ASVS 2020

Virtual Congress

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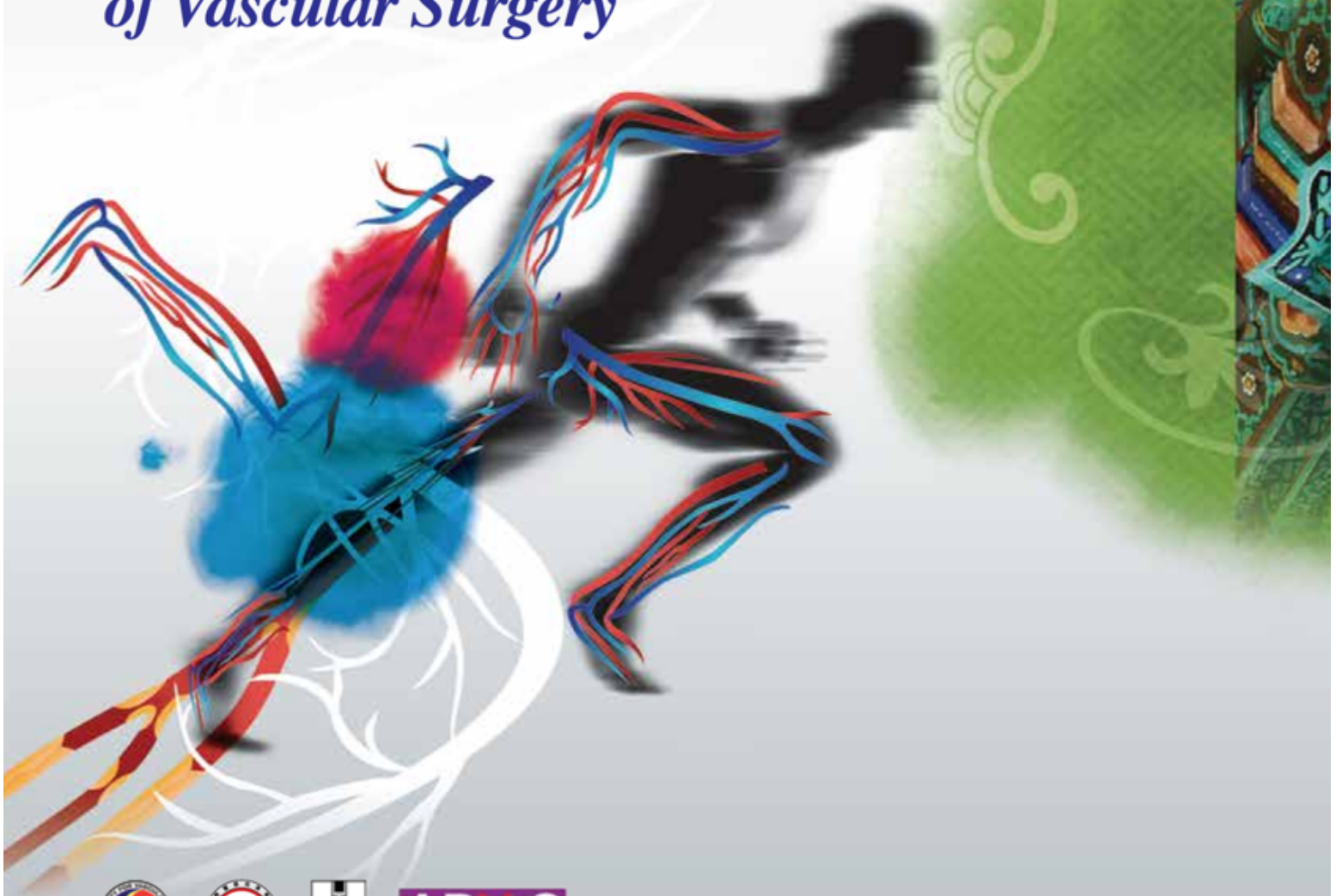
The 21st Congress of the Asian Society for Vascular Surgery

in conjunction with

The 15th AVF & APVAS & KSVS Endo Conference

October 22(Thu)-24(Sat) | Seoul, Korea

Roadmapping the Future of Vascular Surgery



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ABSTRACT BOOK

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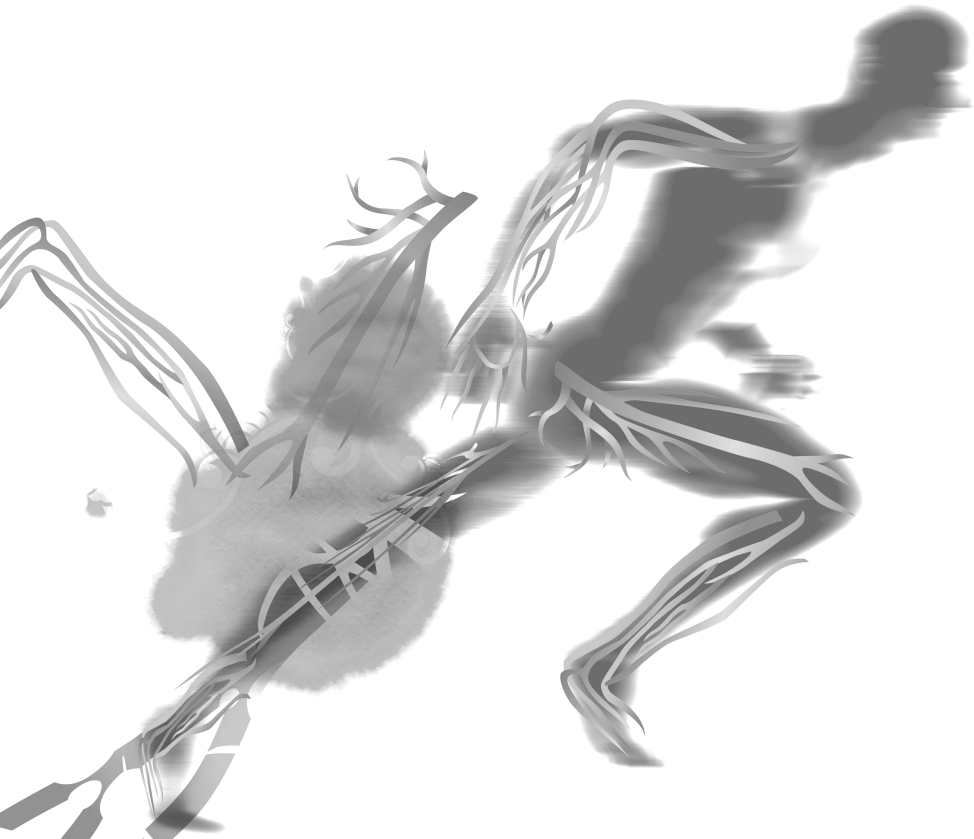
Roadmapping the Future of Vascular Surgery

Oral Presentations



Oral Presentations

OP01-01

09:00-09:10 · Oct. 22 (Thu) · Session B

Ultrasound screening of abdominal aortic aneurysm by junior medical officers in Australian rural hospital setting: A pilot study

Melody Koo[1], George Kiroff[2], Vincent Chow[1], Azim Fadzli[1], Sara Stephensen[1], Justin Shelton[1], Tracey Paterson[1]

[1]Department of Surgery, Whyalla Hospital and Health Services, Australia,
[2]Department of Discipline of Surgery, The University of Adelaide, Australia

Introduction: Cost-effectiveness of Abdominal Aortic Aneurysm (AAA) ultrasound screening in Caucasian male population from 65 years in the metropolitan setting has been demonstrated. Literature suggests that trained novices can reproduce abdominal aorta measurements comparable to sonographers. Utilising ultrasound as a screening test for AAA in the remote Australian communities, however, has not been directly assessed. This study aimed to determine if, after limited Point-of-Care ultrasound (POCUS) training, junior doctors could perform ultrasound AAA screening reliably in a rural Australian hospital setting.

Method: This was a 23-day prospective study carried out at the Whyalla Hospital and Health Services, a regional health provider in rural South Australia located at 400 km from its affiliated vascular surgery centre. Participants aged 50 years or above were recruited from hospital inpatients and community volunteers. Three junior doctors who underwent two-hour practical POCUS training performed scans sequentially on participants. The maximum anteroposterior diameter of infrarenal aorta was measured. Measurement discrepancies between operators were compared against the clinically acceptable difference (CAD) of 5 mm. Scanning efficiency and aneurysm detection were systematically identified.

Result: Overall, amongst 71 participants included in the study, measurements were within CAD in 58 (81.7%) cases between three operators; 16 (72.7%) inpatients and 42 (95.5%) volunteers. Measurement reproducibility substantially improved after standardisation of ultrasound technique on day 1 of the study; subsequently, measurements were within CAD in 55 (88.7%) cases, and all within 10 mm discrepancy between operators. 5 (7.0%) infrarenal aneurysms were identified, with an excellent agreement on aneurysm detection between operators. Improvement in scanning efficiency from inpatients to volunteer groups was statistically significant.

Conclusion: For the purpose of screening, junior doctors were able to reproduce ultrasound infrarenal aortic measurements comparable to sonographers after limited POCUS training. One day of supervised practice is recommended to institute standardised ultrasound technique. Ultrasound AAA screening by junior doctors in rural Australia is feasible, cost-effective and should be advocated.

OP01-02

09:10-09:20 · Oct. 22 (Thu) · Session B

Comparison of cost effectiveness of endovascular versus open surgical repair for abdominal aortic aneurysm in young patients

Eunae Byun, Tae Won Kwon

Department of Surgery, Asan Medical Center, University of Ulsan College of Medicine, Korea

Introduction: The object of this study was to compare cost-effectiveness between young patients who underwent elective endovascular aortic repair (EVAR) and open surgical repair (OSR) in abdominal aortic aneurysms (AAA) (if aortic morphology is suitable to EVAR and OSR).

Method: A retrospective analysis was conducted on a prospectively compiled computerized database of consecutive AAA patients under the age of 70 who underwent elective EVAR or OSR for AAA from January 2012 to October 2016, with follow-up terminating on March 30, 2020. We only selected the patients having aortic morphology feasible for both EVAR and OSR. Patient demographics, mortality, reintervention procedures, medical expenses and health-related quality of life (HRQOL) were collected and compared. The cost effectiveness was analyzed from medical expenses and expected quality adjusted life years (QALYs).

Result: Out of 90 patients selected, 37 patients had undergone an EVAR and 53 had undergone an OSR. There were no significant differences in perioperative (during hospitalization) morbidity and mortality between two groups. However, in long-term result, patients undergoing ORS had significant low complication rate (35.1% v s7.4%, P=0.001) and reintervention rate (21.6%vs5.6%, P=0.021). In our 3-year cost-effective analysis, total sum of cost was significantly cheaper for OSR patients ($P < 0.001$). South Korean population-based preference weights for EQ-5D and QALY were more superior in OSR group (P=0.17, P=0.17). Cost per QALY at 3 years proved to be significantly cheaper in the OSR group than in the EVAR group (EVAR: mean\10,919,761; OSR: mean\4,619,609; $P < 0.001$)

Conclusion: This study suggests that reintervention rate for EVAR group is not only higher, but also more expensive and less cost-effective than OSR. Therefore, given the patient had aortic anatomically feasibility and can operate either EVAR or OSR at a young age, OSR is more beneficial than EVAR in both complication rates and cost effectiveness.

OP01-03

09:20-09:30 · Oct. 22 (Thu) · Session B

Gender and aneurysm size are independently associated with the suitability for EVAR in abdominal aortic aneurysm

Deokbi Hwang, Hyung-Kee Kim, Seung Huh

Department of Surgery, Kyungpook National University Hospital, Korea

Introduction: To evaluate the factors associated with the suitability for endovascular aneurysm repair (EVAR) in patients with abdominal aortic aneurysm (AAA).

Method: We examined computed tomography (CT) scans of 482 patients with an AAAs (≥4.5 cm) obtained between 2009 and 2019. Suitability of aortoiliac anatomy for EVAR was assessed with the neck anatomy (length ≥15 mm, suprarenal angulation (SRA) ≤45°, infrarenal angulation (IRA) ≤60°, and diameter 18–32 mm) and the iliac anatomy (bilateral common iliac artery (CIA) length ≥20 mm, bilateral CIA diameter ≤25 mm, and bilateral iliac diameter ≥6 mm). The overall suitability was determined by satisfying both neck and iliac anatomy.

Result: Neck anatomy was suitable for EVAR in 42.9% and iliac anatomy was suitable in 64.8%. The overall suitability for EVAR was demonstrated in 29.9%. Female sex ($P < 0.001$), older patient age ($P=0.015$), ruptured AAAs ($P=0.009$) and increased aneurysm size ($P < 0.001$) were associated with the violation of overall EVAR suitability. At multivariate analysis using logistic regression model, female sex (15% vs. 33.3% in men; odds ratio, 2.84; 95% confidence interval, 1.49-5.41; $P=0.002$) and increased aneurysm size (odds ratio, 1.08; 95% confidence interval, 1.05-1.11; $P < 0.001$) were independently associated with decreased odds of meeting the overall suitability. When the suitability was checked at 10 mm intervals of aneurysm size, the neck suitability continued to decline depending on the aneurysm size (62.4% in 45-55 mm, 39.6% in 55-65 mm, 31.5% in 65-75 mm, 20.5% in 75-85 mm, 4% in more than 85 mm; $P < 0.001$).

Conclusion: Female sex and large diameter of AAA were adversely associated with the suitability for EVAR. A significant drop in the suitability of neck anatomy was noted between the small AAA and AAA indicated for treatment.

OP01-04 09:30-09:40 · Oct. 22 (Thu) · Session B

Preliminary outcomes of the lifestream balloon-expandable covered stent in zenith iliac branch device to preserve pelvic circulation: A Korean multicenter study

Shin-Seok Yang[1], Sun-Cheol Park[2], Hyungsub Park[3], Taeseung Lee[3], Sang Su Lee[4], Jang Yong Kim[2], Hyung-Kee Kim[5], Yang-Jin Park[1]

[1]Department of Surgery, Samsung Medical Center, Korea,
[2]Department of Surgery, The Catholic University of Korea, Seoul St. Mary's Hospital, Korea,
[3]Department of Surgery, Seoul National University Bundang Hospital, Korea,
[4]Department of Surgery, Pusan National University Yangsan Hospital, Korea,
[5]Department of Surgery, Kyungpook National University Hospital, Korea

Introduction: The aim of this study was to evaluate early outcomes of aortoiliac or isolated iliac artery aneurysms repair using Zenith Iliac Branch Device and Lifestream Balloon-Expandable Covered Stent as a bridging stent graft.

Method: Between August 2018 and February 2020, 38 patients (37 male, mean age 72.7 years) received 46 LifeStream balloon-expandable covered stents in conjunction with 38 Iliac Branch Devices to bridge hypogastric arteries for abdominal aortic aneurysms (n=31, 81.6%) and isolated common iliac aneurysms (n=7, 18.4%) in 6 university hospitals in Korea. We reviewed medical records and pre- and post-procedural computed tomography (CT) scans. The primary outcomes were technical success rate and procedure-related complications. Secondary outcomes included patency of bridging stent grafts, IBD-related endoleak and re-intervention.

Result: All procedures were performed as elective standard EVAR and unilateral IBD simultaneously. Technical success rate was 76.3% (n=29). Causes of failure were 6 type Ic, 1 type IIIc from IBD junction, 1 unintentional IIA coverage and 1 fail to deploy IIA stent graft. Procedure-related complications were occurred in 3 patients: 2 stent graft migration and 1 occlusion. Thirty-day patency rates of LifeStream stent graft and IBD were 93.3% and 100%, respectively. Median follow-up was 7.1 months and patients' overall survival rate was 96.7%.

Conclusion: This multicenter preliminary experiences with the LifeStream balloon-expandable covered stent in IBD demonstrated good patency; however, an unexpectedly high rate of type Ic endoleaks was observed. There was only one type IIIc endoleak in this study, which was concerned during fenestrated and/or branched EVAR. LifeStream Balloon-Expandable Covered Stent in Zenith Iliac Branch Device to preserve pelvic circulation is safe and feasible with good patency and low rate of device-related reintervention.

OP01-10 09:40-09:50 · Oct. 22 (Thu) · Session B

Endovascular treatment versus open surgical repair for isolated iliac artery aneurysms

Eol Choi[1], Tae Won Kwon[1], Yong Pil Cho[1], Gi Young Ko[2], Seon Jeong Jeong[1]

[1]Department of Vascular Surgery, Asan Medical Center, University of Ulsan College of Medicine, Korea,
[2]Department of Radiology, Asan Medical Center, University of Ulsan College of Medicine, Korea

Introduction: Several studies have demonstrated comparable effectiveness and safety of EVT for IIAAs. However, concern about the lack of reflection of improvements in perioperative management and surgical technique or endovascular devices and non-ignorable number of re-interventions has arisen. The aim of this study is to compare the outcome of open surgical repair (OSR) with endovascular treatment (EVT) using a recent database.

Method: From January 2007 to December 2018, patients who underwent OSR or EVT due to degenerative IIAAs were included. Primary outcomes were early and late complications. Secondary outcomes were all-cause and aneurysm-related mortality and re-intervention rate.

Result: Fifty-eight consecutive patients underwent treatment for IIAAs (25 OSR and 33 EVT). Median follow-up was 75 (39–133) months. The baseline characteristics were not different between groups, except the mean age, which was lower in the OSR group than EVT group. Both groups had a mild risk of comorbidity severity score. Occurrence rate of early complications was higher with OSR than with EVT (P=0.07); late complications including sac expansion and thrombotic occlusion occurred more frequently with EVT (P=0.04). Re-intervention rate during follow-up was not statistically significance. Occurrence of MACEs and mortality between groups were not statistically significant, and there was no aneurysm-related death.

Conclusion: In a group of patients with mild risk factors, EVT for IIAAs offers no difference in survival and re-intervention compared with OSR. However, EVT is associated with an increased risk of late complications that could lead to lower performance status or need re-intervention. OSR should be considered as the first line treatment for IIAAs in younger and mild risk patients.

OP01-06

09:50-10:00 · Oct. 22 (Thu) · Session B

Prospective, multicenter study for the rotational atherectomy with anti-restenotic therapy of the infrainguinal arterial disease

Jin Hyun Joh[1], Seung-Jae Byun[2], Hong-Pil Hwang[3], Hyung-Kee Kim[4], Sang Su Lee[5], Keunmyoung Park[6], Ki-Hyuk Park[7], Ui Jun Park[8], Shin-Seok Yang[9], Woo-Sung Yun[10]

[1]Department of Surgery, Kyung Hee University Hospital at Gangdong, Korea,
[2]Department of Surgery, Wonkwang University Hospital, Korea,
[3]Department of Surgery, Jeonbuk National University Hospital, Korea,
[4]Department of Surgery, Kyungpook National University Hospital, Korea,
[5]Department of Surgery, Pusan National University Yangsan Hospital, Korea,
[6]Department of Surgery, Inha University Hospital, Korea,
[7]Department of Surgery, Daegu Catholic University Medical Center, Korea,
[8]Department of Surgery, Keimyung University Dongsan Medical Center, Korea,
[9]Department of Surgery, Samsung Medical Center, Korea,
[10]Department of Surgery, Yeungnam University Medical Center, Korea

Introduction: The presence of thrombus is not uncommon in the steno-occlusive lesion in infrainguinal atherosclerotic disease. In spite of easy passage of the guidewire through this lesion, the conventional ballooning or stenting cannot treat it effectively and may be at risk of distal embolization. The purpose of this study is to investigate the clinical outcomes of a rotational aspiration atherectomy system (Jetstream) for the treatment of infrainguinal thrombotic and sclerotic lesions.

Method: Prospective, multicenter, single arm study was conducted for the treatment of infrainguinal thrombotic and/or sclerotic lesions. A total of 68 patients were enrolled in this study. Primary endpoint was the freedom from clinically driven-target lesion revascularization (CD-TLR) through 6 months after procedure. Patients were stratified by the clinical severity, lesion type, use of drug-coated balloon (DCB), lesion length, lesion characteristics, and lesion site. Survival analysis for TLR over time was plotted. All statistical analyses were conducted with SPSS 22 (IBM, Armonk, NY, USA). $P < 0.05$ was considered statistically significant.

Result: 68 patients (91.2% male, mean age 69.8 years, 66.2% diabetes) with de novo or restenotic infrainguinal lesions were enrolled. Lesion characteristics were following: mean lesion length 17.2 cm, occlusive lesion 75.0%, severe calcification 38.2%, and sclerotic/thrombosclerotic/thrombotic/in-stent occlusion 64.7%/20.6%/8.8%/5.9%, respectively. Adjunctive DCB was used in 59 (86.8%) of patients. The 6 months CD-TLR was similar in group of claudicant vs chronic limb-threatening ischemia (98.1% vs 93.7%, P=0.757). The 12 months CD-TLR was significant better in group of sclerotic/thrombosclerotic than thrombotic (100%, 100% vs 66.7%, P=0.001), femoropopliteal lesion than popliteal or infrapopliteal lesion (100% vs 66.7%, 83.3%, P=0.013). There were no major adverse events including procedure-related death, myocardial infaction and major amputation.

Conclusion: This study results shows safety and effectiveness of Jetstream atherectomy device in a complex, real-world patient population of infrainguinal disease. Optimal lesions to use Jetstream atherectomy system are sclerotic/thrombosclerotic and femoropopliteal lesions.

OP01-07

10:00-10:10 · Oct. 22 (Thu) · Session B

The para or infra malleolar bypass using 2.5 millimeters diameter vein grafts to chronic limb-threatening ischemia patients is acceptable in Japanese population

Taku Kokubo, Keisuke Kamada, Hiroyuki Nagita, Tadahiro Sasajima

Department of Vascular Center Vascular Surgery, Edogawa Hospital, Japan

Introduction: In order to examine whether it is appropriate to use a smaller-diameter autologous vein graft in the case of para or infra malleolar bypass (PIMB), we compared the treatment results of greater saphenous vein (GSV) grafts of 2.5 mm diameter and 2.5 mm diameter or more.

Method: This was single center and retrospective study. Between 2012 and 2019, consecutive PIMB were performed in 279 patients (338 limbs) with critical limb threatening ischemia (CLTI). 265 limbs were PIBM using a single-piece autogenous GSV graft. 44 limbs (17%) were PIMB with 2.5 mm diameter of GSV graft, and were categorized as Graft=2.5 mm group. In addition, 2.5 mm diameter or more of graft were categorized as Graft＞2.5 mm group. Five-year primary and secondary cumulative graft patency, limb salvage (LS), overall survival (OS), and amputation-free survival (AFS) rates compared between the two groups.

Result: The 44 limbs of Graft=2.5 mm group had an average height of 152 cm and a BMI of 22, and these factors were significant lower compared with Graft＞2.5 mm group. The 5-year primary and secondary cumulative graft patency rates were 60% and 86% in Graft=2.5 mm group and 68% and 83% in Graft＞2.5 mm group, there were no significant differences. The LS, OS and AFS rates were 92%, 22% and 24% in Graft=2.5 mm group and 88%, 38% and 32% in Graft＞2.5 mm, respectively. there were no significant differences in two groups. The negative factors associated with primary patency were hyper tension (HR, .24; 95% CI, .23-.76), low graft flow (HR, .97; 95% CI, .94-.99) and poor run off score (HR, 3.2, 95% CI 1.05-9.58).

Conclusion: The use of 2.5 mm diameter grafts was acceptable in the Japanese subject of PIMB, but more international studies are considered necessary when using vein grafts of 3.0 mm or less.

OP01-08 10:10-10:20 · Oct. 22 (Thu) · Session B

Characteristics of femoropopliteal intervention in Korea from a recent randomized controlled trial enrollment data

Hyunmin Ko[1], Seung-Kee Min[1], Yang-Jin Park[2], Taeseung Lee[3], Sang-Su Lee[4], In Mok Jung[5], Jin Mo Kang[6], Jun Gyo Gwon[7], Woo-Sung Yun[8], Yong-Pil Cho[9]

[1]Department of Surgery, Seoul National University College of Medicine, Korea,
[2]Department of Surgery, Samsung Medical Center, Korea,
[3]Department of Surgery, Seoul National University Bundang Hospital, Korea,
[4]Department of Surgery, Pusan National University Yangsan Hospital, Korea,
[5]Department of Surgery, SMG-SNU Boramae Medical Center, Korea,
[6]Department of Surgery, Gachon University Medical Campus (School), Korea,
[7]Department of Surgery, Korea University College of Medicine, Korea,
[8]Department of Surgery, Yeungnam University College of Medicine, Korea,
[9]Department of Surgery, Asan Medical Center, University of Ulsan College of Medicine, Korea

Introduction: Sarpogrelate Anplone in Femoropopliteal artery intervention Efficacy (SAFE) study is a randomized controlled trial comparing the efficacy of antiplatelet drugs after FP interventions (NCT 02959606). The intervention method was selected by the surgeon's preference. The aim of this study was to extrapolate the characteristics of FP interventions currently performed in Korea with the enrollment data from a well-designed nationwide RCT.

Method: The SAFE study enrolled a total of 272 patients between July 2016 and December 2019. This RCT enrollment data was used to analyze the patient demographics and FP intervention characteristics. Also the pattern was compared with other international RCT data.

Result: The mean age was 70.5±8.9 and males were 86.4%. Risk factors included ever-smoker 66.7%, dyslipidemia 30.9%, diabetes 60.3%, coronary artery disease 22.9%, cerebrovascular disease 10.7%, and hemodialysis 9.6%. Comparing with other studies abroad, the rates of hypertension and dyslipidemia were lower, and the rate of diabetes and male ratio were higher. In addition, the use of statin before the procedure was low (40.1%) compared to the ABSOLUTE trial population (91.3%). The types of FP intervention included 12 (4.4%) plain old balloon angioplasty (POBA), 122 (45.0%) drug-coated balloons (DCB), 74 (27.3%) bare-metal stents (BMS), and 63 (23.2%) drug-eluting stents (DES), respectively.

Conclusion: Enrollment data of current FP intervention in Korea showed different characteristics compared to Western trials; higher male ratio, older age and lower BMI, more diabetes, less hypertension and dyslipidemia. In particular, the use of statin in clinical practice for peripheral arterial disease was only 40%, which is contradictory to the current guidelines.

OP01-09

10:20-10:30 · Oct. 22 (Thu) · Session B

Multidisciplinary approach (Holistic Care in Peripheral Arterial; HOPE) for peripheral arterial disease: Analyses of clinical outcome

Jasmine Chang[1], Tjun Yip Tang[2], Shin Chuen Cheng[1], Min Hoe Chew[1], Jia Sheng Tay[1], Edward Choke[1]

[1]Department of Vascular Surgery, Sengkang General Hospital, Singapore,
[2]Department of Vascular Surgery, Singapore General Hospital, Singapore

Introduction: To investigate the effects of a multidisciplinary team approach on the outcomes in patients with peripheral arterial disease (PAD). Our hypothesis is that the Holistic Care in Peripheral Vascular Disease (HOPE) approach that incorporates formal systematic evaluation and management of medical issues can reduce readmission rates due to medical reasons.

Method: Single centre, multi investigator non- randomized retrospective study. Patients admitted into Seng Kang General Hospital (SKH) from October 2018 to February 2020 were analysed. 128 patients underwent HOPE programme, in which they were automatically reviewed by medical specialists on medical ward rounds, in addition to the care received under the admitting vascular surgeon. The primary outcome measured was readmission rates and secondary outcomes measured were 1) all cause mortality, 2) complete wound healing time, 3) length of inpatient stay.

Result: Majority were elderly males (mean age 65.8, 57.8%). During their inpatient stay, 39/128 (30.5%) had their hypertensive medications titrated while 58/128 (45.3%) had their diabetic medications titrated. 16 patients (16/128, 12.5%) were treated for intermittent claudication while the majority with critical limb ischemia (112/128, 87.5%) had limb salvage therapy. Median length of stay was 16.2 days (IQR 6-21 days). 30-day readmission rates were 3/128 (2.3%). These 3 patients were readmitted for cellulitis, worsening infection requiring eventual below knee amputation and exacerbation of bronchiectasis respectively. At 6 months, amputation free survival rate was 82.8% where 5 patients required a major amputation and 17 patients passed away. At 6 months review in clinic, 37/112 (33%) wounds were completely healed, 35/112 (31.3%) was healing and 10/16 (62.5%) patients' claudication had improved.

Conclusion: Under the HOPE programme, the 30-day readmission rates were low. Other secondary outcomes were similar to benchmarks set in centres of excellence in the literature.

OP02-01

09:00-09:10 · Oct. 23 (Fri) · Session B

Different outcomes of balloon-assisted maturation for radial-cephalic and brachial-cephalic arteriovenous fistula for hemodialysis

Hyo Kee Kim, Ahram Han, Chris Tae Young Chung, Hyunmin Ko, Kwang Woo Choi, Sanghyun Ahn, Sangil Min, Seung-Kee Min

Department of Surgery, Seoul National University Hospital, Korea

Introduction: The native arteriovenous fistula is the first choice for hemodialysis access, but the maturation failure rate still remains high. To overcome maturation failures, balloon-assisted maturation (BAM) is increasingly used with controversy due to limited number of evidence-based studies.

Method: Between January 2013 and December 2017, new 1,622 AVFs were created in Seoul National University Hospital. If AVF did not meet the criteria of hemodynamic maturation (5 mm diameter and 500 mL/min flow rate 4~8 weeks after operation), BAM was considered.

Result: Among 1,622 AVFs, BAM was performed in 142 cases (8.75%). There were 92 radial-cephalic (RC) and 50 brachial-cephalic (BC) AVFs. BAM was performed once in 129 (90.8%) patients, twice in 14 (7.7%), and three times in 2 (1.4%). Mean follow-up was 1,147±715.3 days. There were 9 (6.3%) clinical failures after BAM. Functional primary patencies (FPP) at 1 and 3 years were 63.9% and 48.4%, respectively. Functional secondary patencies (FSP) at 1 and 3 years were 90.5% and 85.7%. FPP and FSP in RC AVF was higher than BC AVF, but this difference was not statistically significant (FPP at 1 year , RC vs BC : 70.9% vs 50.9% , P=0.099 ; FSP at 1 year , RC vs BC : 95.5% vs 81.1.%, P=0.146) In multivariate analysis, the independent risk factor for FPP in RC AVF was number of BAM (HR 3.05, 95% CI: 1.11-8.37, P=0.003). However, that in BC groups was age (HR 1.04, 95% CI: 1.00-1.07, P=0.036).

Conclusion: Balloon-assisted maturation is a relatively good salvage method with tolerable patency. However, the risk factors for immaturation and the outcomes of BAM are different between RC and BC AVFs. Further studies are needed to define the mechanism of BAM failure in each AVF.

OP02-02

09:10-09:20 · Oct. 23 (Fri) · Session B

Distal radial artery access for dialysis access endovascular treatment is a safe and feasible technique

Daehwan Kim

Department of Vascular Surgery, Charm Vascular Center, Korea

Introduction: To evaluate safety and feasibility of distal radial artery (DRA) access for dialysis access interventional procedures. And To investigate whether manual compression is safe and efficient for radial access hemostasis.

Method: Dialysis access interventions via DRA puncture from May 2019 to July 2020 were retrospectively reviewed. 278 punctures in 143 patients were included, mostly in male patients (73% vs 27%). Mean age was 61.5 years (range, 20-94 years) Procedural characteristics, technical success, and complication rates were gathered from the medical records and follow-up ultrasound. Prerequisites for DRA access were adequate radioulnar collateral circulation, sufficient radial artery diameter, and informed consent in patients initially intended for conventional transradial access.

Result: Procedures included plain balloon angioplasty (217 cases, 78.0%), transluminal aspiration thrombectomy (56 cases, 20.0%) simple venogram (5 cases, 0.01%). 4Fr (5 ea), 5Fr (7 ea) and 6Fr (266 ea) sheaths were used. 2 cases of radial artery thrombotic occlusion were occurred. 3 cases of neurogenic symptom on wrist and finger were occurred. No other major and minor complications were reported as a result of DRA access.

Conclusion: DRA access is a feasible and safe technique for dialysis access interventional procedures. Radial artery access is an easy to treat dialysis access problems. 2 cases of occluded complication among 278 procedures were occurred. Manual compression is a safe technique for managing the radial access after sheath removal.

OP02-03

09:20-09:30 · Oct. 23 (Fri) · Session B

Optimal position of the catheter according to the venous diameter during cyanoacrylate closure for incompetent saphenous vein

Jin Hyun Joh, Sungsin Cho

Department of Surgery, Kyung Hee University Hospital at Gangdong, Korea

Introduction: Cyanoacrylate closure (CAC) procedure is a safe and effective modality for the treatment of incompetent saphenous vein. The common pattern of recurrence is associated with the reflux from the residual stump. The purpose of this study is to analyze the proper starting point of glue injection from the junction for decreasing the stump length.

Method: A retrospective review was performed from prospectively collected data of CAC patients. Preoperatively, the diameter of the saphenous vein was measured. The CAC procedure was performed with the instruction for use. The postoperative duplex scanning was performed to evaluate the occlusion rate of target vein, stump length, and presence of endovenous glue-induced thrombosis (EGIT). The stump length was analyzed according to the preoperative venous diameter to evaluate the proper injection point of glue for decreasing the stump length.

Result: During the study period, the CAC procedure was performed in 408 patients. The mean age was 56.2±11.5 years with a range of 19 to 84 years. The 279 patients (68.4%) were female. The occlusion rate of the target vein was 91.2% at 12 months. After the procedure, pain, venous clinical severity score, and quality of life score were improved with statistical significance ($P < .001$). EGIT developed in 5.8% of patients. The stump length was increased with 1.53 times of every 1mm increment of preoperative venous diameter. The venous diameter $\geq$ 8 mm is cut-off value for injection of glue from 4 cm distal from the junction to decrease the stump length with safety.

Conclusion: The stump length is increased with 1.53 times of every 1 mm increase of the saphenous vein diameter. If the diameter of the saphenous vein is more than 8 mm, the glue can be injected 4 cm distal from the junction for acceptable stump length and safety as well.

OP02-04

09:30-09:40 · Oct. 23 (Fri) · Session B

Mid-term outcomes of acute iliofemoral venous thrombosis after successful thrombolysis: 2-year follow-up analysis of the PRAIS trial

Chris Tae Young Chung[1], Jin Mo Kang[2], Ki-Hyuk Park[3], Sanghyun Ahn[1], Taeseung Lee[4], In Mok Jung[4], Jang Yong Kim[6], Sangil Min[1], Seung Kee Min[1]

[1]Department of Surgery, Seoul National University College of Medicine, Korea,
[2]Department of Surgery, Gachon University Gil Medical Center, Korea,
[3]Department of Surgery, Daegu Catholic University Medical Center, Korea,
[4]Department of Surgery, Seoul National University Bundang Hospital, Korea,
[5]Department of Surgery, SMG-SNU Boramae Medical Center, Korea,
[6]Department of Surgery, The Catholic University of Korea, Seoul St. Mary's Hospital, Korea

Introduction: The effect of catheter-directed thrombolysis (CDT) in patients with acute iliofemoral deep vein thrombosis (IFDVT) is still controversial compared to treatment of anticoagulation alone. The PRAIS trial was a randomized, open-labeled and multicenter trial where patients with acute IFDVT after undergoing successful CDT were randomly assigned to either rivaroxaban or warfarin for anticoagulation. The 2-year outcomes of this cohort were investigated to define the role of CDT in acute IFDVT.

Method: Within the cohort of 62 patients, the Villalta scores and clinical recurrence of these patients were reviewed at 6 months and 24 months. Comparison of the 2-year follow-up data was performed with other RCTs, including CaVenT and ATTRACT trials.

Result: The percentage of additional procedures performed at the time of thrombolysis such as iliac vein stenting or mechanical thrombectomy were 87.1% and 80.6%. After 6-mo anticoagulation therapy of either warfarin or rivaroxaban, 62.9% of the patients continued treatment with antiplatelets at 24 mo. The mean Villalta scores at 6 and 24 months was 1.83 and 1.33 respectively, which was significantly lower compared to other RCTs. Post-thrombotic syndrome (PTS, Villalta scale$\geq$5 or ulcer) occurred only in 6.90% at 6 mo and 3.45% at 24 mo. Total recurrence of venous thromboembolism, including in-stent thrombosis, at 6 mo and 24 mo was 9.67% and 12.9%. Iliofemoral patency at 6 mo confirmed by CT was 93.5%. Clinical patency at 24 month was 90.3%.

Conclusion: Compared to other RCTs, patients with acute IFDVT who underwent successful CDT had better long term outcomes, significantly lower PTS occurrence and higher iliofemoral patency. These successful mid-term outcomes could possibly be related due to the ethnicity, higher stenting rate and higher mechanical thrombectomy rate.

OP02-05 09:40-09:50 · Oct. 23 (Fri) · Session B

Multimorbidity in patients with chronic venous disease

Viswanath Atreyapurapu, Prem Chand Gupta, Pranav Hinduja, Gnaneswar Atturu

Department of Vascular and Endovascular Surgery, Care hospitals, India

Introduction: Multi-morbidity is a public health challenge. Management of patients with multiple co-morbidities is associated with poorer outcomes, increased health care costs and is challenging in a resource limited environment. The knowledge on comorbidities in patients with chronic venous disease is limited. The aim of this study was to study the prevalence of multimorbidity in Indian patients with chronic venous disease (CVD).

Method: Electronic medical records of patients who were managed in the department of vascular surgery for CVD between January 2015 to July 2019 were reviewed. Data was collected regarding clinical features of CVD and other comorbidities using a structured proforma. Descriptive statistics were used. Data was analysed using Microsoft Excel.

Result: The study included 8018 patients of which 4659 (58.11%) patients were men. The mean age of the study population was 50.61 years (14-94). 5366 (66.92) patients had bilateral CVD. The most common CEAP stage at presentation was C4 (40.38%). 6224 (77.62%) patients had comorbid illness. Obesity was the most prevalent medical condition (3539, 44.13%). Hypertension (2600, 32.43%), Diabetes (1605, 20.02%) and hypothyroidism (1096, 13.67%) were the other common co-morbidities followed by osteoarthritis (4.98%, 399) and Ischemic heart disease (IHD) (4.03%, 323). The prevalence of deep vein thrombosis was 3.64% (292). In patients younger than 40 years, obesity is the most common condition (40.1%) followed by hypothyroidism (8.73%). Cerebral vascular disease (CVD), Chronic kidney disease (CKD), Chronic liver disease and peripheral vascular disease were present in less than 1% of the subjects.

Conclusion: The results of the study show that multimorbidity is highly prevalent (77.62%) in patients suffering from chronic venous disease. Obesity is the most common associated condition followed by hypertension and diabetes. The prevalence of these conditions is higher in patients with CVD than in general population. Knowledge of these comorbidities helps in comprehensive management and proper optimisation of patient before intervention.

OP02-06

09:50-10:00. · Oct. 23 (Fri) · Session B

Laser Assisted Sclerotherapy (LAST) - New method of moca for varicose vein

Yong Beom Bak, Jinwon Jeon, Jilan Jang, Sinho Hong, Daejung Kim, Hyeseon Jeong

Cheongmac Vascular and Endovascular Hospital, Korea

Introduction: Nowadays mechanochemical ablation (MOCA) has become new varicose vein treatment option replacing preexisting treatment methods. It has many advatages (simplicity, low complications, early recovery) but also has disadvatages (stucking to venous intima or valve, limitation of medicine, cost). The purpose of this study is to propose more simple and unlimited MOCA method using newly designed laser catheter providing laser ablation and sclerotherapy simultaneously. We call it Laser Assisted ScleroTherapy (LAST).

Method: A retrospective review was performed from prospectively collected data of patients treated with LAST. Preoperatively, the diameter of the saphenous vein, venous clinical severity score (VCSS) were recorded. Intraoperatively, total amount of laser energy and sclerosant, operation time, total treated length were recorded. Postoperatively, duplex scanning was performed to evaluate the occlusion rate of target vein and VCSS was recorded.

Result: During 5 months LAST procedure was performed in 113 patients. The mean age was 56 years with a range of 18 to 85 years. The 87 patients (77.0%) were female. The occlusion rate of the target vein was 100% at 3 months. After the procedure, pain, VCSS were improved with statistical significance ($P < .001$). Complication rate was very low.

Conclusion: LAST procedure has many advantages compared to preexisting MOCA procedure, ClariVein. These are simplicity, short operation time, low cost, no major complications, no size limitation, less amount of sclerosant, long treatment length, and it can be redone at the same time operation. And also LAST has strong advantage compared to other nonthermal treatment option using cyanoacrylate, VenaSeal. There was no postoperative allergic reaction. Although the number of patients is small and the follow up period is short, through more longer period follow up and more development of this procedure, we carefully hope that this procedure can be used as another good option for MOCA.

OP03-01

10:00-10:10 · Oct. 23 (Fri) · Session B

Predictive factors of delayed wound healing and amputation after successful below-the-knee endovascular intervention in patients with ischemic foot ulcer

Changsik Shin, Taeseung Lee, Hyungsub Park, Kyunglim Koo

Department of Surgery, Seoul National University Bundang Hospital, Korea

Introduction: The purpose of this study was to clarify risk factors associated with the delayed wound healing rate and amputation after successful below-the-knee endovascular intervention in patients with ischemic foot ulcer

Method: Wound healing rates and limb salvage rates were analyzed retrospectively in patients who underwent successful below-the-knee percutaneous transluminal balloon angioplasty for patients with DFU between January 2014 and January 2019, 89 limbs and 85 patients. We also analyzed the independent predictors of delayed wound healing and lower extremity amputation and compare sensitivity, specificity, classification accuracy, positive predictive, negative predictive and area under the curve (AUC) values of three Diabetic foot ulcer classification systems.

Result: The cumulative wound healing rates were 16.7, 35.6, 46.9%, and 67.5% at 3, 6, 9, and 12 months, respectively. At 6 months and 1, 2, and 5 years, the repeat intervention-free rates were 89.5, 77.8, 75.6% and 69.3%, respectively; the amputation-free survival rates were 68.3, 61.9, 56%, and 48.1% respectively and limb salvage rates were 75.4, 73.3, 68.8% and 63.1%. In a univariable cox proportional hazards analysis, neuropathy, ambulation, ESRD on dialysis and University of Texas classification, albumin level, WIFI amputation risk, showed a statistically significant difference between the healed group and non-healed group. And also WIFI classification showed more sensitivity, specificity and accuracy, PPV and NPV and area under the curve (AUC) values than those of UT or Wagner classification.

Conclusion: The clinical status of the patient and the target limb's condition and DFU classifications are can be predictors of adverse clinical outcomes in patients with diabetic foot ulcer after successful infrapopliteal intervention. And WIFI classification, as object Information on wound ischemic state addition to wound extent and infection would further enable the selection of suitable patients with ischemic foot ulcer for endovascular treatment.

OP03-02

10:10-10:20 · Oct. 23 (Fri) · Session B

Distal Splenorenal Shunt (DSRS) in children with extrahepatic portal hypertension

Zia Rehman, Zafar Nazir

Department of Surgery, Aga Khan University Hospital, Pakistan

Introduction: Portal hypertension (PH) is infrequent in children as compared to adults. Currently, repetitive endoscopic ablation of varices is the standard treatment. However, endoscopic facilities are not readily available in resource-limited settings.

Method: After ERC (ethical review committee) approval (2019- 0749-2321), medical records of pediatric patients (＜18 years) who had DSRS from January 1995 to December 2018 at The Aga Khan University Hospital, Karachi (Pakistan) were reviewed for patient demographics, the indication of the procedure, imaging, laboratory investigations, operative time, morbidity, hospital stay, shunt patency and episodes of recurrent bleeding. Outcomes measures were prevention from repeat bleeding episodes and improvement in platelet counts.

Result: The median age of nine patients was 11 (6-16) years. Most were males (6:3). All patients had a history of upper gastrointestinal bleeding including 4 (44.4%) patients having multiple episodes. Median sclerotherapy sessions before shunt procedures were 2 (0-4). All patients had normal liver function tests. The mean operative time was 263 ±22.2 minutes. There were no operative complications including bleeding, injury to the surrounding structures, wound infection, or encephalopathy. The mean hospital stay was 8.8±1.26 days. Median follow-up was 3 (1-10) years. Mean preoperative platelets improved from 57.3±22.2 to 94.3± 34.4×109/l (P=0.005) and splenic size decreased from 15.6±2.39 to 15.03±2.46 cm (P=0.692, Table I). Most patients (88.8%) had no GI bleeding episode. Shunts were patent on the last follow-up except in one.

Conclusion: DSRS is a safe and effective treatment alternative in resource limiting setting for preventing bleeding and improving hypersplenism in children with extrahepatic portal hypertension.

OP03-03

10:20-10:30 · Oct. 23 (Fri) · Session B

Does taking oral anticoagulants result in worsening outcome in non-traumatic intracranial haemorrhage in Asians?

Yee Han Shum, Yiu Che Chan, Grace C Cheung, Stephen W Cheng

Department of Surgery, Queen Mary Hospital The University of Hong Kong, Hong Kong

Introduction: Increasing number of patients are taking oral anticoagulants. The aim of this study was to evaluate the incidence and outcome of patients who suffered from non-traumatic intracranial haemorrhage (ICH) in relations to use of oral anticoagulants.

Method: All adult patients suffering from non-traumatic ICH from January 1st, 2015 to December 31st, 2019 admitted to our institution were identified using Clinical Data Analysis and Reporting System. Data collected included patients' background demographics, anticoagulation status (warfarin, non-vitamin K antagonist oral anticoagulant (NOAC), or neither), the average length of hospital stay, blood product requirement, need for emergency surgery, and same episode mortality. Statistical analysis was performed using SPSS version 26.

Result: A total of 1,453 episodes of adult non-traumatic ICH were analysed. 39 (2.7%) were on warfarin (mean age 70.5 +/- 13.8 years), 15 (1.0%) were taking NOAC (78.9 +/- 7.4 years), and 1,399 (96.3%) were not taking oral anticoagulants (70.1 +/- 16.4 years). There was no statistical difference in age. The average length-of-stay were 15.3 +/- 11.1 days, 14.9 +/- 12.7 days and 10.0 +/- 15.1 days, which was statistically significant (P=0.049). There was no significant difference in the percentage of patients undergoing emergency operation, 43.6%, 40.0% and 31.4% respectively. The incidence of blood transfusion for warfarin group was 66.7%, NOAC group was 26.7% and neither group was 18.2% ($P < 0.0001$). Three of 39 (7.7%) patients on warfarin died in same episode, none died in the NOAC group, and 267/1399 (19.1%) died in the neither group (P=0.030).

Conclusion: From our Asian cohort study with non-traumatic ICH, the use of oral anticoagulants was not associated with more emergency surgery or mortality. Nonetheless, patients on oral anticoagulant had statistically significant longer length-of-stay, and patients on warfarin required more blood product transfusions.

OP03-04

10:30-10:40 · Oct. 23 (Fri) · Session B

Automated histological segmentation on micro-computed tomography images of atherosclerotic arteries

Salome Kuntz[1], Hugo Gangloff[2], Hanane Naamoune[2], Emmanuel Monfrini[3], Christophe Collet[4], Anne Lejay[1], Matthew Kutyna[5], Renu Virmani[5], Nabil Chakfé[1]

[1]Department of Vascular Surgery and Kidney Transplantation, University Hospital of Strasbourg, France,
[2]Department of GEPROVAS, University Hospital of Strasbourg, France,
[3]Department of SAMOVAR, TelecomSud Paris, France,
[4]Department of ICube, University Hospital of Strasbourg, France,
[5]Department of Histopathology, CVPath Inc, United States

Introduction: No automated system for histological plaque component recognition in atherosclerotic arteries is available for micro-CT. The objective was to create an algorithm, based on artificial intelligence and deep learning to automatically detect the histological composition of atherosclerotic popliteal arteries using micro-CT.

Method: Six popliteal arteries were obtained from 6 patients who had undergone above-the-knee amputation. Arteries were analyzed ex vivo by micro-CT. Imaged popliteal arteries were sectioned and a total of 91 histologic cross-sections were co-registered to micro-CT images. Six histological classes were chosen for a first meaningful histological segmentation (soft tissue, fatty tissue, sheet and nodular calcification, specimen holder and background). Deep learning through U-net architecture was used, 3D automated histological reconstructions were rendered.

Result: Results are given on a test set, held apart during training process. The DICE scores (measurement of the similarity between the actual segmentation of micro-CT images and the predicted segmentation of micro-CT images) were 0.99 for the background, 0.94 for soft tissues, 0.86 for the specimen holder, 0.85 for sheet calcifications, 0.64 for nodular calcifications and 0.41 for fatty tissue. The area under the curve (AUC) corresponding to the precision recall curves for the background was the highest being 1.00. The AUC for soft tissue was high (0.96). Calcifications were also accurately detected, although sheet calcifications were easier to detect (AUC=0.90) than nodular calcification (AUC=0.61). The specimen holder detection was also fairly accurate (AUC=0.86). The harder class to detect was fatty tissue, with an AUC of 0.23.

Conclusion: Our algorithm for automatic histologic segmentation is a rapid way to recognize histological components especially soft tissue and calcifications (differences between sheet and nodular calcification), and to render 3D histological segmentation of popliteal atherosclerotic arteries, therefore allowing a quick accurate histological processing of popliteal artery without destroying the specimen and saving hours of workload.

OP03-05

10:40-10:50 · Oct. 23 (Fri) · Session B

High limb salvage rate in popliteal artery injury with prolonged ischemic time

Kolanya Tangwiwat, Kritiya Kritiyakirana

Department of General Surgery King Chulalongkorn Memorial Hospital, Thailand

Introduction: Amputation rate for popliteal artery injury (PAI) is high, revascularization in a timely fashion may help decrease amputation rate. Therefore, the purpose of this study is to report the factors associated with amputation and outcome in terms of limb salvage for a referral level one trauma center where most of the patients had prolonged ischemic time.

Method: Data was collected retrospectively from 2008-2018 consisting of seventy-nine PAI. The average age was 32.6 years, 71 (90%) patients were male, and the mechanism of injury mostly was blunt 68 (86%) patients. The ischemic time were divided in to three cohorts, early group less than 6 hours, intermediate group 6-24 hours, and delayed group more than 24 hours. Gustilo scale, mangled extremity severity score (MESS), injury severity score, compartment syndrome data was collected and analyzed. Type of injury, associated injuries, conduit used, and complications were also analyzed to determine associated factor for amputations.

Result: Fourteen (18%) patients were revascularized in early group, fifty-three (67%) in intermediate group, and twelve (15%) in delayed group. Over all secondary amputation rate was 19%. No death was observed . Average MESS score was 6.8. There were 67 (85%) vascular repair using reverse saphenous vein graft. Surgical site infection occurred in 19 (24%) patients, reperfusion injury in 11 (14%) patients and compartment syndrome in 62 (78%) patients. Factors associated with secondary amputation were contusion, transection injury, MESS score more than 7, Surgical site infection and reperfusion injury.

Conclusion: In our cohort ischemic time is not a significant factor for secondary amputation. Early referral to a facility willing to treat popliteal artery injury is still preferable. Even in prolonged ischemic time revascularization should be attempted.

OP03-06

10:50-11:00 · Oct. 23 (Fri) · Session B

Renal artery aneurysms have a benign natural history and this results would support the revised recommendation of asymptomatic renal artery aneurysm

Seon-Hee Heo[1], Yang-Jin Park[1], Sung-Hea Park[1], Dong-Ik Kim[1], Shin-Suk Yang[1], Shin-Young Woo[1], Young-Wook Kim[2]

[1]Department of Vascular Surgery, Samsung Medical Center, Korea,
[2]Department of Vascular Surgery, Kangbuk Samsung Hospital, Korea

Introduction: Because of the rarity of RAA rupture and not well defined natural history of RAA, there remains significant controversy about asymptomatic RAA. Recent revised recommendation have changed diameter ＞3 cm as threshold for treatment based on limited literature and required more evidence supporting these recommendation. The objectives of our study were to review the natural history of RAA with conservative management and outcomes of treated RAAs.

Method: A retrospective review of all RAAs at single institution from 1999 to 2019 was performed. Demographics of the patients, aneurysm characteristics, management, and follow-up data were collected.

Result: There were 183 patients (mean age 59±12 years, range 18-89 years, female 56.3%) with 220 RAAs identified. Most RAA was located renal artery bifurcation (n=115, 52.3%) and branched renal artery (n=73, 33.2%). Among 183patients, no one was found to have a RAA rupture at initial CT except one patients who had previous history of renal aneurysm rupture and embolization at other hospital. Total 40 patients with 45RAAs underwent treatment (open repair 72.5%, endovascular treatment 27.5%) and there were 6 (15%) patients who developed renal infarction. Among 143 patients with conservative management, 120 patients with 147 RAAs (including 21 RAA which had initial size of RAA≥2 cm) were available follow up with CT scan. Most RAA (n=139, 94.6%) had growth rate less than 1mm/yr and there was no aneurysm rupture or aneurysm related death during follow up period. Mean growth rate was 0.28±0.60 mm/yr (range 0-5 mm). On regression analysis analyzing the impact of comorbidities and aneurysm characteristics on growth rate with conservative management, calcification was only negative predictor of growth rate (calcified vs non-calcified; 0.02 mm/yr vs. 0.1 mm/yr; P=0.013)

Conclusion: RAA growth rate and rupture risk was very low even at large initial aneurysm diameter. This finding suggest that annual (or less frequent) imaging surveillance is safe in majority of patients and do not necessary repair of asymptomatic small RAAs.

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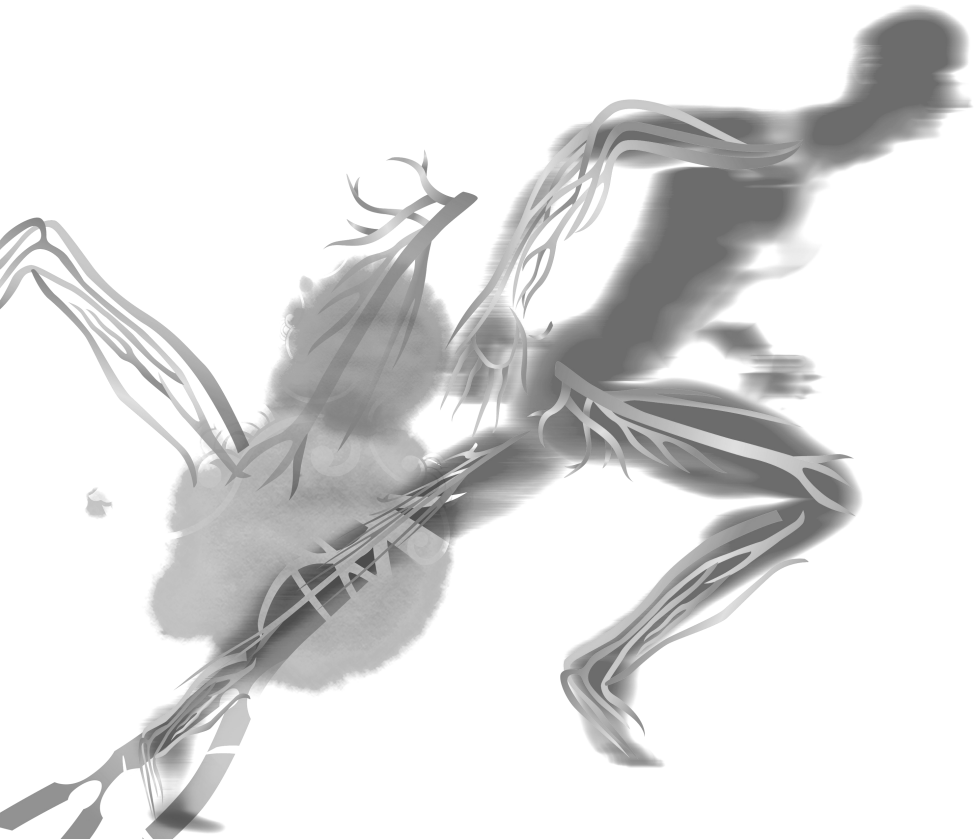
Poster Presentations



[Poster Presentations]

Poster Presentations

Aorta PP-1001 PP-1001 ~ PP-1008

Real-time evaluation of blood flow patterns using AneurysmFlow for AAA rupture risk evaluation

Youngjun Park, Sangkyun Mok, Suncheol Park, Sangseob Yun, Jangyong Kim

Department of Vascular and Transplant Surgery, The Catholic University of Korea, Seoul St. Mary's Hospital, Korea

Introduction: Since only 25% of AAAs are known to rupture in a patient's lifetime, accurate evaluation of AAA rupture risk is necessary to perform treatments on appropriate patients. New tools for AAA rupture risk evaluation such as finite element analysis need detailed hemodynamic information in AAA, but there is lack of hemodynamic data obtained from in vivo research. We performed analysis of blood flow patterns in in vivo models to acquire real-time hemodynamic information.

Method: This is retrospective study of patients who underwent AneurysmFlow to analyze blood flow pattern to evaluate blood flow pattern in AAA. AneurysmFlow was designed to evaluate hemodynamics of cerebral aneurysm during flow diverter treatment in vivo, which can show patterns of blood flow or contrast transit in aneurysm.

Result: Blood flow patterns in six AAA patients (four with intramural thrombus and two without intramural thrombus) were analyzed. When there was intramural thrombus, average flow pattern was relatively laminated with localized flow impingement, whereas when there was no intramural thrombus relatively vortex average flow pattern with diffuse flow impingement was found. And contrast transit time in aneurysmal sac were shorter in AAA patients with intramural thrombus compared to AAA patients without intramural thrombus.

Conclusion: Hemodynamic analysis of AAA by using real-time individual models has shown that different flow patterns are found depending on intramural thrombosis. This analysis highlights potential of AneurysmFlow to play an important role in assessing AAA rupture risk and provides a starting point for more sophisticated quantitative analysis.

Aorta PP-1002 PP-1001 ~ PP-1008

Outcomes after open abdominal aortic aneurysm repair in octogenarians and predictors associated with mortality and morbidity

Joon-Kee Park[1], Ji-Hee Kang[2], Young-Wook Kim[3], Dong-Ik Kim[1], Seon-Hee Heo[1], Eun-Mi Gil[4], Shin-Young Woo[1], Yang-Jin Park[1]

[1]Department of Surgery, Samsung Medical Center, Korea,
[2]Department of Transplantation and Vascular Surgery, Inha University Hospital, Korea,
[3]Department of Surgery, Kangbuk Samsung Hospital, Korea,
[4]Department of Critical Care medicine, Samsung Medical Center, Korea

Introduction: It is generally known that open abdominal aortic aneurysm (AAA) repair in old age has higher mortality and morbidity than younger patients. However, even at an old age, AAA repair has been successfully performed through appropriate patient selection, surgical techniques and postoperative management. This report aims to investigate the outcomes after AAA repair in octogenarians and to find the risk factors associated with mortality and morbidity.

Method: The elective AAA repair data recorded in the Vascular surgery database of Samsung Medical Center (1996-2020) was analyzed through a retrospective study. Patients were divided into over 80 and under, and outcomes were analyzed as 30-day, 1-year, 3-year, and 5-year mortality through univariate analysis. In addition, predictors of mortality outcomes and postoperative complications were analyzed through multivariate analysis.

Result: A total of 650 patients underwent AAA repair, and non-octogenarians and octogenarians were 592 (91.1%) and 58 (8.9%), respectively. The 30-Days mortality was 1.7% for octogenarians and 0.5% for non-octogenarians (P=0.313). 1-year mortality was 4% and 1.3 (P=0.342), and there was no statistically significant difference between two groups. In multivariate analysis, low BMI increased the risk of 30-day and 1-year mortality by 202% and 133%, respectively (P=0.07 and 0.024), but age≥80 did not affect outcomes. In addition, low preoperative serum albumin levels increased the incidence of postoperative pneumonia by 357% (P=0.009), and age≥80 increased the incidence of postoperative delirium by 297%.

Conclusion: Since the mortality outcomes of octogenarians after AAA repair do not differ from that of younger patients, the elderly are not a contraindication of AAA repair. However, it should be considered that a low BMI may increase the mortality outcome of AAA repair. In addition, low serum albumin levels may increase the incidence of postoperative pneumonia, and age ≥80 may increase the incidence of postoperative delirium.

Aorta PP-1003 PP-1001 ~ PP-1008

PETTICOAT-Kanjiki method for type-B aortic dissection

Hiroyuki Ishibashi[1], Yuki Orimoto[1], Yuki Maruyama[1], Yusuke Imaeda[1], Hiroki Mitsuoka[1], Takahiro Arima[1], Kojiro Suzuki[2]

[1]Department of Vascular Surgery, Aichi Medical Univerisity, Japan,
[2]Department of Radiology, Aichi Medical University, Japan

Introduction: Distal stent graft-induced new entry (d-SINE) would occur during thoracic endovascular aortic repair (TEVAR) for type B aortic dissection (TBAD), especially in a double-barrel type. Simple placement of bare stent (Zenith Dissection Endovascular Stent, PETTICOAT-method) is not completely effective for prevention of d-SINE.

Method: We developed a new method of deploying a second stent-graft within a pre-deployed bare stent. Bare stent acts as kanjiki (Japanese snowshoe) to prevent d-SINE (PETTICOAT-kanjiki method).

Result: So far, we applied this method in 18 double-barrel type TBADs. Five were acute, five sub-acute and eight chronic dissection. Applied devices were 6 CTAGs and 12 TXDs. Proximal landing zone was zone-1 in one, zone-2 in 10, zone-3 in three, and zone-4 in four. As principal, bare stent was deployed within the thoracic aorta and 2nd stent-graft was deployed at a half stent proximal to a distal edge of the bare stent, but in two patients, bare stent was extended down to the abdominal aorta. Length of the stent-stent was 165-297 mm (med. 231 mm), that of bare stent was 8-138 mm (med. 24 mm). Diameter difference of a distal stent-graft to a proximal stent-graft was +3 mm in one, 0 mm in six, -4 mm in seven, -10 mm in four. There were no operative death, d-SINE, nor paraplegia, but cerebral infarction in one. Remodeling rate at 1-month was 64+/-26% at proximal descending aorta, 62+/-27% at aortic valve, and 51±23% at diaphragm, and 87±22%、83±22%、61±31% respectively at 6-month.

Conclusion: PETTICOAT-kanjiki method was useful for prevention of d-SINE in TEVAR for TBAD keeping a larger distal diameter.

Aorta PP-1004 PP-1001 ~ PP-1008

Iliac anatomical suitability for EVAR is associated with in-hospital mortality after open repair for ruptured AAA

Deokbi Hwang, Hyung-Kee Kim, Seung Huh

Department of Surgery, Kyungpook National University Hospital, Korea

Introduction: Whether or not the anatomical suitability for EVAR affects the outcome after open repair in ruptured abdominal aortic aneurysm (rAAA) patients is a controversial issue and has not been sufficiently studied. Herein, we tried to identify the predictors of poor postoperative prognosis, including EVAR eligibility based on our 10 year experience.

Method: Retrospective review was conducted of all patients with rAAA who had open repairs. To confirm the neck and iliac suitability for EVAR, preoperative CT images were reviewed. Patient characteristics, initial vital signs and operation-related factors including time and transfused RBC amounts were also checked. Chi-square and Logistic regression analysis were used to explore the linkage between the suspected factors and in-hospital mortality.

Result: A total of 43 patients with immediate rAAA underwent open repair between January 2011 and June 2020. In-hospital mortality was 23.2% (10 deaths). Among the patients, respective 16.3%, 55.8%, and 9.3% showed the suitability of neck, iliac, and overall anatomy for EVAR. According to univariable analysis, massive RBC transfusion (P=0.032, OR=1.196) and combined common iliac artery aneurysm (P=0.017, OR 10.333) were significantly associated with the in-hospital death rates after open repair in rAAA. Operation time and vital signs such as blood pressure, pulse pressure, heart rate were not associated with early mortality. Contrary to the neck suitability (P=0.548), strong connection between iliac suitability and in-hospital mortality was indicated (P=0.058). Multivariable analysis revealed that the lower in-hospital mortality (P=0.026, OR=0.037 for iliac suitability; P=0.030, OR=0.837 for age) was shown in rAAA patients with eligible iliac anatomy for EVAR and in older patients. It appeared that the amount of transfused RBC (P=0.035, OR=1.353) also has an influence on the in-hospital death rate.

Conclusion: Iliac suitability for EVAR and the intraoperative transfusion volume of RBC affected the in-hospital mortality after open repair in rAAA patients.

Aorta PP-1005 PP-1001 ~ PP-1008

Early experience of Heli-FX EndoAnchor system (EndoAnchor) for durability after EVAR in single institution

Youngjun Park, Sangkyun Mok, Suncheol Park, Sangseob Yun, Jangyong Kim

Department of Vascular and Transplant Surgery, The Catholic University of Korea, Seoul St. Mary's Hospital, Korea

Introduction: EndoAnchors is endovascular fixation and sealing between endovascular aortic grafts and the native artery and can be used as an adjunct to endovascular abdominal aortic aneurysm repair for prevention of proximal neck complications in patients with challenging neck anatomy.

Method: This is a retrospective study from a prospectively registered database of patients who underwent adjunctive procedures with EndoAnchor. The indications of EndoAnchor are to treat or prevent type Ia endoleak or stent-graft migration for complex aortic neck. Procedural success was defined as the absence of a type Ia endoleak on the first CT scan after the EndoAnchor. Preprocedural and periprocedural data were prospectively gathered and retrospectively analyzed. Follow-up after end anchor placement consisted of regular hospital visits, with computed tomography or duplex scanning.

Result: Nine cases were enrolled (5 men, 78 years old). The indication for EndoAnchors is short aortic neck with type Ia endoleak in 4 cases, short aortic neck to prevent type Ia endoleak for ruptured EVAR in 2 cases and type Ia endoleak in 3 cases. Implantation of EndoAnchors was technically successful in 9/9. There was no procedure-related death. There were no ruptures, migrations, or open surgical conversions. There were 7 Endurance, 1 Excluder, and 1 In craft. Six cases were done during initial EVAR and 3 during follow up for persistent type Ia endoleak. There were 2 ruptured cases. There were 2 EndoAnchors after persistent Type Ia endoleak after aortic cuff. There were 4 screws in 1 case, 5 in 1, 6 in 2, 7 in 2, 8 in 1, and 10 in 1. The procedural success rate was 88% (8/9).

Conclusion: EndoAnchor use for challenging aortic neck anatomy was associated with satisfactory early results. These results need to be evaluated with long term follow up.

Aorta PP-1006 PP-1001 ~ PP-1008

Outcomes of prophylactic endoanchor in aortic aneurysm with hostile landing zone

Ha Lee[1], Myeongsu Kim[1], Wan Kee Kim[2], Seungjun Song[2], Tae-Hoon Kim[1], Kwang-Hun Lee[3], Suk-Won Song[1], Kyung-Jong Yoo[4]

[1]*Department of Cardiovascular surgery, Gangnam Severance Hospital, Korea,*
[2]*Department of Cardiovascular surgery, Yongin Severance Hospital, Korea,*
[3]*Department of Radiology, Gangnam Severance Hospital, Korea,*
[4]*Department of Cardiovascular surgery, Severance Hospital, Korea*

Introduction: To review clinical outcomes of prophylactic Endosuture Aneurysm Repair (ESAR, EndoAnchor®) during Endovascular Aortic Repair (EVAR) and Thoracic Endovascular Aortic Repair (TEVAR).

Method: Retrospectively 22 patients who underwent EVAR/TEVAR with prophylactic ESAR (February, 2018 to August, 2020) were analyzed. 20 (90.9%) patients had severe comorbidities (ASA score≥3). In EVAR with ESAR (n=14), 12 (85.7%) patients had conical neck, 11 (78.6%) patients had short neck, 6 (42.9%) patients had angulated neck, 10 (71.4%) had mural thrombosed neck. In TEVAR with ESAR (n=8), all of them had short landing zone and mural thrombosis. Endoleak was assessed by final angiography after endovascular treatment and by follow-up computed tomography (CT)s.

Result: Total procedure time was mean 114.59 min. There was no mortality after endovascular treatment and 21 (95.5%) patients are visiting outpatient departments. Total 16 (72.7%) patients had follow-up CTs. No stent migration was found. Mean 7.7 EndoAnchor®s were implanted. In EVAR with ESAR, 11 (78.6) patients had no endoleak after immediately after endovascular treatment. 2 of 3 patients who had endoleaks resolved at follow-up CTs. 2 of 11 patients who had no endoleaks found newly developed endoleaks at follow-up CTs and 1 patient had reintervention due to endoleak. In TEVAR with ESAR, 7 (87.5%) patients had no endoleak after endovascular treatment. 1 patient who had type Ib endoleak resolved at follow-up CT and 1 patient had newly developed endoleak.

Conclusion: Prophylactic ESAR is helpful in endovascular treatment of Aortic aneurysm with hostile landing zone. ESAR can prevent stent migration and endoleaks.

Aorta PP-1007

PP-1001 ~ PP-1008

Vascular closure device failure and complication during EVAR or TEVAR: Frequency and risk factors

Keunmyoung Park[1], Jihee Kang[1], Sungoo Cho[2], Jungmin Lee[2]

[1]Department of Surgery, Inha University Hospital, Korea,
[2]Department of Radiology, Inha University Hospital, Korea

Introduction: Vascular closure devices (VCDs) are effective in reducing the time to ambulation for patients undergoing endovascular treatment in reducing the risk of vascular complications in selected patient cohorts. However, the frequency and consequence of failure of VCDs is not well defined. So that we evaluated complications and identification of potential risk factors that could predict major or minor complications using VCDs during EVAR or TEVAR.

Method: Respectively, we reviewed 192 access sites of 111 patients that used with VCDs during EVAR or TEVAR form January 2013 to December 2019. VCD failure was defined as unsuccessful deployment or failure to achieve hemostasis. Major vascular complication was defined as any retroperitoneal hemorrhage, limb ischemia, or any surgical repair. Minor vascular complication was defined as any groin bleeding, hematoma (≥5 cm) or pseudoaneurysm without major complication.

Result: Among the 192 VCDs used in the study, VCD failed in 42 limbs (21.8%). There were 11 (7.8%) major complications (2 retroperitoneal hematomas, 9 limbs occlusions or 3 open conversions due to active bleeding) and 20 (10.4%) minor complications (4 groin bleedings, 14 hematomas or 2 pseudoaneurysms). The common femoral artery (CFA) calcification over 50% (P＜0.001), subcutaneous tissue within 1 cm (P=0.002), iliac tortuosity (3 iliac artery at the axial CT image) (P=0.003 and VCDs failure (P＜0.001), were significantly increased in complication groups.

Conclusion: In contemporary practice, VCD failure isn't rare, but when it does fail or there are severe calcification CFA with thin soft tissue or tortuos iliac artery, it is associated with a significant increase in the risk of vascular complications. Patients with VCD failure should be closely monitored.

Influence of preoperative sarcopenia and nutritional status on mid-term and long-term mortality of AAA after endovascular aneurysm repair

Shuta Ikeda, Youhei Kawai, Takuya Tsuruoka, Kiyoaki Niimi, Masayuki Sugimoto, Akio Kodama, Hiroshi Banno, Kimihiro Komori

Department of Vascular Surgery, Nagoya University Graduate School of Medicine, Japan

Introduction: Sarcopenia is known as one of the poor prognostic factors after surgery. There are some papers about the relationship between survival after endovascular aneurysm repair and preoperative sarcopenia. On the other hand, there are few reports about the relationship between nutritional status and the prognosis of surgery. Therefore we investigated the effects of sarcopenia and nutritional status after endovascular aneurysm repair.

Method: Between June 2007 and December 2013, 407 patients were performed EVAR in our hospital. Of these, patients who underwent retreatment during follow-up were excluded, and 324 patients were examined. We examined the relationship between comorbidities, sarcopenia, malnutrition and long-term prognosis. Psoas muscle area at L4 level was used as an indicator of sarcopenia. Geriatric Nutritional Risk Index (GNRI) was used as an indicator of malnutrition.

Result: There were 274 (85%) men in the study. Mean age was 78.1 years. 166 (51.2%) was defined sarcopenia and 145 (44.8%) was defined malnutrition. The median follow-up period was 56.7 months. 58 (18%) died during follow-up, and 2 (0.6%) died within 30 days after surgery. Five-year survival rate after surgery was 83%. Examining the factors involved in survival, significant difference were shown in sarcopenia (HR, 2.03; P=.009), malnutrition (HR, 2.28; P=.002) and the history of malignant tumors (HR, 1.76; P=.04). Multivariate analysis of these factors indicates that sarcopenia (HR, 1.79; P=.042) and malnutrition (HR, 1.78; P=.043) were independent prognostic factors. Patients were divided into three groups based on the number of these two risk factors (0, 1 and 2) and the survival rates were compared. Five-year survival rates were 90%, 84%, and 67%, respectively ($P < 0.001$, 0vs2; P=.007, 1 vs 2).

Conclusion: Sarcopenia and malnutrition were associated with mid- to long-term mortality after EVAR. Particularly patients with both indicators had poor prognosis.

Aortoiliac PP-1009

PP-1009, PP-1011, PP-1052

Efficacy and safety of brachial artery open access for iliac endovascular interventions

Seungjae Byun

Department of Surgery, Wonkwang University Hospital, Korea

Introduction: To evaluate the use of a brachial artery open access for endovascular treatment of iliac artery disease.

Method: A retrospective review was conducted of 45 patients (mean age 73 years; 41 men) treated via a brachial artery open access for iliac artery steno-occlusive lesion (TransAtlantic Inter-Society Consensus II (TASC) C/D lesion). The primary outcome was technical success achieved exclusively with a brachial artery access. Secondary outcomes were secondary technical success (adjunctive transfemoral access), access site complications, and stroke/transient ischemic attack (TIA).

Result: In 2 (4.4%) patients, lesion crossing through brachial access was unsuccessful, while an adjunctive transfemoral approach was necessary to restore iliac vessel patency in 2 (4.4%) cases. Thus, the primary and secondary technical success rates were 95.6% and 100%, respectively. Brachial artery local hematomas (2.4%) dominated the access site complications. No late brachial artery bleeding, brachial artery occlusion and puncture site infection. No transient or permanent median nerve dysfunction was observed. The stroke/TIA rate was 0%.

Conclusion: Brachial artery open access enables endovascular treatment of iliac artery TASC C,D lesions, although an adjunctive transfemoral access may be required. And, it is an efficacy and safety with low incidences of open access site complications and no cerebral events.

EVAR with double iliac side branch device to preserve hypogastric artery and ectopic renal artery in aorto-iliac aneurysm - A case report

Rolf Dammrau

Department of Vascular and Endovascular Surgery, Helios University Hospital Wuppertal, Germany

EVAR is established treatment for AAA. When iliacs are involved the preservation of hypogastric arteries shows high technical success with low morbidity. This became the preferred treatment when the illiac artery is aneurysmatic. Ectopic kidney is a birth defect, if the kidney stays in the pelvis it is called a pelvic kidney. The renal artery comes from the common iliac. If the iliac is involved in the aneurysm the artery has to be re-vascularized to save renal function.

A 55 year old female patient was admitted with a symptomatic infrarenal AAA and aneurysm of the right common iliac artery to the iliac bifurcation. She had a single pelvic kidney on the right side with the renal artery coming from the aneurysm. Endovascular treatment was done with 2 iliac side branch devices, the distal with the side branch for the hypogastric artery and the proximal for the renal artery.

Endovascular therapy was without complications, beside the EVAR main body have been used 2 iliac side branch devices in line. The distal side branch was connected to the hypogastric and the more proximal side branch to the renal artery. There was no endoleak, the branches have been patent. Postop was a occlusion of the external iliac artery on the right side cause by local dissection from vascular closure device. It was solved endovascular with aspiration thrombectomy and stenting of the external iliac.

Standard stent grafts are designed for aneurysm treatment in patients with normal anatomy. If the aneurysm extends to branch vessels or has atypical branches we prefer custom made devices. In symptomatic patients there is no time to wait for the production so chimneys or the use of standard materials are the option. ISB devices are useful tools because they allow branches and avoid gutter endoleaks.

Aortoiliac PP-1052 PP-1009, PP-1011, PP-1052

When we can use of iliac branch device for endovascular treatment?

Jinho Mun, Sang-Su Lee

Department of Surgery, Pusan National University Yangsan Hospital, Korea

Common iliac artery aneurysms are shown in more than a third of patients with abdominal aortic aneurysm and may pose a challenge during endovascular and open repair. Despite of embolization of the internal iliac artery is an established method, it may be complicated with colon ischemia, buttock claudication, pelvic necrosis, and erectile dysfunction. Iliac branch devices (IBDs), which permit preservation of the hypogastric artery, have been used to prevent complications.

A 63-year-old male presented to vascular surgery clinic with abdominal palpable mass 3 month ago, without pain. He had a history of high blood pressure, ischemic heart disease and PCI at p-LAD. Current medications included aspirin and clopidogrel. His workup revealed 7 cm sized abdominal aorta aneurysm with dissection, 2.2 cm sized right common iliac artery aneurysm .with severe iliac occlusive disease. Due to his comorbidities, medication history and low platelet count, the risk of open surgery was high. Therefore, We decided to endovascular treatment with IBD. We conduct embolization left internal iliac artery and insert IBD into right femoral artery. But we could not select right internal iliac artery. Its entrance was not contrasted and there was no entry. IBD is determined to be impossible and conversed open repair.

The process of IBD is complex, but it is can prevent several artery flow limitation after surgery. If patient did not have contraindication, IBD is good treatment choice. However, it is important to evaluate whether the operation can be performed. Changing the surgical procedure during surgery can lead to a number of problems, such as prolonged surgical time and bleeding.

Outcomes of percutaneous rotational mechanical thrombectomy using Rotarex® catheter in acute and subacute limb ischemia, single-center experience

Watchara Aukkarachalanont, Nuttawut Puangpanngam

Department of Surgery, Siriraj Hospital, Thailand

Introduction: The aim of this retrospective single-center study was to analyze the immediate results, failures and complications of percutaneous mechanical thrombectomy using the Rotarex catheter in the treatment of peripheral artery occlusion.

Method: In this study, we identified a total of 43 patients who underwent mechanical thrombectomy using Rotarex catheter at our institution. Procedural outcomes and complications were evaluated.

Result: The cohort consisted of 43 patients (28 men and 15 women), aged 15-91 years (median 73 years). The number of iliac artery occlusion was 9, femoral artery 29, popliteal artery 31, popliteal trifurcation 14, subclavian artery 1, bypass graft 4 and multilevel lesion 31. The causes of occlusion were thrombosis (20 cases, 46.5%), embolism (11 cases, 25.6%), and reocclusion after intervention (12 cases, 27.9%). The onset of symptom was acute 23 (less than 14 day) and subacute 20 (lass than 3 months). We achieved primary success in 83.7% of the patients with mechanical thrombectomy, associated with balloon angioplasty (33/43, 76.7%), stent deployment (24/43, 55.8%), catheter aspiration (12/43, 27.9), Intra-operative thrombolysis (13/43, 30.2%), catheter directed thrombolysis (11/43, 25.6%) and convert to open bypass (1/43, 2.3%). The median time of the interventional procedure was 180 min. We encountered percentage of distal embolization (2.3%) and arterial perforation (11.6%) during usage of Rotarex catheter in our cohort.

Conclusion: Rotarex thrombectomy was a useful tool to recanalize occluded vessels with additional treatment such as balloon angioplasty or stent deployment, with a low rate of failures and complications. And prospective studies in this issue are recommended.

PAD PP-1015

Mortality is not associated with paclitaxel coated devices usage in peripheral arterial disease of lower extremities

Dai Sik Ko, Jin Mo Kang

Department of Vascular Surgery, Gachon University Gil Medical Center, Korea

Introduction: A recent meta-analysis indicated that paclitaxel coated device use may be associated with increased mortality in patients with peripheral arterial disease. The purpose of this study was to investigate the survival of patients with peripheral arterial disease after the use of paclitaxel coated devices.

Method: This was a retrospective population-based cohort study analyzing National Health Insurance Service claims in Korea from January 1, 2015 to December 31, 2017. Survival and amputation-free survival were compared in Cox regression analyses adjusted for age, gender, and Charlson comorbidity index parameters before and after propensity score matching.

Result: After propensity score matching, there were 1,305 patients per each group. The median follow-up days was 474 days (IQR: 204-787 days) and 332 days (IQR, 142-589 days) for the non-paclitaxel coated device group and paclitaxel coated device group, respectively. Multivariate analysis adjusted for age, gender, and Charlson comorbidity index indicated that the mortality associated with paclitaxel coated device was not significantly higher than non-paclitaxel coated device (Hazard Ratio (HR) 0.871, 95% CI 0.719-1.056). The rate of amputation event with multivariable adjustment was higher in patients with a drug-coated device than those with a non-drug-coated device (HR, 1.542; 95% CI, 1.235-1.1.925).

Conclusion: In this population-based health insurance claim analysis, mortality in patients with peripheral arterial disease (PAD) was not associated with paclitaxel coated device usage, even though there was a higher amputation rate.

PAD PP-1016

Obturator bypass using a ringed polytetrafluoroethylene graft for inguinal graft infection

Joohyun Lee[1], Jun G Gwon[1], Youngjin Han[2], Tae-Won Kwon[2], Yong-Pil Cho[2]

[1]Department of Surgery, Korea University Anam Hospital, Korea,
[2]Department of Surgery, Asan Medical Center, University of Ulsan College of Medicine, Korea

Introduction: Inguinal vascular graft infections are high-risk events that cannot be controlled medically but require surgical intervention. This study reviewed the long-term clinical outcomes of obturator bypass using a ringed polytetrafluoroethylene graft for inguinal graft infection.

Method: A total of eight consecutive patients who underwent obturator bypass using a ringed polytetrafluoroethylene graft for inguinal prosthetic graft infection at a single medical center between January 2006 and October 2017 were retrospectively analyzed. The demographics, clinical characteristics, surgical procedure, and clinical outcomes were evaluated.

Result: There was no perioperative death; however, there were three operative complications. On the 1st and 9th postoperative day, two patients underwent hematoma evacuation in the pelvic cavity, and the other patient underwent suture reinforcement for partial dehiscence of the distal anastomosis on the 49th postoperative day. The median length of hospital stay was 14.5 (range, 7-29) days. Only one graft occlusion was observed at postoperative month 40; however, there were no ischemic symptoms. There were no limb amputations and postoperative deaths during the long-term follow-up period. There were no infections of the previous residual and obturator bypass grafts and inguinal infection during the follow-up period of 49 (range, 7-154) months.

Conclusion: Obturator bypass for inguinal graft infection is feasible and durable with excellent long-term outcomes. However, perioperative bleeding should be taken into consideration.

PAD PP-1017

Limb salvage vs amputation: A prospective cohort review based on wifi classification in a single academic medical centre

Thiru V Raau, Ahmad Rafizi Hariz Ramli

Department of General Surgery, University Malaya Medical Centre, Malaysia

Introduction: The clinical spectrum of the threatened-limb is highly heterogeneous because of the variety of combination of wound, ischemia, and infection. SVS WIfI classification system was proposed to predict 1-year amputation risk and benefit from revascularization. The extent of wound, ischemia, and foot infection has major impact on amputation risk based on 4 clinical stages, stage 1 (0.75%), stage 2 (5.9%), stage 3 (8.4%) and stage 4 (25%). This study was designed to evaluate whether the predictive ability of WIfI classification system correlates with clinical outcomes for limb salvage and wound healing among patients with CLTI (Chronic Limb-Threatening Ischemia) and DFU (Diabetic foot ulcer).

Method: This is a prospective cohort study involving patients who presented with CLTI and DFU to UMMC from June 2017 to May 2019. Total of 232 patients were stratified into clinical stages 1 to 4 based on SVS WIfI classification according to their wound status, ischemia index, and extent of foot infection. Objective goals of SVS guidelines as major amputation, amputation-free survival (AFS) at 1 year, and wound healing time (WHT) for patients stratified by WIfI classification were compared.

Result: The interim analysis of 203 patients show the mean age was 63 years (63% male, 77% diabetic). 39 (19%) patients required major amputation and 164 (81%) patients limbs were salvaged. The group with amputation had a higher prevalence of stage 4 patients, whereas the group with limb salvage were predominantly in stages 1 and 2. Majority patients presented in clinical stage 4 had a significantly higher incidence of amputation (63%),and decreased AFS (37%). Revascularization resulted in better WHT in stage 3 (89%).

Conclusion: This data supports the ability of SVS WIfI classification system to predict major amputation, correlates with the important clinical outcomes for limb salvage and wound healing. Hence, it is essential to incorporate this new classification system into clinical practice and decision-making.

PAD PP-1018 PP-1014 ~ PP-1020

Major adverse events and outcomes in delayed presentation of acute limb ischemia

Srujan Babu Yarlagadda[1], Abhiram Rallabandi[1], Viswanath Atreya[2], Kereena Chukka[2], Prem Chand Gupta[2], Gnaneswar Atturu[2], Vamshi Krishna Yarramsetti[2]

[1]Department of General Surgery, Osmania General Hospital, India,
[2]Department of Vascular Surgery, Care Hospitals, India

Introduction: Acute limb ischemia (ALI) is one of the vascular emergencies where time is tissue. However, patients can present to vascular surgeons with ALI several days to weeks after initial event. There is limited data regarding the outcomes of interventions in such patients. The aim of this study is to understand the limb salvage and mortality associated with intervention in patients presenting late with ALI.

Method: Electronic medical records of all the patients who underwent open, endovascular or hybrid revascularisation for acute limb ischemia between 2017 and 2019 were reviewed. Clinical presentation, management and outcomes in these patients were collected and analysed using descriptive statistics.

Result: A total of 151 patients presented with ALI during the study period. 38 patients presented with upper limb ischemia and 113 patients presented with lower limb ischema. 74 out of 113 patients were available for follow up at 2.5 years. The mean age of the patients was 54.24years and SD of 17.46 and 34 number were men. Hypertension and smoking were the major risk factors. The mean delay in presentation was 14 days (3 days to 6 months). Most patients (n=33) presented following a week after symptom onset. Most patients belonged to Rutherford class IIB (n=55) acute limb ischemia. CT angiography was the most common modality of investigation used. 49 patients underwent open surgery and 25 required a hybrid procedure. The mean follow up was 24 months (range 8 months to 32 months). 3 patients underwent re-intervention within 24 hours. One death and one major amputation was noted within the 30 days post procedure. At two and half year follow up, 10 patients (13.5%) died and 8 patients (10.8%) had major amputation.

Conclusion: The results of the study show that Limb salvage is possible even in patients who present late with ALI with low morbidity and mortality.

PAD PP-1019

Association of serum lipoprotein (a) with limb severity in chronic limb-threatening ischemia

Yohei Ichikawa, Shinsuke Kikuchi, Takamitsu Tatsukawa, Tomoki Nakatsu, Ai Tochikubo, Yuri Yoshida, Daiki Uchida, Atsuhiro Koya, Yukihiro Saito, Nobuyoshi Azuma

Department of Vascular Surgery, Asahikawa Medical University, Japan

Introduction: The aim of this research was to evaluate whether serum lipid profile including serum lipoprotein (a) (Lp[a]) affects clinical outcome in patients with chronic limb-threatening ischemia (CLTI).

Method: A total of 123 patients (67%) out of 180 patients treated for CLTI, who were measured serum cholesterol level (total, LDL and HDL cholesterol), triglyceride and Lp(a) concentration before treatment between 2017 Jan and 2019 Dec at our institution were retrospectively enrolled for this study. The participants were followed after revascularization and recorded postoperative incidence of mortality and major adverse cardiovascular events (MACE) as well as major adverse limb events (MALE). In addition, limb severity was assessed based on WIfI classification, and subsequent development of CLTI in a contralateral leg was also evaluated. A relationship between serum lipid profile and these outcomes were statistically analyzed using SPSS.

Result: Total, LDL and HDL cholesterol and triglyceride was altered by patient's background, such as statin use and dialysis, but not LP(a). LP(a) was not correlate with other serum cholesterol and triglyceride, leading Lp(a) was a differentially expressed serum protein. There was no difference in postoperative all-course mortality, MACE and MALE by any serum lipid profile. However, an increased level of LP(a) ($\geq$30 mg/dl) was significantly associated with wound grade of WIfI classification (P=0.05 from ANNOVA), in which $>$30 mg/dl deteriorated wound grade, but not in grade of ischemia and foot infection. Interestingly, CLTI patients with an increased level of LP(a) ($\geq$30 mg/dl) significantly developed subsequent CLTI in a contralateral leg, compared with those with $<$30mg/dl (52% vs. 33%; P=0.048).

Conclusion: Risk of mortality, MACE and MALE were not related to any serum lipid profile, whereas Lp(a) differentially expressed and associated wound grade and subsequent CLTI development in a contralateral leg. Lp(a) may be a meaningful marker showing limb severity in CLTI.

PAD PP-1020 PP-1014 ~ PP-1020

Risk of peripheral arterial disease in patients with periodontitis: A nationwide, population-based, matched cohort study

Jun Gyo Gwon, Cheol Woong Jung, Chang Hun Lee

Department of Surgery, Korea University Anam Hospital, Korea

Introduction: The association between coronary heart disease (CHD) caused by atherosclerosis and periodontitis has already been established. Peripheral arterial disease (PAD) is also caused by atherosclerosis, but the characteristics of the target artery and the disease are different from those of CHD. The aim of this study was to determine whether the risk of PAD was high in patients with periodontitis.

Method: For this study, we used data from the Korean National Health Insurance Service-Health Screening Cohort (NHIS-HEALS) database that were collected between January 2003 and December 2014. We compared the incidence of PAD between patients with periodontitis and a matched control group selected from among 514,832 people enrolled in the NHIS-HEALS database to confirm the increased incidence of PAD in patients with periodontitis.

Result: The incidence per 1,000 person-years was 2.40 in the patients with periodontitis and 2.08 in the matched controls. The hazard ratio (HR) of PAD in the periodontitis group compared with that in the matched group was 1.15 (95% confidence interval, 1.07-1.23). In the subgroup analysis, sex, age, smoking, and hypertension statistically modified the influence of periodontitis on PAD risk.

Conclusion: Control of periodontitis is important in the prevention of PAD, in addition to correcting conventional risk factors such as diabetes mellitus, hypertension, dyslipidemia, and smoking.

Rare Vascular Disease PP-1022 PP-1021 ~ PP-1024

A case and surgical report of Kasabach-Merritt syndrome at Fatmawati central general hospital

Kemal Fadhli Hadi, Witra Irfan

Department of Vascular and Endovascular Surgery Department, Fatmawati Central General Hospital Jakarta, Indonesia

Introduction: Kasabach-Merritt syndrome (KMS) is a rare disorder affecting infants from the time of birth, or may appear later in infancy as the vascular malformation grows. KMS is diagnosed based on the constellation of a vascular lesion, thrombocytopenia, and consumptive coagulopathy. High mortality rate is possible resulting from severe hemorrhage.

Method: A two- and-half month old male infant was admitted to Fatmawati Central General Hospital at March 28th 2018, with history of throat blockage, mild respiratory distress and noisy breathing for 7 days, associated with a reddish purple swelling on his left neck. There was no history of fever, cough, vomiting, trauma or foreign body inhalation. A wide excision was done on 1st of April 2018. As the reduction of Kaposiform Hemangioendotheliomas, the hemostasis was getting better based on laboratory findings. But it caused hemodynamic instability so the patient was rested for 12 days before the next surgery on 13th of April 2018. Following the success of surgery, patient was transferred to pediatrician and nutritionist for recovery.

Result: KMS results in a consumptive coagulopathy from platelet trapping and aggregation within a specific type of hemangioma. The overall mortality rate is between 12-50% with death occurring from severe hemorrhage related to disseminated intravascular coagulation, local invasion of vital structures, high output cardiac failure, multi-organ failure, or sepsis. Treatment aims to involute the tumor to prevent significant morbidity or mortality, or in response to a life-threatening event. Historically, the first-line of treatment has been high-dose systemic corticosteroids. However, up to two-thirds of lesions will not respond to corticosteroids, or will quickly relapse once treatment is discontinued. Surgical excision is curative but most lesions are not amenable to this option.

Conclusion: Kasabach-Merrit Syndrome was successfully treated by surgical excision despite the first line treatment was steroid considering the relapse effect.

A case of 9-year-old girl with severe digital ischemia caused by Upper Extremity Fibromuscular Dysplasia (UEFMD)

Daiki Uchida, Ai TochikuboKazuki Takahashi, Shinsuke Kikuchi, Atsuhiro Koya, Nobuyoshi Azuma

Department of Vascular Surgery, Asahikawa Medical University, Japan

Introduction: Fibromuscular dysplasia (FMD) is a nonatherosclerotic disease that generally affects medium-sized arteries. The distribution typically involves the renal, extracranial carotid/vertebral, and iliac arteries, whereas FMD in upper extremity arteries is considered rare. Unfortunately, there is no consensus on proper management, much less the treatment approach for UEFMD. Invasive strategy for complete symptom relief have been reported in cases with severe UE ischemia. We present a case of 9-yaer-old girl with severe digital ischemia caused by upper extremity fibromuscular dysplasia (UEFMD).

Method: The patient suffered her left thumb with painful cyanosis and ulceration after hitting on a table 1month ago. The angiographic diagnosis demonstrated multi focal stenosis in brachial to ulnar arteries. The patient had been receiving medical care for renovascular hypertension due to FMD since the age of 5 years by her previous physician and had undergone endovascular treatment of the right renal artery and the left external iliac artery. Thus we diagnosed these angiographic findings to be due to UEFMD, based on the history of the disease. Subsequent emergent intervention with percutaneous transluminal angioplasty (PTA) was performed to relieve her critical digital ischemia. After PTA, multimodality therapy (including carefull wound management, oral aspirin, hyperbaric oxygen therapy (HBOT) and rehabilitation) was introduced to promote wound healing.

Result: Successful PTA was done with the thinnest peripheral diameter balloon and vasodilator agents. Postoperative CT angiography demonstrated satisfactory patency up to the hand. About 4 month After PTA and multimodality therapy, we finally achieved wound healing and salvaged her digits cosmetically and functionally.

Conclusion: This case highlights the importance of immediate and appropriate revascularization and multimodality therapy for severe digital ischemia caused by UEFMD in childhood. Consensus on appropriate management and treatment approaches for UEFMD is desired in the future.

Rare Vascular Disease PP-1024 PP-1021 ~ PP-1024

Effectiveness of surgical treatment with complete cyst excision for cystic adventitial disease of the popliteal artery

Seonjeong Jeong, Tae-Won Kwon

Department of Vascular Surgery, Asan Medical Center, University of Ulsan College of Medicine, Korea

Introduction: Cystic adventitial disease is a rare, non-atherosclerotic disease that affects various arteries and veins, involving the formation of a mucinous cyst within the adventitia. The etiology of cystic adventitial disease is currently unclear, with several hypotheses having been suggested. The purpose of this retrospective observational study was to evaluate the etiology of popliteal cystic adventitial disease based on imaging and surgical findings and to evaluate the efficacy of surgical treatment.

Method: From April 2013 to January 2020, nine patients were diagnosed with popliteal cystic adventitial disease and underwent surgical treatment. We performed complete resection of the cyst and the affected segment of the popliteal artery, followed by interposition with autologous reversed small saphenous vein or great saphenous vein.

Result: The resected adventitial cyst tissue was multilobular, filled with high-viscosity mucus. Pathologic examination of the surgical specimen revealed intramural cysts filled with gelatinous material located between the media and the adventitia, consistent with the clinical diagnosis of cystic adventitial disease. The median follow-up period was 27.5 months (range: 2-91 months). All patients underwent cyst excision with graft interposition, and the overall graft patency was 80.9 months (95% CI: 62.2-99.6 months).

Conclusion: Computed tomography, magnetic resonance imaging, and surgical findings confirmed communication between the synovial cyst and arterial adventitia. It is recommended that priority be given to surgical resection and graft interposition because this can eliminate the disease's cause and reduce its recurrence.

Outcomes of incisional Negative Pressure Wound Therapy (iNPWT) following Brachiobasilic Transposition Arteriovenous Fistula (BBT-AVF) creation: A propensity score matched study

Kai Siang Chan[1], Muthaiah Arunaachalam[2], Qiantai Hong[1], Enming Yong[1], Pravin Lingam[1], Li Zhang[1], Sadhana Chandrasekar[1], Glenn Wei Leong Tan[1], Zhiwen Joseph Lo[1]

[1]Department of General Surgery, Vascular Surgery Service, Tan Tock Seng Hospital, Singapore,
[2]Department of Yong Loo Lin School of Medicine, National University of Singapore, Singapore

Introduction: Incisional negative wound pressure therapy (iNPWT) use on closed incisions has been shown to improve wound outcomes, but no studies have evaluated the use of iNPWT following brachiobasilic transposition arteriovenous fistula (BBT-AVF). We aim to investigate the efficacy of iNPWT versus conventional wound therapy in reducing surgical site infections (SSIs) for BBT-AVF incisions.

Method: This is a retrospective cohort study of patients who underwent BBT-AVF creation between January 2010 and December 2017. Inclusion criteria were patients who electively underwent a 1-stage or second stage of a 2-stage BBT-AVF creation. A 1:2 propensity score matching (PSM) was performed to reduce selection bias and address for confounding factors. Study outcomes included SSI and haematoma incidence, 30-day readmission and 30-day mortality.

Result: A total of 154 patients were reviewed in this study: 47 (30.5%) had iNPWT and 107 (69.5%) had conventional wound therapy. The overall median age was 60.5 (IQR 54-69). PSM with a 1:2 ratio resulted in a total of 117 patients (39 iNPWT and 78 conventional wound therapy). In the unmatched cohort, SSI incidence was lower in the iNPWT group (n=1/47 (2.1%) vs n=14/107 (13.1%), P=0.035). However, incidence of SSI was comparable between iNPWT and conventional wound therapy after matching (n=1/39 (2.6%) vs n=9/78 (11.5%), P=0.102). There was no significant difference in incidence of haematoma, admission into general ward, 30-day readmission and 30-day mortality between the 2 groups in both the unmatched and matched cohort. The incidence of SSIs and haematoma formation was also comparable between patients who underwent 1-stage and second stage of 2-stage BBT-AVF creation.

Conclusion: Within our study population of patients with BBT-AVF incisions, there is a non-statistically significant reduction in SSI incidence for patients who received iNPWT as compared to conventional wound therapy. Further prospective randomised controlled studies should be conducted to validate these findings.

Vascular Access PP-1026 PP-1025 ~ PP-1031

Hemodynamic effect of dual drainage veins in upper arm arteriovenous fistula for prevention of cephalic arch stenosis

Hong Pil Hwang, Byeoung Hoon Chung, Hee Chul Yu

Department of Surgery, Jeonbuk National University Hospital, Korea

Introduction: Cephalic arch is critical point to maintain functional arteriovenous fistula (AVF) for hemodialysis. The reported incidence of cephalic arch stenosis in brachiocephalic AVFs ranges from 30 to 39% or more, which is much higher than that reported for radiocephalic AVFs. Our aims in this study is to evaluate effectiveness of upper arm arteriovenous fistula with dual drainage vein (cephalic and basilic vein) for preventing cephalic arch stenosis.

Method: We identified 369 patients who underwent arteriovenous fistula in upper arm between July 2016 and June 2019, retrospectively. 326 patients were performed brachio-cephalic fistula (BCF) and 43 were done brachio-cephalic-basilic fistula (BCBF; dual drainage veins). This study is heading to identify the hemodialysis value by comparing BCF and BCBF group.

Result: There are no statistical difference in median age (65.5 vs. 63.8, P=0.885), sex, co-morbidity, initial vein (2.4±0.2 vs. 2.5±0.15, P=0.89) and artery diameter (3.7±0.45 vs. 3.8±0.38, P=0.383), flow volume in 2 months and arteriotomy diameters. 4 patients should be performed basilic vein transposition because cephalic vein stenosis with basilic vein engorgement. There are statistical differences in prevelence of symptomatic cephalic arch stenosis BCF group (56/326, 17.4%) and BCBF (4/43, 9.3%) (P=0.043). There is no difference in re-intervention rate (13.5% vs. 11.7%, P=0.281), maturation failure (32.1% vs. 28.4%, P=0.463), primary, assisted primary patency rate statistically. There is no statistical difference for other post-operative complication (infection, steal syndrome and ischemic neuropathy).

Conclusion: Upper arm arteriovenous fistula with cephalic and basilic vein dual drainage can be optimal method for prevent cephalic arch stenosis. However, BCBF should be warned that it can affect as a factor that disturb the maturation of the cephalic vein.

Vascular Access PP-1027 PP-1025 ~ PP-1031

The role of additional Fogarty ballooning during the formation of radial-cephalic arteriovenous fistulae on reducing maturation failure

Hyo Kee Kim, Chris Tae Young Chung, Hynmin Ko, Kwang Woo Choi, Ahram Han, Sanghyun Ahn, Sangil Min, Jongwon Ha, Seung-Kee Min

Department of surgery, Seoul National University Hospital, Korea

Introduction: To reduce maturation failure in radial-cephalic arteriovenous fistulae (AVF), many attempts were tried. Intraoperative ballooning using a Fogarty catheter is a simple technique for vessel dilatation, but its role on AVF maturation still remains controversial with only a few reported studies.

Method: We retrospectively reviewed the medical records of patients who underwent the radio-cephalic AVF operation and simultaneous Fogarty ballooning from January 2013 to December 2017 at a single center. Intraoperative ballooning was performed using a 2-Fr Fogarty catheter at the surgeons' discretion.

Result: Intraoperative Fogarty ballooning was performed in 44 patients. Most common reason for using Fogarty was absence of thrill after anastomosis (27.3%), followed by resistance during saline flushing after venotomy (20.5%), small venous diameter after dissection (20.5%) and focal stenosis in intraoperative sonography (6.8%). During the follow-up, 12 (27.2%) patients performed interventions for maturation and 3 cases (6.8%) developed maturation failure. The mean maturation time for patients on hemodialysis (68.2%) was 71.8±28.22 days. Functional primary patency rates at 1 and 3 years were 59.7 % and 50.1%, and functional secondary patency rates at 1 and 3 years were 93.2% and 89.7%, respectively.

Conclusion: The outcome of using Fogarty catheter during radial-cephalic AVF formation was good. However, a quarter of patients required additional angioplasty for maturation. Larger future prospective studies are needed to evaluate the efficacy of the procedure.

Vascular Access PP-1028 PP-1025 ~ PP-1031

Fate of arteriovenous fistula with early thrombotic occlusion event

Hyejin Mo[1], Sanghyun Ahn[2], Ahram Han[2], Sangil Min[2], Seung-Kee Min[2], In Mok Jung[1]

[1]Department of Surgery, SMG-SNU Boramae Medical Center, Korea,
[2]Department of Surgery, Seoul National University Hospital, Korea

Introduction: Early thrombosis is the most common complication after arteriovenous fistula (AVF) formation. In order to preserve AVF, it is treated with a combination of thrombectomy or intervention, but the results of AVF undergoing salvage operation are unknown. The aim of the study was to investigate the outcomes of AVF with early thrombotic occlusion event.

Method: Patients underwent at Seoul National University Hospital or Seoul Metropolitan Government - Seoul National University Boramae Medical Center were retrospectively reviewed. Patients who received salvage operation within 30 days after AVF formation due to early thrombotic occlusion were analyzed.

Result: During study period, a total of 45 patients underwent salvage operation after AVF formation. 26 patients received radiocephalic AVF for the first formation, and 19 received brachiocephalic AVF. Subsequent operations after AVF formation were performed on average 1.3 times (31 once and 14 twice), and the first salvage operation was performed after a mean of 3.5±5.9 days. Thrombotic occlusion was attributed to distal stenosis in 64.4% of cases, technical failure in 6.7%, inflow problem in 28.9%, and hypercoagulable status in 4.4%. Thrombectomy only was performed in 33 cases, PTA in 9 cases, proximal re-anastomosis in 4 cases, and branch ligation in 4 cases. Salvage operation failed in 23 cases (51.1%). The secondary patency rate of AVFs that were successfully salvaged was 100% at 1 year and 94.1% at 2 years.

Conclusion: The early thrombosis of AVF is associated with high failure rate. However, if the salvage operation is successfully performed, it is associated with an acceptable short-term and mid-term outcome.

Vascular Access PP-1029 PP-1025 ~ PP-1031

Outcomes of catheter-directed thrombolysis for arteriovenous fistula thrombosis in Singapore: Is it still relevant today?

Clarice Yeo, Enming Yong, Joseph, Zhiwen Lo, Glenn, Wei Leong Tan, Sadhana Chandrasekar, Qian Tai Hong, Justin Kwan, Lawrence, Han Hwee Quek, Uei Pua, Sundheep Punamiya

Department of Vascular Surgery, Tan Tock Seng Hospital, Singapore

Introduction: To review the outcomes of catheter-directed thrombolysis (CDT) for salvage of thrombosed arteriovenous fistula (AVF) in a single centre in South-East Asia.

Method: A retrospective study of CDT in AVF between January 2015 and July 2018 at a tertiary university hospital. Demographics, AVF characteristics, CDT findings, complications, outcomes and patency rates were evaluated.

Result: Within the study period, 85 patients underwent CDT for AVF thrombosis. 55% had at least one prior fistuloplasty procedure performed whilst 12% had one prior CDT performed. Mean AVF age was 34 months. 78% of the patients underwent CDT for 24-hours and 12% of patients required extended duration CDT for 48-hours of CDT. 14% of patients had bleeding during CDT and hence required a decrease in dosing or complete cessation. Incidence of intra-cranial hemorrhage (ICH) was 1%. Technical success was 92%, with incidence of culprit lesions at juxta-anastomosis, venous limb and cephalic arch being 42%, 44% and 14% respectively. Post CDT, primary patency at 12-months, 24-months and 36-months were 87%, 62% and 36%, whilst assisted primary patency at 12-months, 24-months and 36-months were 96%, 82% and 69% and secondary patency at 12-months, 24-months and 36-months were 99%, 93% and 86%, respectively. Multivariate analysis did not identify any predictive factors for patency post CDT.

Conclusion: Within our study population of Southeast Asians and mean AVF age of 34 months, CDT for AVF salvage conferred good technical results with low rates of complications. There was good primary patency at 12 months and the results were sustained up to 36-months.

Vascular Access PP-1030 PP-1025 ~ PP-1031

The index determining tip location for peripheral inserted central catherization based on Korean body

Chanjoong Choi, Jiwon Kim, Moonsang Ahn, Song-Yi Kim

Department of Surgery, Chungnam National University Hospital, Korea

Introduction: Many patients have been benefiting from intravenous catheterization including peripheral inserted central catheterization (PICC) or armport. However, in many cases, X-ray image devices have been used during the procedure or rough indexs based on body landmarks. The pre-cut PICC is released as products, but it is made based on Western body, so indexes based on the body of Koreans are required.

Method: This study was conducted with 107 patients who received PICC or armport from 2020.1.9 to 2020.9.6. The 30 patients were received the catheterization on their right upper arm, 77 patients were received on their left upper arm. The correlation was analyzed between the body index including height, weight, body mass index, and body surface area (BSA), and the distance from elbow crease to the junction between right atrium (RA) and superior vena cava (SVC).

Result: Mean length of intravenous catheter was 39.6±4.7 cm in right arm group, 44.3±3.6 cm in left arm group. The distance from elbow crease to the junction of RA-SVC determined during the procedure using intraoperative X-ray device was 45.8±4.8 (36-59) cm in right arm group, 50.0±3.9 (41-60) cm in left arm group. The distance determined postoperative chest X-ray (PA) image was 46.0±4.7 cm in right arm group, 49.7±3.9 cm in Lt. arm group. In the equation from multiple linear regression test, the distance from elbow crease to the junction of RA-SVC in postoperative chest X-ray was 38.3+4.6×BSA cm in right arm, 27.332+2.586×BSA+0.116×height cm in left arm.

Conclusion: The distance index using the Korean body can be useful during catheterization such as PICC or armport. These distance indexs can be used to build big data of body indexes and basic data for future treatment using artificial intelligence by region and race as more data are collected.

Subclavian artery stenosis causing vascular access related steal syndrome

Nurhamizah Binti Zulkifli, Ahmad Rafizi Hariz Bin Ramli, Muhammad Syafiq Idris

Department of General Surgery, University Malay Medical Centre, Malaysia

Introduction: Subclavian artery stenosis incidence is 2% (general population) and 7% (risk factor group), usually it's an incidental finding. The approach can be via endovascular but in cases with unfavorable anatomy, surgical revascularization is advisable. At present the endovascular method slowly gaining popularity although their role is still debatable and unknown.

Method: We report a case of a 42-year-old gentleman with multiple co-morbidities of diabetes mellitus, hypertension, ischemic heart disease and end stage renal failure. He had his left brachiocephalic fistula created in October 2019 and initially treated as steal syndrome. Fistula was ligated. Left radiocephalic fistula creation in January 2020. Post-operatively patient complained of pain and numbness during hemodialysis. Clinically, noted muscle atrophy over the left hand and upper limb. Thrill was palpable over the fistula with hand muscle wasting. He was subjected for Computed Tomography Angiography, noted left subclavian artery and proximal brachial artery stenosis. We proceeded with drug coated balloon (DCB) angioplasty. With ultrasound guidance, right femoral artery was punctured for vascular access. The left subclavian artery was cannulated and selective angiogram showed stenosis at the left subclavian and left brachial artery. Pre-dilatation angioplasty was done with size 7 mm POBA (subclavian artery) and size 5 mm POBA (brachial artery) and subsequently DCB were done for both arteries using AR Baltic Medical UAB Elutax DEB.

Result: Post-plasty angiogram showed good flow to the left radial and ulnar artery with no recoil or restenosis in the angioplasty segment and the pain resolved, pulses were palpable at left radial and ulnar arteries with biphasic doppler signal and was discharged well at day 1 after intervention.

Conclusion: Diagnosis of Subclavian Artery Stenosis could be missed due to its low incidence and non-specific presentation which may mimic steal syndrome. Surgeons should have high index of suspicion of this condition as to avoid the catastrophic loss of the limbs.

Crucial roles of vascular surgeons in oncovascular and nonvascular surgery

Hye Young Woo, Seung-Kee Min, Sanghyun Ahn, Sangil Min, Ahram Han, Hyejin Mo, Jongwon Ha

Department of Surgery, Seoul National University Hospital, Korea

Introduction: Vascular surgeons can be useful in nonvascular surgery cases, especially in oncology where complete resection is important. Such activity has been quantified at least locally, but maybe not enough reported in a systematic manner, or studied prospectively. This study aimed to describe the roles of vascular surgeons in oncovascular surgery (OVS) and nonvascular surgery (NVS), and to analyze the yearly trends of consult surgery, early outcomes of mortality and morbidity and risk factors for poor outcomes.

Method: Between January 2014 and December 2018, the vascular surgery registry data of Seoul National University Hospital were reviewed retrospectively for OVS or NVS assisted by vascular surgeons and operations primarily done by vascular surgeons. Demographic data, clinical characteristics, operative data, vascular-related data and operative outcomes were collected. The operations were classified into primary surgery or consult surgery. Consult surgeries were divided into planned or unplanned surgery.

Result: Out of 564 cases, vascular surgeons performed 74 OVS as primary surgery, and retroperitoneal tumor was the most frequent diagnosis (n=34, 45.9%). There were 490 intraoperative requests for a vascular surgeon's assistance, of which 109 (22.2%) were emergency calls. Total intraoperative consultations increased by 115.9% over 5 years, and the proportion of unplanned operations also increased. Unplanned assistance was most commonly requested for bleeding, whereas node dissection was the most common reason for planned surgery. The mortality rate was not different between planned and unplanned surgery groups, but the latter showed worse outcomes in total operative time, length of hospital stay, postoperative consultations, and postoperative vascular-related complications.

Conclusion: Vascular surgeons have an essential role to play in the modern practice of cancer surgery. Oncovascular surgery enables gross resection of a tumor even in the presence of major vessel invasion. Emergency unplanned surgery showed worse outcomes; therefore, preoperative vascular consultation and multidisciplinary management are highly recommended for better patient outcomes.

Vascular Research, Training & Education PP-1033 PP-1032 ~ PP-1039

Combined therapy with rapamycin and atorvastatin decreases atherosclerosis and improves lipid metabolism in apolipoprotein E-deficient mice with chronic kidney disease

Kwang Woo Choi, Sanghyun Ahn, Hyo Kee Kim, Chris Tae Young Chung, Hyunmin Ko, Ahram Han, Sangil Min, Jongwon Ha, Seung-Kee Min

Department of Surgery, Seoul National University Hospital, Korea

Introduction: Atherosclerosis arising from the pro-inflammatory conditions associated with chronic kidney disease increases major cardiovascular morbidity and mortality. Rapamycin is known to inhibit atherosclerosis under CKD and non-CKD conditions, but it can cause dyslipidemia; thus, the co-application of lipid-lowering agents is recommended. Atorvastatin has been widely used to reduce serum lipids levels, but its synergic effect with RAPA in CKD remains unclear. We analyzed the effect of their combined treatment on atherosclerosis stimulated by CKD in apolipoprotein E-deficient (ApoE-/-) mice.

Method: All animal studies were approved by the Institutional Animal Care and Use Committee of Ewha Womans University. All experiments were carried out on female ApoE-/- mice at 8 weeks of age. A two-step procedure was used to induce uremia. The sham operation used as a control comprised the decapsulation of both kidneys. Quantitative real-time PCR was conducted to determine the relative levels of mRNA using a 7700 sequence detector and primers for the target mouse genes.

Result: Oil Red O staining revealed that treatment with RAPA and RAPA+ATV, but not ATV alone, significantly decreased the atherosclerotic lesions in the aorta and aortic sinus, compared to those seen in the control group. The co-administration of RAPA and ATV improved the serum lipid profile and enhanced the liver expression levels of genes involved in cholesterol transport (Abcg5), bile acid biosynthesis (Cyp7a1), and lipid metabolism (Pparɣ, Apoa1). The CKD group showed increased levels of various genes encoding atherosclerosis-promoting cytokines in the spleen (Tnf-α, Il-6 and Il-1β) and aorta (Tnf-α and Il-4), and these increases were attenuated by RAPA treatment. ATV and RAPA+ATV decreased the levels of Tnf-α and Il-1β in the spleen, but not in the aorta.

Conclusion: In CKD-induced ApoE-/- mice, RAPA significantly reduces the development of atherosclerosis by regulating the expression of inflammatory cytokines and the co-application of ATV improves lipid metabolism.

Vascular Research, Training & Education PP-1034 PP-1032 ~ PP-1039

Effects of hypercholesterolemia for expansion of abdominal aortic aneurysm in rat model-early experience

Sang Dong Kim[1], Jong Seok Lee[1], Jeong Kye Hwang[2], Sun Cheol Park[3], Ji Il Kim[4], Sang Seob Yun[3], In Sung Moon[5]

[1]Department of Division of Vascular Surgery, Department of Surgery, The Catholic University of Korea, Incheon St. Mary's Hospital, Korea,
[2]Department of Division of Vascular Surgery, Department of Surgery, The Catholic University of Korea, Eunpyeong St. Mary's Hospital, Korea,
[3]Department of Division of Vascular Surgery, Department of Surgery, The Catholic University of Korea, Seoul St. Mary's Hospital, Korea,
[4]Department of Division of Vascular Surgery, Department of Surgery, The Catholic University of Korea, Uijeongbu St. Mary's Hospital, Korea,
[5]Department of Division of Vascular Surgery, Department of Surgery, The Catholic University of Korea, Yeouido St. Mary's Hospital, Korea

Introduction: The abdominal aortic aneurysm (AAA) is derived from serial inflammatory reactions of aortic wall. Low density lipoprotein (LDL) and triglyceride (TG) play important roles in this reactions. Therefore, it is suggested that lipid-lowering agents can reduce expansion of AAA. So, we studied effects of hypercholesterolemia for expansion of AAA in rat model.

Method: Sixteen rats were divided into four groups. Group I was the normocholesterol diet and saline injected group. Group II was the normocholesterol diet and porcine pancreatic elastase (PPE) injected group. Group III was the hypercholesterol diet and PPE injected group. Group IV was the hypercholesterol diet, lipid-lowering agent (atorvastatin), and PPE injected group. At the third week, we injected saline into aorta in group I and PPE into aorta for induction of AAA in group II to IV. At the 5th week, we checked diameter of aorta, and obtained blood and aortic tissue. We checked ratio of final diameter (df) to initial diameter (di), lipid profile, and characteristics of aortic walls from four groups.

Result: The ratio of diameter (df/di) of group II was more than 1.5 and significantly higher than that of group I ($P < 0.05$). Among PPE groups (group II to IV), the ratio of diameter (df/di) of group III and IV was significantly higher than that of group II ($P < 0.05$). The ratio of diameter (df/di) of group III was significantly higher than that of group IV ($P < 0.05$).

Conclusion: We suggest the possibility that hypercholesterolemia can proportionally induce expansion of AAA, and lipid lowering agent can reduce expansion of AAA. But, large-volume experiments in animal models and clinical researches should be performed to confirm our results.

Vascular Research, Training & Education PP-1035 PP-1032 ~ PP-1039

New hemodynamic parameters show higher accuracy than standard (WSS, OSI, vorticity) for 4D-Flow MRI hemodynamic analysis

Don-Gwan An[1], Doosang Kim[2], Sang Hyung Lee[3], Simon Song[1]

[1]Department of Mechanical Engineering, Hanyang Unviersity, Korea,
[2]Department of Thoracic and Cardiovascular Surgery, Seoul Veterans Hospital, Korea,
[3]Department of Neurosurgery, SMG-SNU Boramae Medical Center, Korea

Introduction: Recently, many researchers have conducted hemodynamic analysis for vascular flows, specially using the 4D-flow MRI that can measure a time-resolved velocity vector field in a 3-dimensional space. They often used WSS, OSI, and vorticity which were obtained by differentiating the velocity vector field. As a result, these hemodynamic parameters suffer from a high uncertainty due to a limited spatial resolution of 4D-flow MRI. In this study, we propose to the new set of hemodynamic properties derived by integrating the velocity vector field: averaged velocity, separation bubble size, and circulation to replace the three parameters. We present the comparison of the differential and integral parameters in terms of accuracy and usefulness.

Method: The circular pipe flows of different diameters and flowrates were measured by using 4D-flow MRI for the evaluation of average velocity and WSS. Next, the phantom flows of carotid endarterectomy patients were measured for evaluating the size and behavior of recirculation zone and circulation.

Result: The WSS showed an error of 40% while the averaged velocity showed only an error of 1.5% for pipe flow analyses. In the carotid phantom flow, we found that the recirculation zone is almost coincident with the high OSI region, and the former has more hemodynamic information such as flow changes over a cardiac cycle both in the vessel and on the vessel surface. The circulation that corresponds to the level of swirling motion per a cross-section of a flow indicates a capability to replace the vorticity with a high accuracy.

Conclusion: We show that the three integral properties of average velocity, recirculation zone, and circulation could be good candidates to replace the differential hemodynamic parameters of WSS, OSI, and vorticity. In the future, we will analyze the relationship between the integral properties and vascular diseases and develop a hemodynamic biomarker that consisting of them.

Vascular Research, Training & Education PP-1036 PP-1032 ~ PP-1039

3D convolutional neural networking and volumetric analysis of MRVenograms of patients with chronic venous insufficiency

Viswanath Atreyapurapu[1], Malini Vyakaranam[2], Srinivas Atreya[2], Prem Chand Gupta[1], Gnaneswar Atturu[1]

[1]Department of Vascular Surgery, Care Hospitals, India,
[2]Department of Data Science, RoundSqr, India

Introduction: Chronic venous insufficiency is a progressive disease ranging from visible varicose veins to venous ulcers. Clinically, morphological changes appear in the shape of the calf and skin like lipodermatosclerosis, atrophic blanching and ulceration. This progression is not linear and there are limited tools to accurately monitor the progression of disease from C2 to C6. The aim of the study was to analyse the MRVenogram of CVI using artificial intelligence to identify possible surrogate markers of disease progression.

Method: MRVenogram of patients who presented with unilateral limb chronic venous insufficiency between November 2019 and June 2019 were included in the study. The images were analysed using 3D convolutlional neural network approach and Deep Taylor decomposition was used to understand the volumetric changes in the superficial and deep structures of the leg.

Result: A total of 12 patients met the inclusion criteria with a mean age of 44.08 years. 8 out of 12 patients were men. All patients had clinically CEAP 4 to 6 severity. 9 out 12 patients had disease in the left lower limb. The volumetric changes showed significant changes in the deep muscles of the calf mainly involving the posterior compartment. There was also measurable difference in the subcutaneous tissues between affected and unaffected limbs.

Conclusion: Artificial intelligence using 3D conventional neural networking can be used to identify anatomical changes in the limbs of patients with chronic venous insufficiency that could potentially be used in monitoring the progression of disease and or response to treatment.

FRZB as a key molecule in abdominal aortic aneurysm progression affecting vascular integrity

Dai Sik Ko, Jin Mo Kang

Department of Vascular Surgery, Gachon University Gil Medical Center, Korea

Introduction: Abdominal aortic aneurysm (AAA), when ruptured, results in high mortality. The identification of molecular pathways involved in AAA progression is required to improve AAA prognosis. The aim of this study was to assess the key genes for the progression of AAA and their functional role.

Method: Genomic and clinical data of three independent cohorts were downloaded from the NCBI Gene Expression Omnibus (GSE57691, GSE7084, and GSE98278). To develop AAA diagnosis and progression related differentially expressed genes (DEGs), we used a Significance analysis of microarray (SAM). Spearman correlation test and gene set analysis were performed to identify potential enriched pathways for DEGs.

Result: Only the Frizzled Related Protein (FRZB) gene and chromosome 1 open reading frame 24 (C1orf24) exhibited significant down-expression in all analyses. With FRZB, the pathways were associated with RHO GTPase and elastin fiber formation. With C1orf24, the pathways were elastic fiber formation, extracellular matrix organization, and cell-cell communication. Since only FRZB was evolutionally conserved at the vertebrate, function of FRZB was validated using zebrafish embryos. Knock-down of frzb remarkably reduced vascular integrity in zebrafish embryos.

Conclusion: We believe that FRZB is a key gene involved in AAA initiation and progression affecting vascular integrity.

Vascular Trauma PP-1041 PP-1041

Peripheral arterial injuries in children: An audit at a university hospital in developing country

Zia Rehman, Amna Riaz, Zafar Nazir

Department of Surgery, Aga Khan University Hospital, Pakistan

Introduction: To review the prevalence, pattern, management, outcome, and predictive factors for limb loss of pediatric peripheral arterial injuries (PAIs) at a university hospital in Pakistan.

Method: Medical records of children (age ＜18 years) managed for PAIs at the university hospital between Jan 2008 and Dec 2018 were reviewed for demographic data; mechanism, type, and severity of injury; management; and outcome.

Result: During the study period, of the 1718 children managed for trauma, 75 (67 males and 8 females) had PAI secondary to glass cut (33.3%), gunshot (28.0%), and road traffic accidents (24.0%). Forty-nine patients (65.3%) presented to the emergency room within 6 h of injury. Brachial (28.0%), superficial femoral (20.0%), and radial (20.0%) arteries were the frequently injured vessels. At presentation, the mean revised trauma score and Mangled Extremity Severity Score (MESS) were 3.86±0.55 and 3.4±1.92, respectively. Sixty-eight patients (90.66%) underwent vascular procedures: interposition saphenous vein bypass graft or PTFE graft in 38.7% and primary repair in 29.3%. Limb salvage was achieved in 92.65% of the patients. Late presentation (＞6 h) was a risk factor for limb loss (P=0.014).

Conclusion: Of the 23 children who presented with trauma, 1 had major PAI. Early presentation (＜6 h) and appropriate vascular interventions can salvage limbs in most of the patients.

Vein PP-1043 PP-1043 ~ PP-1050

Safety and efficacy of aspiration thrombectomy after catheter-directed thrombolysis and pharmacomechanical thrombectomy after catheter-directed thrombolysis for the treatment of acute iliofemoral deep vein thrombosis

Seungjae Byun[1], Joong Kwon Lee[2], Kyungyun Kim[3]

[1]Department of Surgery, Wonkwang University School of Medicine, Korea,
[2]Department of Surgery, Wonkwang University Hospital, Korea,
[3]Department of Surgery, Degine Hospital, Korea

Introduction: To evaluate the safety and efficacy of patients who underwent between aspiration thrombectomy (AT) after catheter-directed thrombolysis (CDT) and pharmacomechanical thrombectomy (PMT) after CDT for the treatment of acute iliofemoral DVT (AIFDVT).

Method: From May 2017 to December 2018, 40 patients with acute iliofemoral DVT were enrolled. Twenty patients underwent AT after CDT (CDTAT), while the other 20 patients underwent PMT using the AngioJet™ after CDT (CDTPMT). Thrombus clearance was judged by computed tomography venography at 1 week after procedure as follows: grade I, ＜50%; grade II, 51-75%; grade III＞ 75%. Grades III was considered successful outcomes. Treatment outcomes (thrombus clearance grade, thrombolytic therapy duration, total urokinase dose, major bleeding complication, remained filter thrombosis and Villalta score) were compared between groups.

Result: Successful thrombus clearance was accomplished in 95% of patients in both groups. Significant reductions in the thrombolytic therapy duration (P=0.018) and total urokinase dose (P=0.014) were noted in the CDTPMT. There were no major complications in both groups. Remained filter thrombus ＞ 10 mm was found in 6 filters in the CDTAT versus 1 filter in the PMTCDT (P=0.038). The mean Villalta score at 6 months was 1.47±1.24 and 1.12±0.92 in the CDTAT and the CDTPMT, respectively (P=0.372).

Conclusion: Both methods could be a safe and effective management for patients with AIDVT. CDTPMT is a method that reduces urokinase dosage, time and remained filter thrombus compared to CDTAT.

Vein PP-1044 PP-1043 ~ PP-1050

The multidisciplinary management of the Klippel-Trenaunay Syndrome (KTS)

Changsik Shin, Taeseung Lee, Hyunsub Park, Kyunglim Koo

Department of Surgery, Seoul National University Bundang Hospital, Korea

Introduction: The objective of this study is to assessment the results after multi-disciplinary treatment including radiofrequency ablasion (RFA), direct puncture sclerotherapy or transcatheter sclerotherapy, and superficial vein surgery to treat varicose veins of treatment for the patients who diagnosed Kilppel Treanaunay syndrome at Seoul National University Bundang Hospital.

Method: We had reviewed the patient's medical records retrospectively, who visited our institute for KTS, including pre and post-operative phothographs, CT venogram, conventional angiography and photopletismography. Eleven patients (eight men, three women) were treated at our institution against Kippel-Trenaunay syndrome.

Result: 18 patients, 11 males and 7 females (mean age, 25.1 years; range, 13-54 years). All patients had varicose veins and port-wine stains. In imaging studies, ten patients showed deep vein pathology, one of them was thrombosis, others were showed reflux. Seven patients showed lateral embryonic vein, one patient showed deep vein hypoplasia, one patient showed arteriovenous malformation on deep femoral artery. Nine of them were treated with surgical ligation of perforating veins. Among these patients, eight patients had received sclerotherapy or RFA also. Four patients feel improvement of symptoms although they had port-wine staining and some varicosities. Four patients were observed with conservative management, one patient was conducted only skin graft surgery for local wound. Four patients were improved venous refill times compared between preoperative results and postoperative results. They had port-wine stain & some varicosity, but don't complaint their symptoms (leg heaviness, discomfort, and pain).

Conclusion: Removal of symptomatic varicosities or localized venous malformations can yield good results at selected patients, provided a functioning deep vein system is present. Overall clinical improvement is noted at most patients, and reexcision may be performed as indicated. Because KTS is rare and the patients' problems often complex, patients should receive multidisciplinary care.

The functional efficacy of rheolytic thrombectomy in the treatment of deep venous thrombosis in lower limb

Myeong Su Kim, Suk-Won Song, Tae-Hoon Kim, Ha Lee

Department of Cardiovascular Surgery, Gangnam Severance Hospital, Korea

Introduction: The aim of this study is to evaluate the efficacy and safety of rheolytic thrombectomy (RT) for the treatment of deep venous thrombosis (DVT) in lower limb.

Method: A retrospective study was performed on 157 patients with DVT in lower limb from 2008 to 2019. Twenty-four patients treated with RT, and the others treated with catheter directed thrombolysis with or without mechanical thrombectomy. Through computed tomography scan, these two groups were compared.

Result: Mean age was 58.2±16.5 year-old and there were 71 male. Mean follow up period was 16.7±26.7 month. Age of thrombus was classified into acute (＜14 days; n=108), subacute (＜30 days; n=19) and chronic (＜30 days; n=30). Concomittent pulmonary artery thromboembolism was found in 31 (19.7%) patients and inferior vena cava was involved in 26 (16.5%) patients. Left sided DVT was more common (n=105, 66.8%) and 13 (8.2%) cases were bilaterally. According to postoperative thrombus removal grade, significantly less patients showed grade Ⅰ (＜50% reduction; 12.5% vs. 33%, P=0.43) and more patients were grade Ⅲ (100% reduction; 41.6% vs. 24%, P=0.89) in RT group. The average urokinase administration dose (208000±86000 IU vs. 825000±927000 IU, P＜0.001) and duration of thrombolysis (0.5 hour vs. 12.6±16.3 hour, P＜0.001) were significantly smaller and shorter in RT group. More patients in RT group experienced postoperative hemolysis (45.8% vs. 9.0%, P＜0.001). Duration of venous active drug use was significantly shorter in RT group (3.8±4.5 month vs. 19.0±28.3 month, P＜0.001). There were no differences in re-intervention rate and no life-threatening complications in both groups.

Conclusion: This study indicated the use of RT in the treatment of DVT in lower limb is safe and feasible and showed favorable outcomes, especially in reduction of thrombus burden and also, relief of functional symptom. However, postoperative hemolysis should be carefully monitored.

Vein PP-1046 PP-1043 ~ PP-1050

Anatomical patterns of the great saphenous vein in 5,358 Koreans

Insoo Park, Daehwan Kim

Department of Vascular Surgery, Charm Vascular Clinic, Korea

Introduction: The superficial venous system of lower extremity is variable due to its frequent anatomical variations. GSV is surrounded by a 'saphenous compartment' and runs down from the groin to the leg. However, GSV frequently generates a tributary epi-fascial vein, which can be driven outside of 'saphenous compartment'. Some western studies have shown such anatomical variations, but there has been no systematic study of the anatomical variations of GSV in Asia.

Method: From April 2017 to November 2019, 5,358 patients were evaluated with duplex ultrasonogram. We classified the GSV anatomy in the above knee area into four groups. Group 1 : Single GSV located within the saphenous compartment without tributaries. Group 2 : Single GSV makes an epi-fascial tributaries which pierce-out the saphenous fascia and run down without leaving distinct subfascial GSV. Group 3 : Single GSV makes an epi-fascial tributaries which pierce-out the saphenous fascia and distinct GSV also runs down within saphenous compartment. Group 4 : other cases.

Result: A total of 10,716 limbs were evaluated, Group 1 was 7,520 (70.1%), Group 2 was 2,508 (23.4%), Group 3 was 593 (5.5%) and Group 4 was 95 (0.9%). Of the total 5,358 patients, 1,397 (26.1%) had different GSV groups between both limbs.

Conclusion: A good understanding of anatomy is important in treating the upper knee area incompetent GSV. This study showed that the anatomical pattern in the form of Group 2 with epi-fascial GSV tributaries was higher in Koreans than in previous western study.

Endovascular treatment case for complete svc obstruction

Soon Cheon Lee[1], Won Gong Chu[2], Sang Su Lee[2], Sukyung Kwon[2], Dong Hyun Kim[2], Je Hyung Park[2]

[1]Department of Vascular Surgery, Gwang Yang Sarang Hospital, Korea,
[2]Department of Vascular and Endovascular Surgery, Pusan National University Yangsan Hospital, Korea

Introduction: In the case of Stanford classification D, it is easy to give up treatment because the collateral is highly developed and the vessel is chronically occluded.

Method: The patient was a 67-year-old man diagnosed with colon cancer liver metastasis and was undergoing palliative chemotherapy after Hartmann's operation. About 2 years ago, gradually superior vena cana stenosis was observed in follow-up chest CT. However, the symptoms were not severe due to the development of collateral vessels, but swelling of the face and arms occurred as the circulatory vessels decreased from about 6 months ago. Although NOAC anticoagulant treatment was given but the swelling and redness of the upper body gradually increased and dyspnea was accompanied. Finally, the patient had a complete occlusion of SCV, both jugular vein and subclavian vein in the recent chest CT, and only some internal mammary vein and chest wall vein remained. We decided to try an endovascular treatment because the quality of life the patient has been greatly reduced.

Result: We approached through the left GSV and attempted to pass the SVC through the right atrium. Using the Rubicon support catheter, the 0.018" guidewire was successfully entered to the right IJV. Subsequently, the 3 mm and the 6 mm balloon dilatation catheters were sequentially used to expand the SVC, and a 10×57 mm balloon expandable stent was deployed to the recoiled proximal SVC region. The final angiogram confirmed the improvement of venous return from the right internal jugular vein and surrounding collateral vein to SVC. The patient was discharged with improvement of facial edema and dyspnea on the 4th postoperative day.

Conclusion: Development of endovascular wire & catheter, it is possible to try treatment for those occlusion lesions. These procedures can affect the quality of life even in severely symptomatic cancer patients.

Vein PP-1048

Inferior vena cava thrombosis cured by thrombectomy with a half-deployed stent

In Mok Jung[1], Young Ho So[2], Hyejin Mo[1]

[1]*Department of Surgery, SMG-SNU Boramae Medical Center, Korea,*
[2]*Department of Radiology, SMG-SNU Boramae Medical Center, Korea*

Introduction: Inferior vena cava (IVC) thrombosis, a type of deep vein thrombosis (DVT), is a relatively rare and poorly known disease compared to lower extremity DVT.

Method: We present a case of a 68-year-old woman with abdominal pain and mild low leg swelling who was diagnosed with IVC thrombosis extending from common iliac vein to the infrahepatic IVC.

Result: Thrombus was removed using a 14-mm Niti-S stent inserted via right internal jugular vein. A stent was partially deployed and gently advanced to cover the thrombus, and retracted through the vascular sheath capturing the thrombus. This case presents a therapeutic approach for treatment of IVC thrombosis using half-deployed stent as a filter and a basket. Follow-up evaluation at 5 years revealed patent IVC and common iliac vein.

Conclusion: In summary, this case illustrates that thrombectomy using a half-deployed stent as a filter and a basket can offer a treatment option for IVC thrombosis in selected patients.

Reconstruction of inferior vena cava with cryopreserved iliac vein allograft after resection of leiomyosarcoma of IVC

Hyoung Tae Kim, Young Nam Roh, Uijun Park

Department of Surgery, Keimyung University Dongsan Medical Center, Korea

Introduction: Leiomyosarcoma of inferior vena cava is rare malignancy comprising about 5 to 15% of all retroperitoneal tumors. Radical excision en bloc with the affected segment of IVC is mainstay of treatment. Ligation of IVC after tumor excision is possible but accompanied with marked and disabling edema of lower extremities. Since PTFE graft compatible size of IVC reconstruction is not feasible in Korea, Dacron graft is most commonly used for reconstruction of IVC but with frequent graft occlusion. KPTB, Korea Public Tissue Bank was established at 2017 and provides various tissues for clinical use. Iliac and femoral vein are commonly used for hepatic vein reconstruction in living donor liver transplantation. Inferior vena cava is not available but can be reconstructed with femoral or iliac veins. Here we present a case of leiomyosarcoma of IVC managed by en bloc resection and IVC reconstruction with cryopreserved iliac vein allograft.

Result: Sixty one year old male was referred from regional hospital under the impression of IVC leiomyosarcoma. During the work up for nonspecific abdominal pain, the lesion was presented on CT scan. Tumor mass was localized in the infrarenal IVC. The operation was performed by right subcostal incision. IVC was exposed by extended Kocher maneuver. Two cryopreserved iliac vein was longitudinally severed and unified with lateral sutures. Both renal vein was controlled temporarily and resected the tumor en bloc with Infrarenal IVC. IVC was reconstructed with cryopreserved vein. Pathology reported moderate grade leiomyosarcoma and margin free excision. Postoperative recovery was uneventful. Postoperative radiotherapy is ongoing.

Conclusion: Cryoperserved vein is readily available and should be considered first option for great vein reconstruction in case of malignancy involving the large vessel in Korea.

Vein PP-1050

A case report: Successful catheter-directed thrombolysis for saddle pulmonary embolism

Sharhanin Bahrudin[1], Ahmad Faidzal Othman[1], Ahmad Rafizi Hariz Ramli[2]

[1]Department of General Surgery, International Islamic University of Malaysia, Malaysia,
[2]Department of Surgery, University Malaya Medical Centre, Malaysia

Globally, Pulmonary Embolism (PE) is the third most common cause of cardiovascular disease, after myocardial infarction and stroke. Many patient dies within the first few hours of presentation and it account up to 6% of hospital death, making an early diagnosis and treatment cardinal to survival. Pulmonary Embolism can be categorize based on hemodynamic parameters, right ventricular functions and elevation of circulating biomarkers. Patient with hemodynamic instability and/or signs of acute right ventricular failure, classified as intermediate or high risk PE, have poor outcomes hence early treatment of thrombolysis is paramount to have early reperfusion to unload the right ventricular. Catheter-directed Therapy (CDT) have been introduced as an alternative in those high-risk PE patients that are contraindicated to systemic thrombolysis or failed systemic thrombolysis. With the advantage of low bleeding complications and effective in reducing the thrombus load, CDT is currently on the rise as the treatment of choice in high risk PE patient with contraindication to systemic thrombolysis.

Here we report a case of a middle age lady with a recurrent Pulmonary Embolism that presented with palpitation and chest discomfort. Her condition progress and noted to have hemodynamic instability and right ventricular failure. She was diagnosed with saddle pulmonary embolism with involvement of bilateral segmental arteries. Catheter directed thrombolysis was performed for her.

Reassessment after 24 hours noted CDT successfully resolved the saddle embolus.

CDT is an alternative treatment for high risk PE patients with contraindication to systemic thrombolysis, with the low risk of bleeding complication and high efficacy rate, CDT is a promising modality to provide an early hemodynamic recovery.

Visceral PP-1051 PP-1051

Endovascular diagnosis and treatment of early arterial insufficiency in renal transplant recipients: A single-center case series of 8 cases

Mira Yoo, Kyunglim Koo, Changsik Shin, Hyungsub Park, Taeseung Lee

Department of General Surgery, Seoul National University Bundang Hospital, Korea

Introduction: Renal transplantation has proven to be the best therapeutic option for end-stage renal disease. However, there is low but significant risk of vascular complications which can endanger the transplanted kidney. While the late-onset vascular complications such as transplant renal artery stenosis have been widely reported, early vascular complications, for example, procedure-related arterial problems, are rarely studied. This study presents 8 cases of early arterial insufficiencies after renal transplantation, with the diagnosis and endovascular management.

Method: Out of the 324 renal allograft recipients between January 2013 and August 2020 in Seoul National University Bundang Hospital, 8 were considered to have arterial complications within 90 days after renal transplantation based on serum creatinine levels, Doppler ultrasonograms or intraoperative findings. All 8 patients underwent angiography with or without endovascular interventions. The cases were retrospectively reviewed.

Result: With the mean follow-up of 846.7 days (range, 126-1778 days), the early arterial complication rate was 2.5% (8 of 324). Out of 8 patients, 3 had renal artery stenosis (37.5%), 1 had renal artery thrombosis (12.5%), 2 had native aortoiliac occlusion disease (AIOD) (25.0%), 1 had renal artery stenosis combined with native AIOD (12.5%), and 1 had renal artery kinking (12.5%). The mean interval time between renal transplantation and endovascular intervention was 23.2 days (range, 0-82 days). The endovascular interventions were angiography only (n=1), thrombolysis (n=1), percutaneous transluminal angioplasty (PTA) only (n=2), and PTA and stent insertion (n=4). The technical success rate of endovascular intervention was 87.5% (7 of 8); one patient had graft failure, but the others kept stable kidney function after the intervention.

Conclusion: Physicians should be aware of the early arterial complications after renal transplantation, which can be successfully treated with endovascular interventions.

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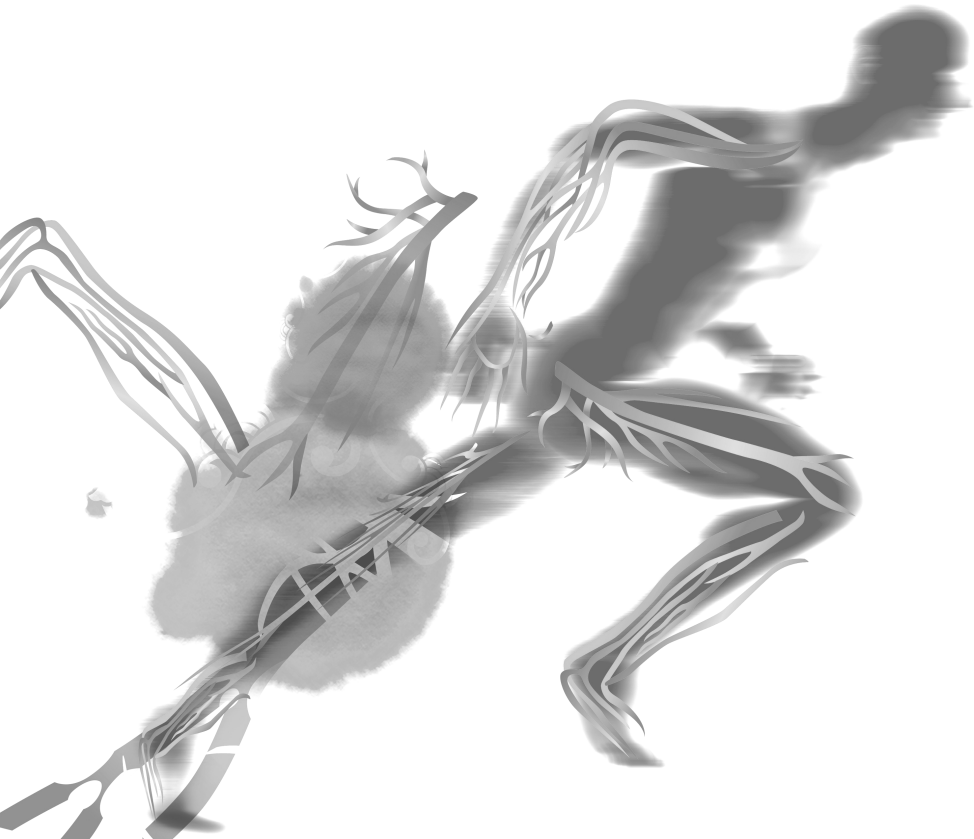

[E-Poster Exhibition]

E-Poster Exhibition

Aorta EP-2001

Laparoscopic bypass is good alternative treatment for juxtarenal aorta occlusion compartive with CERAB

Changsik Shin, Taeseung Lee, Hyungsub Park, Kyunglim Koo

Department of surgery, Seoul National University Bundang Hospital, Korea

Introduction: Since the minimally invasive laparoscopic surgery has been advanced in gastrointestinial and gynecologic surgery with significant benefits compared to open method, the effort of using the laparoscopic technique to vascular surgery has been tried. Recently, several studies reported that the outcome of laparoscopic aortic bypass surgery for patients with TransAtlantic Inter-Society Consensus (TASC) II Classes C and D was comparable to open surgery. The aim of this study is to evaluate the result of laparoscopic bypass surgery in mortality and patency rate.

Method: It was a retrospective study in a single center from February 2004 to February 2012. Laparoscopy assisted procedure, total laparoscopic aortic surgery or Robot assisted laparoscopic surgery was performed to treat 20 patients with aortoiliac occlusive disease. Patients with ASA class IV were excluded from this study.

Result: Patients included 18 men and 2 women. The median age was 65.0 years (range, 45-77 years). Mean follow up was 63.2 months (range, 1-132 months). The 30-day postoperative mortality was 5% (one of 20 patients) and morbidity rate was 20% (4 of 20 patients). Wound complication occurred in two patients. Both wound problems happened in groin area, treated by conservative management without surgical intervention. One patient had acute kidney insufficiency which was recovered to pre-operative level without sequelae. A postoperative compartment syndrome happened in one patient who needed emergent fasciotomy. Conversion to open surgery was necessary in 15% (one for bleeding in lumbar artery, one for small bowel injury, one for friable aortic tissue). 1 year and 5 year patency rate was 100%, 83.3% respectively.

Conclusion: Laparoscopic aortoiliac bypass surgery can be performed safely and the long term patency of graft is comparable to open method. Also it can be performed in low volume center safely.

Aorta EP-2003 EP-2001 ~ EP-2017

Comparative surgical treatment outcomes of abdominal aortic aneurysm in Marfan syndrome patients and non-Marfan population: Propensity score matching analysis

Jihee Kang[1], Yang-Jin Park[2]

[1]*Department of Surgery, Inha University Hospital, Korea,*
[2]*Department of vascular surgery, Samsung Medical Center, Korea*

Introduction: Marfan syndrome (MFS) is a congenital connective tissue disease that affects cardiovascular system. The aortic aneurysms in MFS are mostly dissecting type, thus true abdominal aortic aneurysm (AAA) is rare. In this study, we sought to compare surgical outcomes of AAA in MFS with non-Marfan patients.

Method: This is a retrospective single-center study. From 2003 to 2020, 417 patients in Marfan clinic were reviewed and 28 patients were identified as those underwent surgical repair for AAA. To form a control group, 776 non-Marfan AAA patients who underwent OSR were reviewed. After excluding etiologies other than degenerative AAA, 426 non-Marfan patients were collected. Propensity score matching was performed in a 1:3 ratio. Surgical outcomes were compared between two matched groups.

Result: After propensity score matching, 84 non-Marfan patients were matched to 28 Marfan patients. Age at diagnosis was younger in Marfan than non-Marfan patients (63.8±8.3 vs. 47.2±12.3, $P < 0.001$). Previous aortic root surgery was more prevalent in MFS. AAA was located at the infrarenal aorta most commonly in both groups. Proportion of symptomatic patients was higher in non-Marfan patients (27.4% vs. 3.5%, $P=0.008$). The maximal median diameter of aneurysm was larger in non-Marfan patients (55.5 mm vs. 52 mm, $P=0.035$), but concomitant aortic dissection (3.6% vs. 32.1%, $P < 0.001$) and iliac artery aneurysm (46.4% vs. 75%, $P=0.009$) were more prevalent in MFS. During the median follow-up of 51.5 months for non-Marfan and 71 months for Marfan patients, there was no significant difference between two groups. There was no 30-day mortality in both groups, and overall survival showed no differences between two groups.

Conclusion: OSR for AAA in MFS showed favorable course that is not significantly different from those in non-Marfan patients. However, further investigation based on a larger number of Marfan patients is required. Also, agreement on routine screening of the abdominal aorta in Marfan patients is necessary.

Aorta EP-2004 EP-2001 ~ EP-2017

Single center experience of ruptured AAA treatment: 9 years single center retrospective analysis

Sangkyun Mok, Jang Yong Kim, Sun Cheol Park, Sang Seob Yun, Young Jun Park

Department of Surgery, The Catholic University of Korea, Seoul St. Mary's Hospital, Korea

Introduction: Treatment of ruptured abdominal aortic aneurysm is very important. Because it is directly connected to life. We aimed to evaluate the clinical characteristics, treatment outcomes of patients with ruptured abdominal aortic aneurysm in our hospital.

Method: This was a retrospective study of patients who were treated for ruptured abdominal aortic aneurysm from the prospectively registered database of patients who were treated for ruptured abdominal aortic aneurysm between 2012 and 2020 at Seoul St. Mary's Hospital, South Korea. We analyzed comorbidities, preoperative factor, intraoperative factor, postoperative factor and treatment outcomes.

Result: 40 patients were enrolled in the study. The mean age of the patients was 75.1 years. There were 28 (70%) male and 12 (30%) female. DOA (Dead on arrival) was 2 (5.0%). The treatments included EVAR in 21 (52.5%), open surgical repair in 16 (40.0%), hybrid treatment in 1 (2.5%). The comorbidities, preoperative factor, intraoperative factor and postoperative factor were generally similar between EVAR group and open surgical repair group. EVAR group had a significantly higher 1 month survival than that of the open surgical repair group (76.1% vs. 37.5%, P=0.028).

Conclusion: EVAR should be considered if anatomically appropriate. But, Treatment should be tailored according to a patient's situation, surgeon preference and expirence. Long-term survival studies for EVAR will be needed.

Aorta EP-2005 EP-2001 ~ EP-2017

The outcome of AAA management in a newly-opened, small-volume hospital in Korea

Mihyeong Kim[1], Kangwoong Jun[2], Ji-Il Kim[3], Jeoungkye Hwang[1]

[1]Department of Surgery, The Catholic University of Korea, Eunpyeong St. Mary's Hospital, Korea,
[2]Department of Surgery, The Catholic University of Korea, Bucheon St. Mary's Hospital, Korea,
[3]Department of Surgery, The Catholic University of Korea, Uijeongbu St. Mary's Hospital, Korea

Introduction: The outcome of abdominal aortic aneurysm (AAA) surgery is known that highly affected with the volume of hospital. We are going to report our experience managing AAA in newly-opened small-volume medical center.

Method: This hospital newly opened in April 2019 and has overall 700 beds but only 400 beds was available at first. Two vascular surgeons performed surgery together.

Result: Between April 2019 and February 2020, total nine cases of AAA was treated and among them, three were ruptured AAA. We performed open repair in five patients and endovascular repair in four patients. The mean age of patients was 78 years (65-90 years) and male was dominant (eight patients). The type of AAA was six of infrarenal, two of juxtarenal and one of suprarenal. One patient was diagnosed huge AAA with 84 mm in diameter and right colon cancer with obstruction, and underwent two surgeries simultaneously. There was one case using endoanchor due to hostile proximal neck. The mean duration of follow-up was 176 days (50-308 days). The success rate of surgery was 100%, the rate of re-intervention or re-operation was 0%, 30-days mortality was 0% and overall mortality was 0%. There were three cases of surgery-related complication; one of tibioperoneal trunk thromboembolism treated with anticoagulation, one of chyle leakage managed diet therapy and one of large-amount pleural effusion treated with catheter drainage. One case of medical complication was newly-developed atrial fibrillation and ileus.

Conclusion: Even in small-volume center, physicians have experience managing AAA and members of medical team and facilities are supportive, the outcome of AAA is comparable to large-volume center.

Aorta EP-2006 EP-2001 ~ EP-2017

Early experiences of endoanchor for abdominal aortic aneurysm with challenging neck anatomy

Dai Sik Ko, Jin Mo Kang

Department of Vascular Surgery, Gachon University Gil Medical Center, Korea

Endovascular aortic aneurysm repair (EVAR) has proved to be a successful, safe, and popular treatment choice for abdominal aortic aneurysm (AAA). Yet challenging proximal neck anatomy remains a key factor to the success of endovascular repair despite of good results with fenestrated and chimneys grafts as well as proximal aortic cuffs. Here, we presented two cases of using endoanchor overcoming short neck of AAA with type Ia endoleak.

Case 1:

A 77-year-old male AAA patient with challenging proximal neck anatomy was treated with EVAR in February 2020. Intraoperative angiography showed type Ia endoleak. Therefore, we applied with Heli-Fx endoanchor system in stent graft. During the procedure we tried to apply 6 endoanchors. In 30 degree RAO view, 3 H and 9 H side the anchors was applied, and in 30 degree LAO view, 3 H and 9 H side also the anchor was applied. Then we did angiography, type Ia endoleak was mostly resolved. On follow-up CT angiographies 3 days after intervention, there was not type Ia endoleak.

Case 2:

A 73-year-old male AAA patient with 7 mm of proximal landing zone and severe angulation was treated with EVAR in April 2020 at our facility. After deployment of graft including extension limbs, intraoperative angiography revealed substantial amount of type Ia endoleak. Due to severe angulation, left infrarenal aorta was not fully covered by stent graft. Extension cuff was applied and type Ia was decreased, but remained. We applied with Heli-Fx endocnachor system in extension cuff in same manner as the above case. Type Ia was completely resolved, and CT angiography on 3 days after procedures did not reveal type Ia. Endoachor can be applied to AAA with challenging proximal neck anatomy in conjunction with various modalities.

Aorta EP-2007 EP-2001 ~ EP-2017

Zone 0 to 2 thoracic endovascular aortic repair: A Malaysian single-centre experience

Mem Tim Lee, Leong Dak Keung Benjamin, Sibangun Joseph Feona

Department of Vascular Surgery, Hospital Queen Elizabeth II, Malaysia

Introduction: Thoracic endovascular aortic repair (TEVAR) has been the emerging surgery of preference for thoracic aortic pathologies due to better mortality and morbidity profile. However, TEVAR for thoracic aortic pathologies in close proximity to or at the aortic arch is technically challenging as involvement of the supra-aortic trunk vessels is inevitable.

Method: Our unit performed a retrospective analysis of our experience with zone 0 to 2 TEVAR from January 2015 to June 2020. We analysed the demographic variation, underlying aortic pathology, technique of supra-aortic trunk re-vascularisation, mortality and morbidity profile of the cases.

Result: In total, we performed 5 zone 0 to 2 TEVAR in the study period. All patients are male with mean age of 64.2 years old. The indications include 2 patients with descending thoracic aortic aneurysm and 1 patient each with aortic arch mycotic aneurysm, Type 1a endoleak post-TEVAR for intramural haematoma and acute Standford B aortic dissection. All patients had supra-aortic trunk re-vascularisation. Patient with aortic arch mycotic aneurysm required zone 0 landing. The remaining 4 patients had zone 2 TEVAR. 2 patients had surgical debranching-1 with carotid- carotid-left axillary artery bypass with chimney innominate TEVAR (zone 0) and another had left carotid-left subclavian artery (LSA) bypass (zone 2). The remaining 3 patients had LSA perfused through chimney technique (zone 2). We achieved 100% technical success with 0% mortality in the follow up period (mean 22 months). There is no incidence of stroke, limb ischemia and other major operative complication. 1 patient has type II endoleak during radiological follow-up and was managed conservatively.

Conclusion: Endovascular intervention for thoracic aortic diseases has evolved and progressed in recent years. With meticulous planning, careful selection and application of appropriate endovascular techniques, zone 0 to 2 TEVAR can be performed safely in selected patients.

Aorta EP-2008 EP-2001 ~ EP-2017

Sac regression after endovascular relining of perigraft seroma after open repair of abdominal aortic aneurysm with PTFE graft: Report of a long term follow-up case

Jiwon Seo[1], Sangkyun Mok[1], Young Jun Park[1], Jin Go[2], Jang Yong Kim[1], Sun Cheol Park[1], Sang Seob Yun[1]

[1]Department of Surgery, The Catholic University of Korea, Seoul St. Mary's Hospital, Korea,
[2]Department of Surgery, Mediplex Sejong Hospital, Korea

Introduction: Perigraft seroma is sterile, serous fluid collection confined around the prosthetic vascular graft. Authors experienced successful endovascular treatment of perigraft seroma, which was developed after open surgical repair of abdominal aortic aneurysm (AAA).

Method: A 64-year-old man presented with enlargement of aneurysm sac (11 cm) 6 years after open repair of AAA with PTFE graft. AAA was 5.5 cm in diameter at initial treatment. The patient was referred to abdominal discomfortness and the CT showed a huge perigraft seroma measuring 112 mm. The patient underwent endovascular PTFE graft relining with an Aortic extender and 10 mm×10 cm Viabahn.

Result: Perigraft seroma after open repair of AAA with PTFE graft occurs rarely. After 6 months, the Sac regressed after endovascular relining of enlarged aneurysm sac from 112 mm to 77 mm in diameter. A follow-up CT scan 5 years later showed decreased sac size with a diameter of 59 mm without infection.

Conclusion: Endovascular Relining of perigraft seroma can be considered after open repair of abdominal aortic aneurism with PTFE graft if it is not infected.

Aorta EP-2009 EP-2001 ~ EP-2017

Vicious cycle of inflammatory abdominal aortic aneurysm

Byeounghoon Chung, Heechul Yu, Hongpil Hwang

Department of Surgery, Jeonbuk National University Hospital, Korea

Introduction: The 82-year-old male patient visited the emergency room with fever. CT finding suspected aortoenteric fisula. He had history of penetrating atherosclerotic ulcer of descending thoracic aorta, r/o impending rupture and infrarenal abdominal aortic aneurysm with intramural hematoma, r/o mycotic aneurysm (68×50 mm sized) 4 years ago.

Method: Explorative laparotomy was carried out due to suspected aortoenteric fistula with previous stent-graft infection, however, due to poor general condition, definitive open conversion was not able to perform. Only mesenteric abscess drainage with omentopexy was performed.

Result: After 2 weeks of operation, he complaint sudden abdominal pain with distension, and intra-abdominal bleeding accompanied by decreased blood pressure were suspected, and emergency surgery was performed again as CT showed the rupture of the left common iliac pseudoaneurysm and massive ongoing hematoma formation. Endovascular stent-graft insertion at rupture site of Lt. CIA and performed transperitoneal intraabdominal hematoma evacuation, drainage. Multiple emergency surgeries have resulted in complications such as acute respiratory distress syndrome and pneumonia, and the progress is being observed while maintaining long-term preservation treatment and rehabilitation that required tracheostomy and Levin tube feeding.

Conclusion: As a treatment of inflammatory or mycotic aneurysm, endovascular or minimal invasive treatment requires cautious approach as it can eventually produce results that could threaten the lives of patients and emergency situations that require additional treatment.

Aorta EP-2011 EP-2001 ~ EP-2017

Clinical comparison between early and late spontaneous sac shrinkage after EVAR

Masayuki Sugimoto, Tomohiro Satou, Shuuta Ikeda, Yohei Kawai, Takuya Tsuruoka, Masashi Sakakibara, Katsuaki Meshii, Kiyoaki Niimi, Akio Kodama, Hiroshi Banno, Kimihiro Komori

Department of Vascular Surgery, Nagoya University Graduate School of Medicine, Japan

Introduction: Several studies have suggested that early spontaneous shrinkage (ESS) of aneurysm, which is observed within 1 year after EVAR, could be a predictor for a lower risk of late complications. However, clinical aspects of late spontaneous shrinkage (LSS) during longer follow-up were not well addressed. We aimed to review LSS comparing with ESS.

Method: Our series of elective EVAR from June 2007 to December 2017 was reviewed. Patients with ≥1 year follow-up CTwere included. Those who underwent any reintervention within 1 year were excluded. Spontaneous shrinkage (SpS) was defined as ≥10 mm reduction ofdiameter without any reintervention. The incidence of SpS was checked with annual CT study. SpS within 1 year was defined as ESS. LSS was defined as SpS during ≥2 year follow-up. When aneurysm became larger again than the original size after initial SpS, it was defined as re-expansion. Re-expansion and reinterventions after SpS were included in late complications. Incidence, predictors, and complications were compared between ESS and LSS.

Result: Among 726 elective EVAR, 495 were enrolled. During median follow-up of 43 months [24-67, IQR], 181 SpS (126 ESS and 55 LSS) occurred. Cumulative rates of SpS were 25.7±2.0%, 37.4±2.4%, and 47.3±3.7% at 1, 3, and 7 years. Regression analysis revealed that Zenith was significantly related to ESS compared to Excluder (P=.006) and Endurant (P=.040) and that the number of preoperative patent lumbar arteries ≥6 was also negatively related to ESS (P=.023). However, these factors had no significant impact on LSS. There were 2 re-expansions and 6 reinterventions after SpS. Late complications after SpS was not significantly different between ESS and LSS (P=.465).

Conclusion: Our results suggested that the delayed sac shrinkage with a diameter reduction ≥10 mm could also expect as durable success as the quick shrinkage within 1 year.

Aorta EP-2012 EP-2001 ~ EP-2017

Case Report: Endovascular repair of abdominal aortic aneurysm with hostile proximal neck using endoanchor

Kang Woong Jun[1], Mi Hyeong Kim[2], Jeong Kye Hwang[2], Jiil Kim[3]

[1]Department of Vascular Surgery, The Catholic University of Korea, Bucheon St. Mary's Hospital, Korea,
[2]Department of Vascular Surgery, The Catholic University of Korea, Eunpyeong St. Mary's Hospital, Korea,
[3]Department of Vascular Surgery, The Catholic University of Korea, Uijeongbu St. Mary's Hospital, Korea

An endovascular repair for abdominal aortic aneurysm (EVAR) is concerned preferentially in a patient with severe medical problem. However, if a patient have anatomical traits which are difficult to manage with EVAR, very critical complication such as endoleak is inevitable. Type Ia endoleak is main obstacle in a patient with hostile proximal neck. It is treated with stent-graft extension but is not sufficient in most cases due to renal artery preservation. Recently, endoanchor is available and it can fix the proximal portion of the stent-graft to aorta wall directly.

A 90 years-old man was diagnosed abdominal aortic aneurysm (AAA). We treated coronary arterial disease with stent and diagnosed chronic obstructive lung disease 20 years ago. The aorta dilated 60 mm in diameter, and 7 mm apart from left renal artery and left iliac artery was 38 mm in diameter. The angle of aorta and axis of aneurysm was 83 degree. In preoperative assessment, he rated as high risk for respiratory failure after general anesthesia. We decided to perform EVAR and reconstruct proximal neck with endoanchor. Under general anesthesia, aneurysm was covered with 3 pieces of stent-graft and type Ia endoleak was noted. We fixed proximal stent-graft to aorta, 9 sites on right side and 1 site on left side. On following aortogram, endoleak was reduced remarkably but persisted. We supposed that it will be remodeled and improved spontaneously and ended procedure. It took 195 minutes and transfusion was not needed. He didn't experienced any surgical or medical complication and discharged at 8 days after surgery. On following CT performed after a month, any type of endoleak was not found and diameter of aneurysm sac was decreased.

For AAA patient with hostile proximal neck but open repair is not acceptable, we could manage it by EVAR and proximal neck reconstruction with endoanchor.

Aorta EP-2014 EP-2001 ~ EP-2017

Paraplegia after open repair of suprarenal abdominal aortic aneurysm

Hyo Jun Kim[1], Hyungsub Park[1], Chang Sik Shin[1], Jae S Cho[2], Taeseung Lee[1]

[1]*Department of Surgery, Seoul National University Bundang Hospital, Korea,*
[2]*Department of Surgery, Case Western Reserve University, United States*

Postoperative paraplegia secondary to spinal cord ischemia (SCI) after abdominal aortic aneurysm (AAA) repair is an extremely rare but devastating complication. Although the exact mechanism is still unclear, several mechanisms of postoperative SCI after AAA repair have been proposed. These include surgical interruption of vascular supply to the spinal cord and hypotension-related spinal cord ischemia. In this report, we present a very rare case of postoperative paraplegia secondary to subacute SCI after elective open repair of suprarenal AAA.

A 74-year-old man was admitted for elective repair of 5.5 cm suprarenal AAA. A preoperative abdominal computed tomography angiography showed AAA extending proximally up to the superior mesenteric artery (SMA) origin and distal to the aortic bifurcation. The patient underwent elective open repair of AAA. The patient was admitted to the intensive care unit under light sedation. After the sedatives wore off 6 hours later, the patient was noted to have bilateral lower extremity motor loss, deep tendon reflex loss and sensory loss of the legs. Magnetic Resonance Imaging (MRI) findings were consistent with subacute spinal cord infarction. Immediately after the detection of neurological complication, intravenous administration dexamethasone 20mg was administered for 72 hours and lumbar cerebral spinal fluid drainage (CSF) was instituted and maintained for 5 days. However, the patient's neurological outcome did not improve and recurrent urinary tract infection occurred due to bladder dysfunction. After suprapubic cystostomy formation and rehabilitation, the patient was discharged. Despite vigorous rehabilitation efforts after discharge, the patient still has paraplegia and requires wheelchair for ambulation.

Postoperative paraplegia after suprarenal AAA repair is a very rare complication and precise mechanism is yet to be established.

SCI after abdominal aortic surgery occurs rarely, the surgical team (both the surgeon and the anesthesiologist) must be cognizant of its potential intraoperatively and be ready to institute proper therapy.

Aorta EP-2015 EP-2001 ~ EP-2017

Successful repair of aortoenteric fistula

Yujin Kwon

Department of Surgery, Seoul Medical Center, Korea

Introduction: Aortoenteric fistula (AEF) is a rare but highly fatal cause of gastrointestinal bleeding.

Method: A 69-year-old male was admitted to emergency room due to massive melena which started 6 month prior to first visit and became frequent 3-4 days ago. The patient suffered from dyspnea and had fainted after massive hematochezia. On computed tomography (CT), 4.8 cm lower abdominal aneurysm abutting to duodenal third portion was observed and AEF was suspected and the fistula opening was found in duodenal third portion by gastroduodenoscopy. Also, deep vein thrombosis and pulmonary embolism were diagnosed by CT and IVC filter was insertion prior to the operation.

Result: After dissecting, duodenum was divided from the aneurysm and the opening was closed. Aneurysm was reseced and aortoiliac bypass was done with rifampin soaking graft with omental wrapping.

Conclusion: Aortoenteric fisulta is hard to diagnose and can cause catastrophic complications. However, careful evaluation and operation can make a successful result.

Aorta EP-2016 EP-2001 ~ EP-2017

Saitama experience of aortoesophageal fistula

Takashi Hashimoto, Akihiro Yoshitake, Fumiya Chubachi, Akitoshi Takazawa, Jun Hayashi, Chiho Tokunaga, Atsushi Iguchi, Toshihisa Asakura, Hiroyuki Nakajima

Department of Cardiovascular Surgery, Saitama International Medical Center, Japan

Introduction: Aortoesophageal fistula (AEF) is a rare and potentially fatal disease. Clinical outcomes have improved with evolution of thoracic endovascular aortic repair (TEVAR). On the other hand, few reports have discussed the merits and demerits of TEVAR compared to open surgery or conservative treatment. Furthermore, strategy of repairing esophagus has not established, whether to perform esophagectomy, fistula repair, or esophageal stent. We report our cases, along with the relevant literature, and discuss the optimal strategy to recover this rare disease.

Method: We evaluated the short and intermediate results of TEVAR or open surgery for AEF in our institution. Demographics, clinical findings, intraoperative findings, morbidity, short and long-term mortality were reviewed. From 2009 to 2020, 11 patients were diagnosed as AEF. The average age was 69.6, and all of them were male. 7 patients presented with hematemesis, 1 patient with fever, 1 with chest discomfort, and 1 with loss of consciousness. Etiologies included postoperative mediastinal infection after TEVAR or open surgery, esophageal carcinoma, primary mycotic aneurysm and unknown. 5 patients underwent TEVAR, 2 underwent descending aorta replacement, and 4 did not undergo either treatment. 7 patients underwent esophagectomy.

Result: Two patients, who rejected to be operated expired within 30 days. No patients expired within another 30 days. Another 4 patients expired within one year, one of whose death were related to aortic events.

Conclusion: Short term result of TEVAR is acceptable, however, it remains suspect as a definitive treatment.

Aorta EP-2017 EP-2001 ~ EP-2017

Multifocal aortic steno-occlusion: What's the proper revascularization?

Deokbi Hwang, Seung Huh, Hyung-Kee Kim

Department of Surgery, Kyungpook National University Hospital, Korea

Introduction: Calcification of aorta as well as coronary artery is considered to be associated with cardiovascular events. Studies on the quantification and risk factors for aortic calcification have been occasionally reported, however, treatment options based on severity are not clear. Despite remarkable advances in technology, there are still hard obstacles that cannot be overcome with endovascular approach.

Method: A retrospective chart review was performed on a middle-aged woman with severe aortic calcification.

Result: A 54-year old woman with a medical history of hypertension, dyslipidemia, and essential thrombocytosis (ET), visited our outpatient clinic with claudication after 100 steps. Four months earlier, she had a procedure for spinal stenosis, however, undertook no improvement. In addition, she had a smoking history of 14 pack-year. Regarding ET, she did not take medicine regularly (agrylin, hydrin). At her initial visit, no femoral and ankle pulses were detected and ABI (0.29/0.31) suggested the occlusion above femoral arteries. A recent CT scan showed a multifocal occlusion with flow-limiting calcification from descending aorta to aortic bifurcation and calcification involving the orifice of left renal artery. The decreased function of left kidney was also checked on the DTPA scan.

Under the suspicion of Takayasu's arteritis, PET CT and ANA screening was conducted, however, which showed negative results. Bypass surgery, descending aorta to (distal abdominal aorta-left common iliac artery) and reimplantation of left renal artery was conducted. After operation, she needed a chest tube to treat pleural effusion on left side. That's probably because Dacron graft was placed through the left posterolateral diaphragm. Postoperative kidney DTPA scan showed the improved function of left kidney.

Conclusion: In multilevel aortic calcification, it is important to determine adequate sites for inflow and outflow.

Aortoiliac EP-2018 EP-2018 ~ EP-2021

Case report: A patient with peripheral arterial occlusion undergoing surgical abdominal aortic aneurysm repair

Wan Kee Kim[1], Oh-Hyun Lee[2], Eui Im[2], Jj Woong Roh[2], Yongcheol Kim[2], Seung Jun Song[1], Deok-Kyu Cho[2]

[1]Department of Cardiovascular surgery, Yongin Severance Hospital, Korea,
[2]Department of Cardiology, Yongin Severance Hospital, Korea

Here we present our experience in a patient having abdominal aortic aneurysm (AAA) and peripheral arterial disease.

A 77-year-old male visited hospital for known AAA. A computed tomography (CT) scan revealed that the patient had 58 mm of the abdominal aorta. Although intraluminal irregularity with calcium were observed at both leg arteries, there was no significant flow discontinuation. The operation has been delayed 3 months to define pulmonary nodules.

Abdominal aorta was exposed from the level of the left renal vein to the iliac artery bifurcation. When the infrarenal abdominal aorta was opened, there were no blood flow regurgitation from the both common iliac arteries. AAA repair was performed using a bifurcated artificial graft (Gelweave Bifurcates 24/12 mm, Vascutek Ltd, Scotland, UK) with distal atherectomies of both iliac arteries. On postoperative 1st day, the sensory and motor responses on the both legs were not remarkable. Aspirin and low-molecular weight heparin were administered. Few hours later, however, the patient complained a sudden motor loss on the right leg. An immediate angiography revealed reduced blood flow in the right iliac artery graft. An emergent thrombectomy of the prior graft and additional aorto-right femoral bypass grafting were performed (Advanta VXT, Gentinge, US). The day after second operation, a follow-up angiography was performed. Blood flow in the bifurcated graft was patent, but the aorto-femoral bypass graft was thrombosed due to poor distal run-off. New stenotic lesions in the femoral artery were not observed in the preoperative CT when retrospectively reviewed. After percutaneous stenting (Absolute pro 5.0×100 mm, 5.0×80 mm, Abbott, Illinois, US) at right superficial femoral artery with the retrograde approach, the blood flow and motor function on the right leg recovered.

Proximal mechanical destruction during surgical AAA repair worsened distal arterial obstruction on the leg. Timely evaluation is warranted for patients undergoing vascular surgery.

Aortoiliac EP-2019 EP-2018 ~ EP-2021

Open repair for failed EVAR with sac expansion even after endoanchor

Shin-Ho Hong[1], Dong Hyun Kim[2], Su-Kyung Kwon[2], Won Gong Chu[2], Je Hyung Park[2], Sang Su Lee[2]

[1]*Department of Surgery, Cheongmac Hospital, Korea,*
[2]*Department of Surgery, Pusan National University Yangsan Hospital, Korea*

Introduction: Late open surgical conversion following EVAR may occur in case of sac expansion with persistent endoleak. It is associated significant mortality and morbidity. We report our experience of open surgical conversion due to persistent endoleak after endoanchor (Heli-Fx).

Method: A 86-year-old male patient came to emergency room with complaining back pain on Apr 2020. He previously underwent EVAR on Dec 2017, which was repaired with endoanchor due to endoleak type I with endoanchor on Feb 2018. CT scan presented impending rupture with sac expansion due to persistent endoleak.

Result: The open surgical exploration showed back of sac was rupture with endotension. Surgical conversion was performed with removal of partial stent graft which did not include suprarenal stent and fixation barbs because of endoanchor. After removal of stent graft and aneurysmectomy, abdominal aorta was replaced by Daron graft from previous proximal graft to Rt. distal graft and Lt. external iliac artery. Patient was discharged without any complication.

Conclusion: Even after endoanchor, open surgical conversion may give a complete treatment to overcome complication.

Aortoiliac EP-2020 EP-2018 ~ EP-2021

Treatment of type III endoleak after EVAR using Internal Branched device

Yujin Kwon

Department of Surgery, Seoul Medical Center, Korea

Introduction: Type III endoleaks can be observed in long-term follow-up after endovascular aneurysmal repair graft. It is important to perform urgent repair due to high risk of rupture.

Method: A 64-year-old male underwent left internal iliac artery implanting in common iliac artery and EVAR with internal branched device for right internal iliac artery due to both common iliac artery aneuryms. Three years later, right aneurysmal sac size increase and contrast extravasation was observed in follow up CT imaging, implying type III endoleak.

Result: After right femoral artery puncture, coil embolization was performed and post angiography showed no more extravasation.

Conclusion: Type III endoleak must be immediately repaired owing to risk of rupture. It canbe safely controlled by endovascular treatment.

Aortoiliac EP-2021 EP-2018 ~ EP-2021

Case report: Salvage of Iliac artery rupture during Endovascular aortic Aneurysm Repair (EVAR) procedure

Dong Hyun Kim[1], Yong Beom Bak[2], Su-kyung Kwon[1], Won Gong Chu[1], Je Hyung Park[1], Sang Su Lee[1]

[1]Department of Surgery, Pusan National University Yangsan Hospital, Korea,
[2]Department of Surgery, Cheongmac Hospital, Korea

Technological advances have made it possible to treat most current AAA patients with Endovascular aneurysm repair (EVAR). EVAR appears to be better than open repair in the perioperative period in almost all respects, such as shortening of operation time and length of hospital stay, pain reduction, etc. However, various complications still appear after EVAR. Among those complications, there have been few reports of vascular rupture caused by balloon during EVAR and salvage. This report is to introduce the iliac artery rupture case caused by balloon among EVAR.

One case is a rupture of the common iliac artery caused by a Coda balloon, and the second case is a vascular rupture caused by expanding a narrow external iliac artery using a balloon. In these two cases, we saw a sudden increase in balloon diameter and a decrease in arterial blood pressure during balloon inflation, and confirmed the extravasation in the angiogram.

In the previous case, the amount of bleeding was minimized by inflation of the Coda balloon back into the supra celiac area, while the internal iliac artery was coiled and stent graft extension was applied to the external iliac artery. In the second case, a balloon was applied to the bleeding point to minimize bleeding from the external iliac artery, while a stent graft was prepared and applied to the bleeding area.

In conclusion, we should always be careful of vascular rupture that may occur after balloon inflation when performing EVAR, and when vascular rupture occurs, it is important to immediately inflate the balloon to the proximal aorta or bleeding point to minimize bleeding and to use appropriate stent grafts.

Carotid EP-2023 EP-2023 ~ EP-2024

Carotid artery stenosis revascularization: University of malaya medical centre experience

Muhammad Syafiq Bin Idris, Jazree Bin Jamaluddin, Ashraf Salah Ahmed, Ahmad Rafizi Hariz Bin Ramli

Department of Surgery, University of Malaya Medical Centre Kuala Lumpur Malaysia, Malaysia

Introduction: Carotid artery stenosis remains one of the leading causes of major stroke. Carotid artery revascularization, be it carotid endarterectomy or carotid artery stenting, is proven to be effective in preventing major stroke. University of Malaya Medical Centre first embarked on carotid artery revascularization since late 2017. We are reporting on the outcomes of the first 10 carotid artery revascularization cases done in our institution.

Method: The outcomes of the 10 patients who have undergone carotid artery revascularization have been reviewed retrospectively from our database. 8 patients underwent carotid endarterectomy while 2 underwent carotid artery stenting. The age of the patients ranged from 47 to 76 years old. 7 cases were due to atherosclerotic and 3 cases were due to post radiotherapy. 7 patients were symptomatic while 3 were asymptomatic.

Result: 1 patient who had carotid endarterectomy developed minor stroke (precentral gyrus infarct), presenting with worsening right sided hemiparesis after the carotid endarterectomy. She did not require any surgical re intervention. After 2 months of revascularization, the hemiparesis improved with physiotherapy. No patients developed major stroke postoperatively. There was one mortality reported, in which, a patient who had carotid artery stenting, passed away after 26 days postoperatively due to hospital acquired pneumonia. No cranial nerves injuries were reported for all 10 patients.

Conclusion: The uptake of carotid artery revascularization in Malaysia is still slow. By sharing the outcomes data, hopefully it will create awareness among medical practitioners on the importance of early referral for carotid artery stenosis, hence, preventing major stroke among the patients.

Carotid EP-2024 EP-2023 ~ EP-2024

Delayed rupture of carotid artery following surgical drainage of deep neck infection

Deokbi Hwang, Seung Huh, Hyung-Kee Kim

Department of Surgery, Kyungpook National University Hospital, Korea

Introduction: Pseudoaneurysm of carotid artery is very rare and tends to be reported, especially in immunocompromised conditions. If it were not treated adequately and promptly, lethal results would happen.

Method: Retrospective chart review was conducted in one diabetic patient with carotid artery pseudoaneurysm following deep neck infection.

Result: A 66-year old woman visited ER with fever for 2 days and cough, sputum, rhinorrhea and sore throat that last for 7 days. She had a history of hypertension, diabetes, and osteoporosis. Neck swelling and tonsil enlargement were prominent and she complained of odynophagia. WBC count, ESR and CRP were elevated. Initial neck X-ray indicated the left side deviation of upper air way and neck CT scan was taken, in which 3 cm-sized hypodense lesion encircling the carotid artery about 50% was seen below the right level II SCM muscle. Diagnosed with deep neck infection, she was admitted to ENT department and had a surgery of I&D. In the process, pinpoint tearing occurred on carotid artery and repaired with prolene6-0. Culture tests from pus and blood yielded MRSA. About 10 days later, she was discharged with antibiotics. From 3 days after discharge, neck swelling developed. Newly taken CT scan showed carotid sheath abscess extending toward retropharyngeal space. About 5 cm-sized pseudoaneurysm with 8 mm-sized hole on the postero-media wall, just distal to bulb was seen and it was well-capsulated and filled with thrombus. Infection sign was not clear, which seemed probably due to prolonged use of antibiotics. At first, patch angioplasty with EJV was tried, however, it ruptured. So, bovine pericardial patch was used. Despite repeated clamping, any neurologic deficit did not occurred. After drain removal, she was discharged without complication and stay healthy until a recent date.

Conclusion: Dealyed rupture should be considered, although repair of adjacent vessel is accompanied during the surgical drainage.

PAD EP-2027

The results of hybrid surgery in arterial occlusion of aortoiliac lesion

Sangmin Gong[1], Sang Jun Park[2], Hojong Park[2], Jea Chul Hwang[3]

[1]Department of Surgery, Ulsan University Hospital, Korea,
[2]Department of Surgery, University of Ulsan College of Medicine, Korea,
[3]Department of Radiology, University of Ulsan College of Medicine, Korea

Introduction: Advances in equipment enable higher rates of endovascular revascularization treatments, particularly hybrid surgery has the advantage of being able to effectively perform the procedure with a minimally invasive approach. In this study we evaluated long-term outcomes between different revascularization techniques for patients with aortoiliac occlusive disease.

Method: Patients undergoing treatment at Ulsan University Hospital between January 2006 and December 2018 were retrospectively reviewed. Considering patient limb state and type of lesions, arterial patency was compared in each methods, during follow-up period. The treatment modality were divided by conventional surgery, endovascular treatment and hybrid surgery.

Result: Total 245 patients (open: 21, endovascular: 171, hybrid: 53) were included in this study. There were no significant differences in sex (male vs. female: open, 90.1% vs. 9.9%, endovascular, 85.7% vs. 14.3%, hybrid, 88.7% vs. 11.3%, respectively, P=0.816) or age (mean value: open, 62.8 vs. endovascular, 69.1 vs. hybrid, 68.7, P=0.334). The proportion of critical limb ischemia was high in order of open surgical group hybrid group and endovascular group (66.7% vs. 49.1% vs. 25.7%, respectively, $P < 0.001$). Patients with multilevel and long segmental lesions (TASC C or D) were more in open and hybrid surgery group (open, 100% vs. hybrid, 77.4% vs. endovascular, 3.5%, respectively, $P < 0.001$). The results revealed there is no statistical difference of arterial patency rate of each group during follow-up period (P=0.127).

Conclusion: The hybrid surgery has the benefit of being able to compensate for the possibility of relatively high re-intervention rates, which is a disadvantage when only endovascular procedure is performed alone, while having less possibility of complications in patients with high risk factors.

PAD EP-2028 EP-2027 ~ EP-2041

Single center experience on treatment of isolated Chronic Total Occlusion (CTO) of popliteal artery

Eunju Jang, Sangkyun Mok, Young Jun Park, Jang Yong Kim, Sun Cheol Park, Sang Seob Yun

Department of Surgery, The Catholic University of Korea, Seoul St. Mary's Hospital, Korea

Introduction: Isolated chronic total occlusion (CTO) of the popliteal artery (PA) is not a frequent finding during evaluation of peripheral artery disease. We aimed to evaluate the clinical characteristics, diagnostic studies, and treatment outcomes of patients with isolated CTO.

Method: This was a retrospective study of patients who were treated for isolated CTO of the popliteal artery from prospectively registered database of patients who were treated for peripheral artery disease between 2012 and 2019 at Seoul St. Mary's Hospital, South Korea. We analyzed the etiology, comorbidities, and treatment outcomes.

Result: Thirty-four patients and total 36 limbs were enrolled in the study. The mean age of the patients was 57 years. Our causes included 12 popliteal artery entrapment syndrome (35.3%), 7 popliteal artery aneurysm (20.6%), 6 cystic adventitial disease of the popliteal artery (6%), 3 distal embolization from atrial fibrillation (8.8%), 5 atherosclerosis (14.7%), and 1 popliteal artery pseudoaneurysm (2.9%). The treatments included endovascular treatment in 12 (35.3%), surgical treatment in 16 (47.1%), and observation in 6 (17.6%) patients. One patient experienced in-hospital mortality due to compartment syndrome after thrombolysis. Generally, the open surgical group had a significantly lower complication rate than that of the endovascular group (31.3% vs. 58.3%, P=0.049).

Conclusion: Isolated CTO of the popliteal artery can have different etiologies and different treatment plans. Treatment should be tailored according to each patient's etiology. Open surgical repair should be performed depending on the patient's etiologies. Therefore, in order to minimize complications, surgical options remain important for long-term management.

PAD EP-2029

Mortality after use of pacitaxel coated balloons in femoropopliteal occlusive disease

Seon-Hee Heo[1], Yang-Jin Park[1], Shin-Young Woo[1], Dong-Ik Kim[1], Seung-Hyuk Choi[2], Taek-Kyu Park[2], Young-Soo Do[3], Kwang-Bo Park[3], Young-Wook Kim[2]

[1]*Department of Vascular Surgery, Samsung Medical Center, Korea,*
[2]*Department of Vascular Surgery, Kangbuk Samsung Hospital, Korea,*
[3]*Department of Internal Medicine, Heart Vascular Stroke Institute, Samsung Medical Center, Korea,*
[4]*Department of Radiology and Center for Imaging Science, Samsung Medical Center, Korea*

Introduction: To determine if there is a correlation between dose or frequency of paclitaxel exposure and mortality using independent patient level data from real world experience.

Method: We conducted a retrospective analysis of database of patients who treated with drug-coated balloon (DCB) for atherosclerotic femoro-popliteal lesion during Feb 2013 to Oct 2018 excluding patients with non-atherosclerotic lesion or restenosis after treatment using DCB in other hospital. We investigated the cause of death of individual patients, comorbidities including cancer status and initial and cumulative dose and frequency of paclitaxel use. To determine if dose or frequency of paclitaxel exposure affect mortality, we analyze the risk factors for all cause death conducting time dependent cox regression analysis using demographics, comorbidities (especially including cancer status), lesion, procedural characteristics and paclitaxel exposure data (dose and frequency).

Result: Total 225 patients (mean age 71±9 years, range 38-93 years, male 81%) except 1 patients who could not know if the cancer is cured or not was included for this analysis. During mean follow up duration of 22 months (range 1-78 months), 19 patients (8%) was dead due to respiratory failure with pneumonia (n=5, 26%), septic shock (n=3, 16%), acute MI or heart failure (n=3, 16%), gastrointestinal bleeding (n=1, 5%) and undetermined cause (n=7, 37%). Univariate and multivariate Cox regression analysis identified only age (Hazard ratio, HR, 1.065; 95% Confidential interval, CI, 1.000-1.134; P=0.0492) and critical limb ischemia (HR, 11.487; 95% CI, 2.498-52.823; P=0.0017) as predictors of all cause of death (table 1 & 2). Total dose and frequency of repeated paclitaxel exposure was unrelated to all cause of death.

Conclusion: In this patient level analysis, most cause of death of patients were non-cardiovascular death such as infection and there was no significant association between dose or frequency of paclitaxel exposure and mortality.

PAD EP-2030 EP-2027 ~ EP-2041

Drug-coated balloon versus plain old balloon angioplasty in femoropopliteal disease: A single-center experience

Je Hyung Park[1], Sang Su Lee[1], Su-Kyung Kwon[1], Dong Hyun Kim[1], Wongong Chu[1], Jin-Ho Mun[2]

[1]*Department of Surgery, Vascular and Endovascular Division, Pusan National University Yangsan Hospital, Korea,*
[2]*Department of Surgery, Pusan National University Yangsan Hospital, Korea*

Introduction: An endovascular therapy is usually recommended first for femoropopliteal occlusive disease. However, plain old balloon angioplasty (POBA) has a high rate of restenosis. Recent studies found that drug-coated balloon angioplasty (DCBA) was superior to POBA in terms of preventing restenosis for de novo superficial femoral artery (SFA) disease. Drug-coated balloon angioplasty has emerged as a major treatment for peripheral arterial disease (PAD) involving the superficial femoral and popliteal arteries. To compare the superiority of the outcomes of the two treatments, we report our experience of endovascular therapy with DCBA or POBA in femoropopliteal occlusive disease.

Method: A retrospective review was conducted of 560 patients treated with endovascular therapy in femoropopliteal occlusive disease at Pusan National University Yangsan Hospital between March 2011 to October 2019. Patients were divided into two groups treated with DCBA (n=318) and POBA (n=242) according to the type of treatment, and each outcome was compared. The main outcome measure was primary patency, defined as freedom from of target lesion revascularization (TLR). The risk of major amputation, such as below knee and above knee amputation, during the follow-up period was also analyzed.

Result: Baseline characteristics were similar between two groups. DCBA resulted in higher primary patency versus POBA. The 12-month primary patency rate was 86.3% in the DCBA group versus 81.8% in the POBA group, but the difference was not significant (P=0.212). The 24, 36-month primary patency rate was significantly different in the two group (78.8% vs. 66.8%; P=0.06, 68.8% vs. 40.6%; P＜0.01). There was a significant difference in the major amputation risk during the follow-up period (6.2% vs. 1.3%; P=0.01).

Conclusion: The endovascular therapy with DCB improves primary patency compared POBA in femoropopliteal occlussive disease. DCBA reduces the risk of major amputation and increase the expectation of limb salvage.

PAD EP-2031

Results of common femoral artery endarterectomy with inflow and outflow endovascular treatment

Su-Kyung Kwon, Je Hyung Park, Wongong Chu, Dong Hyun Kim, Sang Su Lee

Department of Vascular and endovascular surgery, Pusan National University Yangsan Hospital, Korea

Introduction: The aim of this study was to investigate the long-term outcome of common femoral artery endarterectomy in patients with peripheral arterial occlusive disease.

Method: The study retrospectively evaluated 226 limbs in 200 patients who underwent common femoral endarterectomy from April 2011 until April 2019 in a single vascular center. Hybrid procedures were used to treat 175 limbs (77.4%). The primary end point was target lesion revascularization (TLR). Limb salvage, and survival rate were the secondary end points.

Result: 85% of patients were male and the mean age was 69.19±8.57 years. Four groups were created according to the endovascular treatment zone: group 1 (only endarterectomy, n= 51); group 2 (inflow, n=38); group 3 (outflow, n=79); and group 4 (combined inflow and outflow, n=58). There were 48 target lesion revascularizations. TLR in each group was 79.0%, 90.7%, 85.4% and 70.32% at 1 year, respectively. Patients in group 2 demonstrated the highest TLR (60.5%) at 5 years. Survival rate in each group was 87.5%, 86.0%, 100% and 89.2% at 5 years, respectively (P=0.008). A total of 7 major amputations were performed, achieving a limb salvage rate of 96.1%. 30 days mortality was 1.8%.

Conclusion: Common femoral endarterectomy combined with an inflow and outflow endovascular revascularization procedure in patients is safe, with acceptable patency rates, despite the need for secondary interventions.

Lipid metabolism may not be associated with the progress of critical limb ischemia: The proliferation study; Multicenter cross-sectional study in Japanese PAD patients

Nobuko Yamamoto[1], Hiroyoshi Komai[1], Hideki Miyama[1], Noriyuki Miyama[1], Kanako Takai[1], Masato Ohno[1], Yuka Kitaoka[1], Masatsune Ogura[2], Atsutoshi Hatada[3], Nobuhiro Tanimura[4], Takashi Nakamura[5], Masato Yoshida[6], Takayuki Kawaura[7], Tomomi Kitawaki[7]

[1]Department of Vascular Surgery, Kansai Medical University Medical Center, Japan,
[2]Department of Molecular Innovation in Lipidology, National Cerebral and Cardiovascular Center Research Institute, Japan,
[3]Department of Cardiovascular Surgery, Saiseikai Wakayama Hospital, Japan,
[4]Department of Vascular Surgery, Aijinkai Inoue Hospital, Japan,
[5]Department of Vascular Surgery, Osaka Rosai Hospital, Japan,
[6]Department of Cardiovascular Surgery, Hyogo Brain and Heart Center, Japan,
[7]Department of Mathematics, Kansai Medical University, Japan

Introduction: This study aims to elucidate the different characteristics of lipid profile between patients with and without critical limb ischemia (CLI). Additionally, we tried to evaluate the incidence of familiar hyperlipidemia (FH) among PAD patients.

Method: This study was designed as multicenter cross-sectional analysis. Two hundred and eighty-four patients with peripheral arterial disease were recruited at five vascular centers in Kansai area in Japan. The blood sample was obtained to check the hematological and biochemical data. Achilles tendon thickness was measured using X-ray radiography. The attending doctor or nurse carefully interviewed and gained the past history, family history and present medication. All data was analyzed and compared between the CLI and non-CLI groups. The incidence of FH was accessed using the criteria of Japan Atherosclerosis Society.

Result: No patient matches the criteria of FH. CLI patients had significantly lower body weight and BMI. More patients in the CLI group had diabetes, end-stage renal disease, history of CAD and atrial fibrillation than those in the non-CLI group. Less patients had history of smoking and took statin in the CLI group. Albumin, alanine transaminase, T-Chol, LDL-C and TG were significantly lower in the CLI group, whereas alkaline phosphatase was higher. Logistic regression analysis revealed body weight, ESRD, CAD and TG were identified to be determinant factors of CLI.

Conclusion: Judging from the results, the lipid markers seem to be offset by the malnutrition in the CLI patients. Lipid titers are no longer the target of the treatment. Lipid contribution to the development of severity should be studied in the different aspect in the future.

PAD EP-2033 EP-2027 ~ EP-2041

Drug-coated balloon in combination with Nitinol stent for critical Limb threatening ischemia

Minsang Song[1], Wongong Chu[2], Dong Hyun Kim[2], Hyuk Jae Jung[3], Su-Kyung Kwon[2], Sang Su Lee[2], Je Hyung Park[2]

[1]Department of Surgery, Vascular and Endovascular Division, Dong Rae Bong Seng Hospital, Korea,
[2]Department of Surgery, Vascular and Endovascular Division, Pusan National University Yangsan Hospital, Korea,
[3]Department of Surgery, Vascular and Endovascular Division, Pusan National University Hospital, Korea

Introduction: We aimed to evaluate the safety and feasibility of treating long infra-inguinal occlusion stenosis using a Drug-coated balloon (DCB) in combination with nitinol stent (NS).

Method: The DCB with NS study was a single center, feasibility, and safety study that enrolled 77 patients (mean age 70.2.±12.6 years; 62 men). Enrolled patient Lesions were classified as Trans-Atlantic Inter-Society Consensus classification (TASC II). For a concomitant inflow or outflow lesion, treatment was performed DCB with NS simultaneously. We analyzed the primary patency of the lesion, freedom from clinically-driven target lesion revascularization, and mortality using Kaplan-Meyer analysis. Medical records were reviewed retrospectively.

Result: Patients with TASC Ⅱ A, B to C and D comprised 6 (7.8%), 19 (24.7%). 29 (37.7%) and 23 (29.9%) of the group, respectively. The technical success rate was 100%. The primary patency rates at 12 and 18 months were 84.5% and 75.2%, respectively. The Free from target lesion revascularization rates at 12 and 24 months were 91.1%.and 81.0% The pre-operative mean ankle brachial index (0.52±0.30) increased to 0.84±0.29 at 1 year post operatively (t-test, $P < 0.05$). The amputation free survival rate was 100%. The 2-year all-cause mortality was 6 (7.8%). All mortality cases were non-paclitaxel related.

Conclusion: we have shown that DCB with NS HT is a feasible alternative modality for patients with multi-level PAD, with satisfactory amputation-free survival and freedom from re-intervention rates.

PAD EP-2034 EP-2027 ~ EP-2041

Peripheral artery bypass graft of hand or foot ischemic ulcer in connective tissue diseases: A treatment algorithm

Jong Ho Kim, Seokchan Eun

Department of Plastic and Reconstructive Surgery, Seoul National University Bundang Hospital, Korea

Introduction: Chronic ischemia of hands and feet is a rare medical condition which requires surgical revascularization. Especially, digital ischemia resulting from connective tissue disease (CTD) is one of the most important manifestations that damages patients' quality of life. In this article the authors will describe the bypass graft technique for treating digital ischemia. The aim of this study is to share the considerable benefits of surgical intervention in CTD and present the treatment algorithm.

Method: From 2009 to 2017, bypass graft surgery was performed in 11 patients to relieve their hands and feet from ischemia. All the patients had connective tissue diseases. Preoperative angiographies were performed and blood distribution pattern was analyzed in detail. Based on the angiographic 4-level analysis, bypass graft surgeries were performed.

Result: Postoperative follow-up ranged from 3 months to 4 years. The hands on which bypass grafts were performed improved immediately from ischemic pain following surgery. All ulcerations healed and did not reoccur in follow-up period.

Conclusion: We proposed a proper surgical treatment algorithm for the management of these CTD patients through arterial bypass graft surgery which is an appropriate option for treating digital ischemia based on the positive long-term results. In conclusion, taking strict measure with precise preoperative planning can provide a satisfied long-term result in these patients.

PAD EP-2036

Prognostic factors of amputation and effectiveness of revascularization in patients with diabetic foot ulcer under SVS-WIfI score classification system

Saritphat Orrapin[1,2], Theotphum Benyakorn[1,2], Kanoklada Srikua[1,2], Boonying Siribumrungwong[1,2]

[1]Vascular Surgery Division, Department of Surgery, Faculty of Medicine, Thammasat University (Rangsit campus), Thammasat University Hospital, Thailand,
[2]Thammasat University - Center of excellence for Diabetic foot care (TU-CDC), Thailand

Introduction: Diabetic foot ulcers (DFU) is a severe burden on the global healthcare system. Amputations caused by DFU lead to significant morbidity and mortality in diabetic patients. The SVS WIfI (wound, ischemia, foot infection) classification system can predict 1-year amputation risk and benefit from revascularization. We aimed to evaluate the prognostic factors of amputation and the predictive ability of SVS-WIfI score in Asian patients with DFU.

Method: 91 patients who presented with DFU between August 2018 and July 2019 were reviewed in this cohort study. Prognostic factors of limb loss were compared between the amputation and non-amputation groups. The real-world outcome and effectiveness of revascularization were compared with SVS-WIfI score classification System.

Result: There were 56 (61.5%) patients were diagnosed with the peripheral arterial disease (PAD). There were 45 patients (49.4%) with chronic limb-threatening ischemia (CLTI) who indicated for both open and endovascular revascularization. The overall major amputation rate was 17.6%. Major amputation rate was 7.1%, 0, 12.5% and 30.3% in SVS-WIfI 1, 2, 3 and 4 respectively. Multivariate analysis was demonstrated the prognostic factors of major amputation including PAD (P=0.010), SVS-WIfI score (P=0.008) and Wagner-Meggitt classification score (P=0.005). A high Wagner-Meggitt classification score is strongly associated with a high rate of minor amputation. ($P < 0.001$) Open revascularization surgery was more favored for high overall and wound grade of SVS-WIfI score for promote wound healing in extensive tissue loss area. However, the type of revascularization was not affected by major and minor amputation rates. (RR =1.03, P=0.949 and RR=1.1, P=0.677, respectively).

Conclusion: PAD, SVS-WIfI score, Wagner-Meggitt classification score were strong prognostic factors of major amputation in patients with DFU. The real-world major amputation rate under SVS-WIfI score was comparable.

PAD EP-2037 EP-2027 ~ EP-2041

Association between clinical outcomes after revascularization and foot wound area in patients with chronic limb-threatening ischemia

Shinsuke Kikuchi, Daiki Uchida, Yuri Yoshida, Takamitsu Tatsukawa, Yohei Ichikawa, Tomoki Nakatsu, Ai Tochikubo, Atsuhiro Koya, Yukihiro Saito, Nobuyoshi Azuma

Department of Vascular Surgery, Asahikawa Medical University, Japan

Introduction: To assess association between foot wound area and patient's clinical outcomes, patient's prognosis, limb salvage and wound healing after revascularization were evaluated in patients with chronic limb-threatening ischemia (CLTI).

Method: A total of 363 consecutive threatening limbs in 286 patients who underwent surgical revascularization (80%) and/or endovascular therapy (20%) from 2014 to 2019 were retrospectively reviewed. Tissue loss was included in 303 limbs (236 patients, 82%). A total of 75% of patients were diabetic, and 47% of patients had dialysis-dependent renal disease. Foot wounds were classified into the 5 following wound area; toe (55%), forefoot (21%), malleolus (8%), heel (14%) and lower thigh (2%). 5-year cumulative survival rate, limb salvage rate and 6-month cumulative wound healing rate were calculated by a Kaplan-Meier curve method and compared by each wound area by a log-rank test and a Bonferroni-adjusted P-value (P=0.01 was significant).

Result: The wound healing rate of toe, forefoot, malleolus, heel and lower thigh was 88%, 69%, 75%, 56% and 72%, respectively; wound healing on forefoot and heel significantly delayed compared to that on toe (P $<$ 0.001 for each vs. toe), but not for malleolus (P=0.29) and lower thigh wounds (P=0.09). Limb salvage rate was more than 90% regardless of foot wound area, in which there was no difference among foot wound area. In terms of patient's prognosis, no difference was seen in 5-year survival rate among patients regardless of foot wound area; forefoot (57%, P=0.88), malleolus (59%, P=0.45), heel (25%, P=0.23) and lower thigh (0%, P=0.03) compared to toe (42%).

Conclusion: Satisfactory limb salvage rate was achieved for CLTI by revascularization. Although foot wound area was associated with wound healing rate, patient's prognosis was not altered. Further investigation should be performed to evaluate how foot wound area gives impact in clinical outcomes with CLTI.

PAD EP-2038

Angioplasty balloon rupture during percutaneous transluminal angioplasty of severe calcified stenotic lesion of common iliac artery

Dae Jung Kim[1], Je Hyung Park[2], Wongong Chu[2], Dong Hyun Kim[2], Sang Su Lee[2], Su-Kyung Kwon[2]

[1]Department of Surgery, CheongMac Hospital, Korea,
[2]Department of Vascular and Endovascular Surgery, Pusan National University Yangsan Hospital, Korea

Circumferential rupture of angioplasty balloons is an unusual complication of percutaneous transluminal angioplasty (PTA). We describe a complication of balloon rupture and fragmentation in a patient undergoing common iliac artery stent placement.

Case: A 78-year-old female with a history of diabetes, hypertension, atrial fibrillation, aortic valve replacement (AVR) and 3-vessel CABG presented with both leg claudication less than 100 meters. The preoperative ankle-brachial index (ABI) was 0.56 and 0.57 on the right and left side, respectively. Computed tomography (CT) angiography demonstrated 50% stenosis of aorto-iliac bifurcation accompanied with severe calcification and 50% to 75% focal stenosis with severe calcification in the both common femoral artery (CFA). She underwent the hybrid operation with both CFA endarterectomy and kissing stent insertion in the both CIA stenosis lesion. While the procedure of kissing stenting (8 mm by 57 mm and 37 mm, Visi-Pro Balloon Expandable Peripheral Stent System, Medtronic, Minneapolis, MN, USA), left side balloon was ruptured. After withdrawing the balloon catheter, a circumferential tear was noted.

The proximal fragment of the balloon was stuck in the stent. Through the Lt. brachial artery approach, we tried to push the remained fragment using 6 mm by 4 cm balloon catheter (Admiral Xtreme, Medtronic, Minneapolis, MN, USA) out of Lt. CFA and removed it successfully. On the final angiography, we confirmed the patent inflow and runoff. She had treated with Lt. foot cellulitis and discharged after post-operative 16 days. The follow up ABI was 0.94 and 0.91 on the right and left side.

A pushing the fragment using balloon angioplasty out of CFA is an option for retrieving foreign objects or device fragments that the lesion is iliac arteries.

PAD EP-2039 EP-2027 ~ EP-2041

Thromboembolic phenomenon to bilateral lower limbs is a catastrophic complication of Blood Culture-Negative Infective Endocarditis (BCNIE)

Rosnelifaizur Ramely[1,2], Razif Ismail[1], Mohd Shakirin Pairan[3], Wan Yus Haniff Wan Isa[3,4], Syed Hassan Syed Ab Aziz[1,2], Wan Zainira Wan Zain[1,2], Mohd Nizam Md Hashim[1,2], Andee Dzulkarnain Zakaria[1,2]

[1]Department of Surgery, USM, Malaysia,
[2]Department of Surgery, HUSM, Malaysia,
[3]Department of Medical, USM, Malaysia,
[4]Department of Medical, HUSM, Malaysia

Introduction: BCNIE poses a dilemma in terms of diagnosis, associated complication, and treatment. The thromboembolic mechanism is from the dislodge portions of the platelet-fibrin matrix of vegetation which travel to the distal arteries, lodging in a vascular bed, and propagate to occlude the affected vessels.

Method: A 33-year-old gentleman presented with chronic fever . He had several visits to the local clinic and was given a short course of oral cefuroxime. On presentation, his hemodynamically unstable, high-grade fever and a pansystolic murmur on mitral area which suggestive of mitral regurgitation (MR). There also presence of Roth spots on fundoscopy and microscopic haematuria on urine examination. He had poor denture. Trans-thoracic echocardiography revealed a large vegetation size 2.81 cm^2 and severe MR. However, no causative microorganism growth. He was diagnosed as BCNIE and intravenous ceftriaxone and gentamicin were commenced. While on antibiotics, he developed Rutherford grade 2b bilateral lower limb ischaemia,. A CTA showed multilevel bilateral lower limb thrombosis involving bilateral common iliac arteries down distally. Patient underwent emergency bilateral open femoral embolectomy.. Intra-operatively clot evacuated from both femoral arteries. Post-operative care with short-term anticoagulant, adequate analgesia, antibiotic therapy and physiotherapy successfully reverse the acute ischaemic event. He was discharge after 6 weeks while waiting for his decision for mitral valve replacement.

Result: In this case, a poor denture is the most likely source of infection. As the circulation of lower limb compromised, emergency surgical intervention was performed in a timely manner. This case highlighted that despite the rarity of BCNIE causing limb ischaemia, it still can occur due to significant risk factors.

Conclusion: A thromboembolic phenomenon is rare to affect bilateral lower limbs moreover the level of occlusion is affecting the common iliac artery and distally. The early recognition of acute limb ischaemia and prompt treatment are deemed important in saving the threatened limb.

PAD EP-2040

Case report: Delayed Percutaneous Transluminal Angioplasty (PTA) on the Below-The-Knee (BTK) artery access from In-situ bypass graft

Kang Woong Jun[1], Mi Hyeong Kim[2], Jeong Kye Hwang[2], Ji Il Kim[3]

[1]Department of Vascular Surgery, The Catholic University of Korea, Bucheon St. Mary's Hospital, Korea,
[2]Department of Vascular Surgery, The Catholic University of Korea, Eunpyeong St. Mary's Hospital, Korea,
[3]Department of Vascular Surgery, The Catholic University of Korea, Uijeongbu St. Mary's Hospital, Korea,

Critical limb threatening ischemia (CLTI) is condition of end stage of peripheral artery disease, and associated with high morbidity, mortality, and limb loss rate. Most of CLTI patients have complex, multilevel arterial lesions, and as the success of endovascular intervention is largely defined by the complexity of atherosclerosis within the anticipated target arterial path (TAP) that provides inline flow to the foot, revascularization is very challenging to vascular surgeon.

A 78 year-old male patient was visited to clinic right (Rt) 1st toe rest pain (NRS 8) with unhealed ulcer for 2 weeks. Ankle-brachial index (ABI) was not check on Rt leg, and on CT angiography demonstrated that significant stenosis at right distal superficial femoral artery (SFA) and proximal popliteal artery (PoA), complete occlusion at right mid PoA (P2 lesion) by large calcified plaque, and segmental occlusion at Rt anterior tibial a. (ATA), right mid poterial tibial a. (Post. TA). Due to heavy calicific occlusion on Rt PoA. (5 cm in length), we perform the Femoro-popliteal (BTK) artery in-situ bypass with GSV using valvulotome. After bypass surgery, ABI was improved to 0.64 at post operative day (POD) 14 and pain was improve, but the ulcer was not improve at POD 2month. We cut-down the bypass graft of the mid-thigh level, and puncture with micro-needle, 5 Fr sheath was inserted, we performed the PTA with 2.5 mm balloon on ATA, Post. TA and 2 mm balloon on common plantar artery. After post-intevention day 3 month, ABI was improve to 0.77, ulcer was completely healed and pain subside without any needs of analgesics.

CLTI with multilevel lesion, successful revascularization is very challenging, though, combination of surgery and endovascular, with staged procedure could another treatment of option for old age, high risk patient with CLTI.

PAD EP-2041 EP-2027 ~ EP-2041

Impact of patient risk and limb severity on preoperative grate saphenous vein for distal bypass grafting in chronic limb-threatening ischemia

Yuri Yoshida[1], Shinsuke Kikuchi[1], Yuki Tanaka[2], Takamitsu Tatsukawa[1], Daiki Uchida[1], Atsuhiro Koya[1], Yukihiro Saito[1], Nobuyoshi Azuma[1]

[1]Department of Vascular Surgery, Asahikawa Medical University, Japan,
[2]Department of Faculty of Medicine, Asahikawa Medical University, Japan

Introduction: The availability and quality of great saphenous vein (GSV) are the key consideration for lower extremity bypass surgery. Nothing is known how the WIfI classification give impact on vein wall remodeling of a preoperative GSV.

Method: Fresh GSVs were obtained as residual specimens from 89 patients performed distal bypass surgeries for chronic limb-threatening ischemia (CLTI) between 2010 and 2018. The preoperative GSV samples were fixed for histology and thickness of intima and media layer of the samples was measured using IMAGEJ analysis to evaluate vein wall remodeling. Patient's background and limb severity expressed by WIfI classification were analyzed to assess factors involved with vein wall remodeling of preoperative GSV.

Result: Average thickness of intimal and medial layer of preoperative GSV was 46.6±5.8 μm and 292±15.2 μm, respectively. Although patient's risk did not alter intimal thickness of preoperative GSVs, wound grade (W) in WIfI classification significantly altered the intimal thickness; high grade (W 2-3) thickened intima more, compared to low grade (W 0-1) (54.3±7.6 vs. 29.1±6.7 μm, P=0.045), but not in the other two components, ischemia and foot infection. Ischemic heart disease (IHD) and non-ambulatory status significantly reduced the medial thickness (P=0.04 for each). Multiple regression analysis demonstrated that wound grade was the significant factor related intimal thickness (P=0.048), and medial thickness was affected by the two following factors, IHD (P=0.03) and preoperative physical status (P=0.04). Regarding midterm clinical outcome, intimal and medial thickness of preoperative GSV did not predict patient's survival rate, graft patency rate as well as limb salvage rate.

Conclusion: Preoperative vein wall remodeling was affected by patient's background and limb severity. CLTI preoperatively alters the underlying pathology of GSV, and clinical outcome might be determined by postoperative pathophysiological change of GSV.

Rare Vascular Disease EP-2042 EP-2042 ~ EP-2048

A rare case of acute bilateral iliofemoral deep vein thrombosis after heavy exertion

Paul Ghaly, Animesh Singla, Gregory Leslie

Department of Vascular Surgery, Liverpool Hospital, Australia

Introduction: Effort thrombosis of the upper limbs, known as Paget-Schroetter's Syndrome, is a well-recognised condition, however, there are few reports of effort thrombosis affecting the deep venous system of the lower limbs in healthy individuals.

Method: Acute, unprovoked bilateral iliofemoral deep vein thrombosis is typically associated with inferior vena cava congenital anomalies.

Result: We present a case examining the diagnosis and management of a young female with acute bilateral iliofemoral thrombosis following high-intensity physical activity, without evidence of an iliocaval anomaly on multimodal vascular imaging techniques.

Conclusion: Lower limb effort thrombosis is a rare syndrome that should be considered in young individuals, particularly athletes, in the absence of common aetiologies for lower limb deep vein thrombosis.

Case report: Medusa's wrath; bleeding giant scalp arterio-venous malformation in an adult

Richard Briones, Kathleen Cruz, Dave Resoco

Department of Surgery, Bicol Medical Center, Philippines

Scalp arteriovenous malformation (AVM) is a rare congenital disease that may present with massive bleeding. The occurrence of such often prompts patients to seek medical intervention. Although surgical excision remains to be the definitive management, high blood flow and complex vascularity of the tumor may lead to complications, such as intraoperative hemorrhage.

A 49 year-old Filipino male presented with a giant scalp arteriovenous malformation, which has been present since birth. Episodes of bleeding prompted consult, requiring blood transfusion during admission. Computed tomographic scan and duplex studies showed multiple feeding vessels with turbulent flow arising mostly from the right superficial temporal, right posterior auricular and occipital vessels. During surgery, the patient was initially placed in the supine position to allow proximal control of the right external carotid artery using a vascular clamp. The patient was then turned to the prone position to achieve maximal skin-sparing incision prior to excision. Ligation of bilateral superficial temporal and posterior auricular arteries were performed. Excision above the periosteum with segmental ligation of feeding vessels around the AVM was carried out. This was followed by reconstruction of the defect via scalp advancement flap and split-thickness skin grafting. Intraoperative blood loss was 1.6 liters.

The patient was discharged on the 6th postoperative day with 100% graft take.

Management of scalp AVMs is challenging due to high shunt flow, complex vascular anatomy, and potential cosmetic defects. Preoperative embolization has been recommended to decrease the risk of bleeding; however, this procedure is currently not available in our setting. Our case highlights the complexity of the management of giant scalp AVMs. Outright surgical excision can be safely performed in areas with no or limited equipment for endovascular intervention.

Rare Vascular Disease EP-2044 EP-2042 ~ EP-2048

Anterior mediastinal mass: Large cell neuroendocrine tumour of the thymus

Rosnelifaizur Ramely[1,2], Harinthiran Vijeyan[1], Ahmad Zuhdi Mamat[1,2], Syed Hassan Syed Ab Aziz[1,2]

[1]Department of Surgery, USM, Malaysia,
[2]Department of Surgery, HUSM, Malaysia

Introduction: In 1972, Rosai and Higa first described primary neuroendocrine tumours of thymus (NETT). This is a rare case of thymic large cell neuroendocrine tumour with a unique method of vascular reconstructions.

Method: A 51 years old gentleman had an incidental finding of a mediastinal mass on chest x-ray. Computer Tomography (CT) performed showed, locally advanced anterior mediastinal mass likely thymic in origin. Adjacent vessels were involved including the brachiocephalic trunk, superior vena cava with tumour thrombus. Biopsy of the mass revealed large cell neuroendocrine carcinoma of the thymus. He underwent chemo-radiotherapy and reassessment CT showed little improvement. We performed sternotomy, en-bloc resection of tumour with brachiocephalic trunk and left brachiocephalic vein. Reconstruction was done from ascending thoracic aorta to the right common carotid artery using ePTFE graft and superior vena cava to left BCV using a bovine graft. There was part of the lung and pleural tissue which was removed together with the tumour and repaired. Post-operatively he recovered well. He is planned for chemo-radiotherapy.

Result: Thymic neuroendocrine tumours constitute approximately 5% of all thymic tumours. Large cell neuroendocrine carcinoma (LCNEC) is considered to have a poorer prognosis and aggressive. They usually present in the advanced clinical stage similar to this case. This mass was in the anterior mediastinum and the histopathological findings showed large, polygonal in shape with moderate to abundant cytoplasm. Immunohistochemistry staining showed positive for chromogranin, CKAE1/AE3, and was negative for TTF-1. Hence, this was likely thymic LCNEC instead of lung LCNEC. Following Masaoka-Koga stage classification for thymic tumours, this tumour would be representing stage IVa.

Conclusion: This is a rare and aggressive form of tumour which require more studies to design better management.

Rare Vascular Disease EP-2046 EP-2042 ~ EP-2048

A case report and review of literature: Intravascular papillary endothelial hyperplasia occurring in the foot

Sangchul Yun[1], Inho Choi[2]

[1]*Department of Surgery, Soonchunhyang University Seoul Hospital, Korea,*
[2]*Department of Pathology, Soonchunhyang University Seoul Hospital, Korea*

Introduction: Intravascular papillary endothelial hyperplasia (IPEH; Masson tumor) is a type of vascular lesions composed of reactive proliferation of endothelial cells that occur in organizing thrombus. It commonly occurs on the head, neck, trunk, and upper extremities, but rarely in the foot.

Method: A 38-year-old woman visited the hospital with a mass on the dorsum of right foot, which gradually increased in size 3 months ago. Diagnoses: Ultrasonographic examination suggested angiomyolipoma or hemangioma. Interventions: The patient underwent excision under local anesthesia.

Result: The lesion was confirmed to be IPEH by histological examination. There were no complications or recurrences after successful surgical excision.

Conclusion: IPEH presenting on the dorsum of the foot is vary uncommon. Radiologic diagnosis may be limited for diagnosis, and histologic confirmation should be made after surgical excision. There are some reports suggesting an association between trauma and IPEH occurrence, but this is not yet conclusive.

Rare Vascular Disease EP-2047 EP-2042 ~ EP-2048

Spontaneous common iliac artery dissection and rupture in a young man: Report of a rare case

Young Sun Yoo

Department of Surgery, Chosun University Hospital, Korea

Introduction: Spontaneous dissection and rupture of the common iliac artery is rare and limited to few case reports. We report a case of spontaneous common iliac dissection and rupture treated with surgical repair.

Method: A 35-year-old healthy man presented to our hospital with sudden abdominal pain without any other traumatic history. At admission, the blood pressure was 60/40 mmHg, and physical examination showed abdominal distension especially in the left lower quadrant. The initial hemoglobin (Hb) level was 10.3 mg/dl, but one hour later, Hb level dropped to 5.3 mg/dl. A contrast-enhanced abdominal computed tomography (CT) revealed rupture of the left distal common iliac artery (CIA) with massive retroperitoneal hematoma. Because of his hemodynamic instability, we decided for immediate open surgery.

Result: The distal abdominal aorta was clamped, and the left iliac artery was dissected. The rupture site was located in the distal left CIA and not extended to the left external iliac artery (EIA). The arterial wall was extremely thin and friable, and intraluminal dissection was identified in the rupture site. At first, we performed left CIA to common femoral artery (CFA) bypass with polytetrafluoroethylene (PTFE) graft after distal CIA ligation. However, bleeding from clamping site of proximal CIA could not be repaired due to its fragility. The proximal anastomosis site was changed to distal abdominal aorta with proximal CIA ligation, and graft-graft anastomosis was done. At the end of the operation, the abdominal wound was not closed due to severe bowel edema. After 48 hours of intensive unit care with vacuum-assisted closure, delayed abdominal wound closure was done. The patient was recovered uneventfully and was discharged without any complications.

Conclusion: A spontaneous CIA ruptured and dissection is rare but life-threatening event. Physicians should be aware of the sign and symptom and the urgent surgical repair is essential for life saving.

Ilio-femoral deep vein thrombosis secondary to may-thurner syndrome with ipsilateral lower limb arterio-venous graft in-situ

Brjan Kaiji Betzler[1], Li Zhang[2], Kai Siang Chan[2], Enming Yong[2], Ivan Kuang Hsin Huang[3], Zhiwen Joseph Lo[2]

[1]Lee Kong Chian School of Medicine, Singapore,
[2]Department of Vascular Surgery Service, Department of General Surgery, Tan Tock Seng Hospital, Singapore,
[3]Department of Diagnostic Radiology, Tan Tock Seng Hospital, Singapore

Introduction: Ilio-femoral deep vein thrombosis (DVT) is rare in patients with lower limb arterio-venous grafts due to a state of high blood flow, with a paucity of literature describing its incidence and management. However, we report a case of DVT in a patient with an AVG in-situ due to underlying May-Thurner syndrome and our management.

Method: The patient was a 71-year old Chinese male with a background of end-stage renal disease with a left superficial femoral artery to common femoral vein loop AVG. He presented with acute lower limb swelling a year after AVG creation. A literature search on DVT in LLAVG revealed a paucity of reports or studies documenting the management of DVT with LLAVG in-situ and underlying MTS; hence we adopted a multi-pronged approach in the management of the rare occurrence of DVT with LLAVG in-situ and underlying MTS. This consisted of catheter-directed thrombolysis, pharmaco-mechanical thrombectomy, venoplasty and iliac vein stenting. Anti-coagulation bridging was also started.

Result: Lower limb edema resolved and our approach showed feasibility and safety, with follow-up surveillance duplex ultrasound showed patency of the iliac vein stent and AVG at 1-year postoperatively. The patient recovered uneventfully.

Conclusion: Acute lower limb swelling in patients with LLAVG warrants the need for imaging to exclude graft thrombosis. Findings of DVT in LLAVG in-situ should prompt further investigations to exclude a concomitant pathology pre-disposing patients to a pro-thrombotic state. The use of a combination of mechanical thrombectomy, venoplasty, iliac vein stenting and systemic anticoagulation in DVT with LLAVG in-situ and underlying MTS in this patient was feasible and safe with favourable outcomes.

Vascular Access EP-2049

Percutaneous venoplasty for central venous stenosis: Effect on patient's symptoms and patency of arteriovenous accesses

Zia Rehman[1], Abdul Hakeem[1], Raza Sayyani[2], Nida Zahid[1]

[1]Department of Surgery, Aga Khan University Hospital, Pakistan,
[2]Department of Radiology, Aga Khan University Hospital, Pakistan

Introduction: To determine symptomatic relief and patency rate of arteriovenous (AV) fistulae and grafts after venoplasty in patients with central venous stenosis (CVS) on hemodialysis.

Method: The data of patients who had one session of successful venoplasty for CVS were reviewed. The outcomes measured were symptomatic recovery and improvement in the patency of AV accesses. Symptomatic recovery was termed 'complete', when there was complete symptomatic relief after venoplasty; and 'partial' when the procedure was technically successful, but symptoms were not resolved. Primary patency of AV access was the duration from first intervention till further intervention. Cumulative patency was the total duration of time fistula remains patent with multiple interventions. Events, considered endpoints to functional access status, were the placement of new access site, ligation of access site, dialysis catheter placement or the patient death.

Result: Thirty-five patients had technically successful venoplasty with a mean age of 56.86 ±14.6 years. Twenty-one (60%) were female patients. All patients tolerated the procedure well. Twenty-one (60%) patients had complete relief of symptoms. Fourteen patients (40%) had partial relief of symptoms. Twenty-one patients required repeat angioplasties. The mean follow-up was 18.6 ±9.02 months. Primary patency was 40%, 24%, 24% at 6, 12 and 24 months. Cumulative patency was 69%, 66% and 59% at 6, 12 and 24 months.

Conclusion: Percutaneous venoplasty provided symptomatic relief to the patients and improved the short-term patency of AV accesses.

Vascular Access EP-2050 EP-2049 ~ EP-2060

Early experience of midline catheter device powerglide pro tm for patients with poor peripheral vascular access

Mi Jin Kim, Cheol Seung Kim, Kyu Dam Han

Department of surgery, Presbyterian Medical Center, Korea

Introduction: Intravascular treatment is essential in most cases for inpatients. Therefore, it is very important to secure peripheral blood vessels. However, the number of cases in which peripheral blood vessels are poor due to aging and underlying diseases has recently increased. Accordingly, the use of PICC or CVC catheter is increasing, but in the case of such central vascular involvement procedure, the procedure cannot be performed on the bedside, and these procedures has limitations, that radiation and using contrast media must be used. Midline catheter, Powerglide Pro TM (BD) recently launched in Korea, is known as a device that can be implemented by compensating for these shortcomings. The authors share the initial experience of this midline catheter.

Method: Retrospective chart review was conducted on patients who were consulted with vascular surgeons for midline catheter in admitted to the Presbyterian Medical Center from March 2020 to June 2020. For the procedure device, the Powerglide proTM (BD) 18 G and 20 G 8 cm sizes were used.

Result: A total of 99 patients were included in the study. The total dwell time of the remaining 99 midline catheters was 1571 days with median of 15.87 (range 1-50) days. Of these catheters, 26 (26.3%) were removed before the indication for intravenous therapy had ceased. Among them, 26 (26.3%) were removed by complication, but only 1 (2%) was major complication confirmed (deep vein thrombosis on upper arm). In addition, there was no statistically significant difference in prematured catheter removal of subgroups (patient sex, age, BMI, ICU care, catheter size, admission reason, procedure reason, and type of vessel used).

Conclusion: The midline catheter is generally safe, and it is possible to secure the intravenous therapy during the patient's treatment period. And the procedure is simple and safe, so the use of the midline catheter will be helpful to the patient's hospital life of quality.

Vascular Access EP-2051 EP-2049 ~ EP-2060

Clinical outcomes of totally implantable venous access ports: Comparison between arm and chest port in cancer patients

Hong Pil Hwang, Byeoung Hoon Chung, Dong Hyun Lym, Hee Chul Yu

Department of Surgery, Jeonbuk National University Hospital, Korea

Introduction: To evaluate the safety, technical feasibility, and complications of totally implanted venous access ports (TIVAPs) in the arm, to comparison with chest ports in patients with solid organ cancer patients in single center.

Method: We identified 502 patients who underwent TIVAP implantation in the upper arm (n=95) or chest (n=407) between July 2018 and June 2019, retrospectively. Implantation via an upper arm (arm port) or jugular vein (chest port) was performed under sonographic and fluoroscopic guidance under local anesthesia. We reviewed the medical records to determine technical success and complications with analyzed the cause of port removal.

Result: In total, 502 devices were implanted in the upper arms (n=95, 19%) and chests (n=407, 81%) of the patients. The technical success rate was 100%. 10 patients (6.7%) occurred complication in arm port group, and 12 patients (9.9%) underwent complication in chest port group. There was no significant difference in complication-free rate in both groups. Most common cause of port removal was local infection with abscess and wound dehiscence. 2 patients diagnosed systemic infection in arm port group.

Conclusion: Implantation of TIVAPs in the upper arm is safe and feasible procedure with a low rate of complications. Upper arm TIVAPs can be a good substitute for chest port.

Vascular Access EP-2052 EP-2049 ~ EP-2060

Immediate postoperative cannulation of trnasposed basilic vein for hemodialysis

Taegeun Rim

Department of Thoracic and Cardiovascular Surgery, CheongJu HANA General Hospital, Korea

Introduction: Usually basilic transposition or superficialization was done for hemodialysis on upper arm basilic vein. After procedure, takes a some wound stabilization period for HD cannulation. So most of patient needs central catheter for HS. This institute have several patient who received hemodialysis treatment right after the basilic transposition within 3 days. It could a alternative measure to prevent central catheterization for patient who have basilic transposition especially using maturated basilic vein.

Method: Surgical protocol is same with conventional upper arm basilic vein transposition or superficialization of cephalic vein after AVF brachiocephalic. To prevent the central catheterization, direct cannulation of transposed vein was done and maticulous manual compression hemostasis is acceptable result without complication.

Result: There is no hematoma formation or active bleeding from cannulation site. Proper flow during HD is provided.

Conclusion: Highly selected patient who recieived the basilic transposition after maturation of this vein could do immediate postoperative direct cannulation of transposed vein, it could be possible to skip the central catheterization for HD. It could lead the result of prevent central venous stenosis or other complications related with central catheter.

Vascular Access EP-2053 EP-2049 ~ EP-2060

Transradial access for arteriovenous fistuloplasty in Singapore

Chee Wui Ong[1], Enming Yong[2], Qiantai Hong[2], Sadhana Chandrasekar[2], Lawrence Han Hwee Quek[3], Uei Pua[3], Glenn Wei Leong Tan[2], Zhiwen Joseph Lo[2]

[1]Yong Loo Lin School of Medicine, National University of Singapore, Singapore,
[2]Vascular Surgery Service, Department of General Surgery, Tan Tock Seng Hospital, Singapore,
[3]Department of Diagnostic Radiology, Tan Tock Seng Hospital, Singapore, Singapore

Introduction: Endovascular balloon angioplasty is standard therapy for dysfunctional arteriovenous fistula in end-stage renal failure patients on hemodialysis. Venous antegrade or retrograde puncture of the fistula is typically performed to gain access for fistuloplasty. Transradial approach for brachiocephalic or brachiobasilic arteriovenous fistulas offers an alternative method of access with the advantage of addressing multi-focal juxta-anastomotic and venous stenosis from the same approach. We aim to review the efficacy, outcomes and complication rates of transradial access for arteriovenous fistuloplasty among patients in Singapore.

Method: A retrospective review of 195 endovascular fistuloplasties from September 2017 to August 2019, at a tertiary university hospital Vascular Surgery unit.

Result: Of 195 fistuloplasties, 43 (22%) were transradial approach (23 brachiocephalic arteriovenous fistulas, 20 brachiobasilic arteriovenous fistulas) in 33 patients (67% male and mean age=65 years). Of these 43 procedures, 11 (26%) were performed as balloon-assisted maturation fistuloplasties while 32 (74%) were performed for mature arteriovenous fistulas with multi-focal juxta-anastomosis and venous stenosis. Technical success rate was 95% with mean procedure duration at 43.5±14.6 min. Mean pre- and post-fistuloplasty dialysis access flow rates increased from 502 to 952ml/min ($P < 0.001$). Post-intervention primary patency was 100%, 66% and 20% at 1, 6 and 12months, respectively. There were four patients with non-limb-threatening radial artery thrombosis (9.3%) while there was no radial artery pseudoaneurysm or post-procedural bleeding.

Conclusion: Transradial approach for arteriovenous fistuloplasty is a safe and feasible option in patients requiring balloon-assisted maturation or with multi-focal juxta-anastomotic and venous stenosis.

Vascular Access EP-2054 EP-2049 ~ EP-2060

Optimal prediction of the central venous catheter insertion depth targeting the cavoatrial junction

Hyejin Mo[1], Sanghyun Ahn[2], Joongyub Lee[3], Seung-Kee Min[2]

[1]*Department of Surgery, SMG-SNU Boramae Medical Center, Korea,*
[2]*Department of Surgery, Seonam University Hospital, Korea,*
[3]*Department of Prevention and Management, Inha University Hospital, Korea*

Introduction: Central venous catheters should be positioned at the cavoatrial junction or the right atrium. If catheters are inserted to a depth derived by adding the length between the needle insertion point and the clavicular notch and the length between the clavicular notch and the carina, the catheter tip can be placed near the carina. Based on this, we aim to make a formula to place a catheter tip near the cavoatrial junction.

Method: This prospective nonrandomized interventional study included patients who needed a central venous catheter from June 2017 to July 2018. The location of the cavoatrial junction was identified using a fluoroscopic technique. The following variables were measured: L1, the length between the needle insertion point and the clavicular notch; L2, the length between the clavicular notch and the carina; and α, the length between the carina and the cavoatrial junction.

Result: A total of 70 patients were enrolled. The mean age was 65.5±11.6 years and 62.9% were male. The mean L1 and L2 were 7.6±1.4 and 7.0±1.4 cm, respectively. The mean α was 4.4±1.5 cm (95% CI 4.1-4.8) and it was not affected by demographic factors, such as sex, age, height or weight.

Conclusion: Central venous catheters in adult patients can be placed near the cavoatrial junction using a simple formula: the distance between the insertion point and the clavicular notch + the distance between the clavicular notch to the carina + 4.4 cm.

Vascular Access EP-2055 EP-2049 ~ EP-2060

Novel use of Surfacer, an inside-out device, in tandem with HeRO graft for creation of vascular access: Case reports for 3 patients with 1 year follow up

Qi Tian Teo[1], Hao Yun Yap[2], Jia Sheng Tay[1], Shin Chuen Cheng[1], Tjun Yip Tang[2], Edward Tieng Chek Choke[1]

[1]*Department of General Surgery (Vascular Surgery), Sengkang General Hospital, Singapore,*
[2]*Department of Vascular Surgery, Singapore General Hospital, Singapore*

Introduction: The Surfacer Inside-Out Access Catheter System (Surfacer) is a novel approach to restore access in total central vein occlusion (TCVO).

Method: We report a series of 3 cases, with 1 year follow up, in our institution where this technique was safely and effectively used in tandem with Hemodialysis Reliable Outflow (HeRO) graft for creation of upper limb vascular access in patients with TCVO.

Result: All 3 patients had failed prior conventional attempts at TCVO crossing and had exhausted most conventional vascular access methods. The above technique yielded a 100% technical success rate with mean operative time of 140 minutes. Cannulation rate was 100% with all undergoing successful early cannulation by post-operative day 3. Mean primary patency of 199 days and mean cumulative patency of 371 days was achieved. Average intervention rate of 1.0 a year was required to maintain patency.

Conclusion: The Surfacer device used together with HeRO graft is a safe and effective technique to avoid catheter femoral dependence in patients where conventional attempts to cross the TCVO have failed.

Vascular Access EP-2056 EP-2049 ~ EP-2060

Inconsistent results of completion angiography after femoropopliteal angioplasty in comparison with follow-up duplex study

Kyunglim Koo, Daehwan Kim, Chang Sik Shin, Hyungsub Park, Taeseung Lee

Department of Surgery, Seoul National University Bundang Hospital, Korea

Introduction: In previous report, endovascular treatment (EVT) for femoro-popliteal artery (FP) lesions has a high initial technical success rate at completion angiography (CA). But 12% had a significant lesion found on follow-up duplex study (DUS) that was not seen in CA. However, study population of previous study was very small, and no long term outcome was discussed. In this study we performed 3-year follow up for the patients who had inconsistent results in CA comparison with DUS after FP EVT.

Method: Prospectively collected data from 208 FP lesions (147 patients) between March 2013 and April 2017 were reviewed retrospectively. All FP lesions were treated primarily with balloon angioplasty followed by spot stenting when needed, with adjunctive procedures in selected cases. CA was routinely performed between 5 to 15 minutes after EVT. And routine DUS was performed within 48hours of the procedure.

Result: A total of 178 cases were analyzed, after excluding EVT failures and absence of follow-up (mean age 73.85, male 77.2%). Patients presented with ulceration (52.1%), resting pain (18.1%), and claudication (29.8%). After DUS, 21 cases (11.8%) were found to have a significant lesion that was not found on CA (non-consistent group), 13 (7.3%) of which were moderate stenosis and 8 (4.5%) were occlusions. Lesion length was significantly longer in the non-consistent group (19.3 cm vs 15.4 cm [P=.02]). All lesions were found at non-stented zones and 66.7% were within 1 cm of the edge of the stent. And 7 cases (33.3%) of immediate second EVT due to occlusion were necessary, 16 cases (76.2%) required target lesion revascularization (TLR) in 3-year follow-up.

Conclusion: This study shows that CA may not reflect the true technical success of an EVT procedure. In 3-year follow up TLR rate was much higher in non-consistent group than all cases (90.5% vs 23.4% [P < .001]). Therefore routine use of DUS evaluation is necessary, and intensive treatment in non-consistent group are needed.

Vascular Access EP-2057 EP-2049 ~ EP-2060

Clinical outcomes of percutaneous treatment strategy for cephalic arch stenosis in arteriovenous fistulas for hemodialysis

Sungsin Cho, Jin-Hyun Joh

Department of Surgery, Kyung Hee University Hospital at Gangdong, Korea

Introduction: There was no definitive management strategy for cephalic arch stenosis (CAS). Endovascular treatment can be used to treat CAV in this era. The objective of this study is to evaluate the outcomes of endovascular interventions for CAS in dysfunctional hemodialysis access.

Method: A retrospective review of patients who underwent endovascular intervention for CAS at single institution was undertaken. The cephalic arch was defined as the terminal portion of the cephalic vein as it joins with the axillary vein to form the subclavian vein. CAS was defined within 5 cm of the confluence of the cephalic vein with the axillary vein and was ＞50%. Three cephalic arch intervention groups were categorized as percutaneous transluminal angioplasty (PTA), stent insertion, and stent-graft insertion. Primary and secondary patency, and complications were examined.

Result: Between 2007 and 2018, 306 patients were underwent brachiocephalic AVF creation and 42 patients (13.7%) had CAS. PTA was performed with a high-pressure balloon in 28 patients (66.7%, and 21% of these patients were treated with a cutting balloon), stent insertion was performed in 11 patients (26.2%) and stent-graft was done 3 patients (7.1%). At 12 months, the primary patency rates at were 11 patients (39.3%), 5 patients (45.5%), 1 patient (33.3%) (P=0.01), primary-assisted patency rates 16 patients (57.1%), 6 patients (54.5%), 1 patients (33.3%) (P=0.02), secondary patency rates 23 patients (82.1%), 7 patients (63.6%), 1 patients (33.3%) (P=0.01).

Conclusion: CAS is one of the major causes of brachiocephalic AVF malfunction. PTA showed superior 1-year outcome results even though a higher re-intervention rate and should be considered first when percutaneous intervention is procced.

Vascular Access EP-2058 EP-2049 ~ EP-2060

Successful surgical bypass and remodeling of a giant venous aneurysm formed in an autogenous arteriovenous fistula

Rosnelifaizur Ramely[1,2], Nik Ahmad Amru Nik Mazlan[1], Syaiful Azzam Sopandi[3], Mohd Nizam Md Hashim[1,2], Wan Zainira Wan Zain[1,2], Syed Hassan Syed Ab Aziz[1,2], Andee Dzulkarnain Zakaria[1,2]

[1]*Department of Surgery, USM, Malaysia,*
[2]*Department of Surgery, HUSM, Malaysia,*
[3]*Department of Surgery, HRPZ II, Malaysia*

Introduction: The prevalence of chronic kidney disease among the Malaysian population, is about 9.43%. Among those with end-stage renal failure, the main choice for renal replacement therapy (RRT) is by hemodialysis. An internal jugular vein catheter (IJVC commonly used as temporarily access. Though a complication of central venous obstruction (CVO) can happen.

Method: A 28-year-old man who had ESRF due to nephrotic syndrome. He is on regular hemodialysis since 2012 via right brachiocephalic fistula that was created since 2013. The later he developed progressively increasing in size of fistula which causes significant discomfort and cosmetic deformity. A central venogram done noted to have central venous obstruction and failed angioplasty. Two stages of operation were planned. The first stage of surgery was the right axillo-iliac vein bypass for the management of CVO. Then the giant fistula was dissected and skeletonized from the subcutaneous tissue extending from cubital fossa until the axillary region. Consequently, with access giant fistula was removed and remain vein used as new cannulation site. New anastomosis between the cephalic vein with a more proximal brachial artery was done.

Result: An AVF aneurysm is commonly seen as a complication of autogenous AVF, while the incidence of rupture is reported to be 0.8% to 5.2%. Ligation of the AVF is an effective method to prevent rupture but the functional vascular access must be sacrificed. In our experience the AVF aneurysm could be remodeled to an appropriate size by resection the excess aneurysm vein. Furthermore, long-term patency seems to be satisfactory without aneurysm recurrence. Our procedure preserves and utilizes the already thickened vein wall while removing the aneurysm.

Conclusion: Surgical remodeling of an AVF aneurysm is a safe and effective procedure to treat an aneurysm and salvage the native AVF.

Vascular Access EP-2059

Case report: Central venous port implantation in double superior vena cava

Kyungjai Ko

Department of Surgery, Kangdong Sacred Heart Hospital, Korea

Central venous port implantation is increasing with advance in chemotherapy and the growth in the number of cancer patients. Duplication of the superior vena cava is rare anomality with a prevalence in the general population of 0.3-0.5%. In this case, we report on a central venous port implantation in double superior vena cava.

A fifity-four years old female patient underwent central venous port implantation through right jugular vein for gastric cancer chemotherapy (figure 1). Four months later, she had fever. For rule out of pneumonia, she had chest computed tomography and double superior vena cava was revealed without pneumonia (figure 2). Blood and pus on central venous port was cultured as Methicillin sensitive Staphylococcus aureus. She was recovered with port removal and antibiotics (cefazolin).

After 1 month, for continuation of chemotherapy, central venous port implantation through left jugular vein was planned with angiogram (figure 3). The port was safely implanted without any complication and operated well for chemotherapy.

Double superior vena cava can be accidentally detected during thoracic imaging, catheter insertion and surgery. This case shows that central venous port in double superior vena cava can be implanted safely regardless right or left jugular vein.

Necessity of retrograde angioplasty for juxta-anastomosis area in brachiocephalic arteriovenous fistula PTA

Sunghoon Yoon, Yong Sung Won

Department of Surgery, The Catholic University of Korea, St. Vincent's Hospital, Korea

Introduction: In the case of brachiocephalic arteriovenous fistula, the proximal stenosis of the draining vein is more prevalent than juxta-anastomostic stenosis. When any problem is not found around anastomosis in preoperative ultrasound, PTA is performed by approaching the distal cephalic vein as an antegrade. However, there are cases where unsatisfactory results occur. Reintervention is required in a short period due to insufficient volume, diameter or maturation failure. We assessed our intervention database, to investigate the effect of balloon angioplasty on the juxta-anastomosis site in brachiocephalic arteriovenous fistula PTA.

Method: Retrospective datd were collected from April 2019 to August 2020 on 34 brachiocephalic arteriovenous fistula PTA cases. In all cases, ultrasound evaluation was performed before the procedure. whole procedure were done with fluoroscopy and ultrasound guided. Balloon calibers were chosen based on duplex and angiogram measurements. Results were confirmed by ultrasound after 2-4 weeks.

Result: Of the 34 casese, Antegrade only were 19 casese and bidirectional were 15 cases. Much higher flow rate was observed in bidirectional cases on follow up ultrasound evaluation. Post procedural arm edema occurred in 1 case of bidirectional PTA. Cases requiring reintervention within a short time because hemodilaysis could not be performed were observed more in antegrade only PTA.

Conclusion: There were some cases that satisfactory result was not obtained with proximal vein PTA alone. A much higher flow rate was observed when juxta anastomosis angioplasty was performed, but it seems that complications could be noted like arm edema. The criteria for classifying case need for bidirectional approach will be meaningful if they can be established through follow up research.

Vascular Trauma EP-2061 EP-2061 ~ EP-2067

Ligation and debridement: Review of managing infected pseudoaneurysm among intravenous drug abusers in a developing country

Ahmad Faidzal Othman, Sanjay Dev, Abdul Rahman Norhisham Azmi

Department of Vascular Unit, Department of Surgery. Kulliyah (Faculty) of Medicine, International Islamic University Malaysia, Malaysia

Introduction: Infected pseudoaneurysms among intravenous drug abusers are a serious clinical condition that carries significant morbidity and mortality. The management of such cases has been controversial on deciding the need of revascularisation following simple ligation and local debridement. In this audit, we present the results of simple ligation and local debridement of our patients with infected pseudoaneurysm.

Method: We conducted a retrospective review from 2013 to 2020 our patients who are intravenous drug abusers that underwent simple ligation and local debridement for an infected pseudoaneurysm.

Result: We reviewed total of 15 patients presented with pseudo aneurysms due to IVDU (intravenous drug abuse).

Conclusion: Infected pseudoaneurysms can be safely managed with simple ligation and local debridement without revascularisation as they pose acceptable complication rates. We will analyse and discuss the problems with reconstruction versus ligation in our setting.

Vascular Trauma EP-2063 EP-2061 ~ EP-2067

Traumatic ulnar artery thrombosis, treated with of arterial reconstruction using reverse interposition vein grafting

Rosnelifaizur Ramely[1,2], Lenny Suryani Safri[3], B Karthik Krishnan Balakrishnan[1], Mohamad Azim Md Idris[3], Hanafiah Harunarashid[3], Krishna Kumar Katheraveloo[3]

[1]*Department of Surgery, USM, Malaysia,*
[2]*Department of Surgery, HUSM, Malaysia,*
[3]*Department of Surgery, PPUKM, Malaysia*

Introduction: Thrombosis of the distal upper limb vasculature is often described as the consequence of repeated minor trauma from activities which apply pressure onto the ulnar artery against deeper structures.

Method: A 45-year lady, presented with complain of pain and numbness over the hypothenar aspect of her left hand with bluish discolouration over the left little finger. She has given a history of difficult and painful experience during cannulation and extraction of plasma from her left arm from previous blood puncture for blood donation. The brachial artery and radial pulse were easily palpable, however, her ulnar artery pulsation was feeble with a biphasic signal. Her upper limb angiogram revealed, a short segment filling defect at the proximal ulnar artery immediately after the brachial artery bifurcation. A surgical bypass of the thrombosed segment is done by using a harvested segment from the distal cephalic vein from the upper arm. Postoperatively, the numbness disappeared and bluish discolouration of the little finger had returned to normal.

Result: Patients who are subjected to repeated venopuncture, are at risk of developing this problem if the ulnar artery is injured during cannulation. DSA is a very valuable tool in mapping and identifying these vessels and planning management. In general, others treatment methods like vasodilators, stellate ganglion blockade, cervicodorsal sympathectomy, and chemical thrombolytics can be tried An autologous venous graft is an easy and widely available technique in creating a bypass between a thrombosed segment and should be employed in cases where it is possible. In certain cases, the surgeon can consider the initiation of antiplatelet therapy to reduce the risk of thrombosis in the graft and improve chances of graft survival.

Conclusion: We highlights that a single isolated blunt trauma can cause proximal ulnar artery thrombosis and can be treated effectively by reconstruction of the thrombosed distal ulnar arterial segment.

Vascular Trauma EP-2064 EP-2061 ~ EP-2067

Open revascularization of renal artery injury with occlusion

Jayun Cho[1], Kang Kook Choi[2], Min A Lee[2], Byungchul Yu[2], Gil Jae Lee[2], Youngeun Park[1], Jihun Gwak[1], Seung Hwan Lee[1], Jungnam Lee[2]

[1]Department of Trauma Surgery, Gachon University Gil Medical Center, Korea,
[2]Department of Traumatology, Gachon University College of Medicine, Korea

Blunt abdominal trauma with major vascular injury is rare. We present the case of a 15-year-old woman involved in a fall, who had multiple trauma including renal infarction due to renal artery injury.

Case Summary: Previously healthy 15-year-old female patient was transferred to the level 1 trauma center after fall from a height of 5m. Initial vital sign was blood pressure with 130/60 mmHg and heart rate with 105 beats/min. Computed tomography (CT) scan showed hemoperitoneum with liver injury, pancreas injury, spleen injury, and renal infarction due to renal artery injury with occlusion. We decided to do surgical revascularization of the renal artery because she was transferred immediately after trauma and an emergent laparotomy was necessary for the pancreas injury with transection of body. On an exploratory laparotomy, there was no active bleeding from liver, pancreas, and spleen injury. Therefore, revascularization of the renal artery could be done first. By using the midline approach and left medial visceral rotation, renal artery and renal vein were identified. Arterial wall contusion and no pulsation was found on the left renal artery through surrounding tissue dissection. After resection of the injured arterial segment and angioplasty with end-to-end anastomosis, revascularization of left kidney was achieved which was within 6 hours from the time of trauma. Urination was found from the associated ureter injury. And then, spleen-preserving distal pancreatectomy, liver resection of segment 2 were done. After hemorrhagic control surgery, uretero-ureterostomy with double-J ureteral stent placement and primary repair of cecal serosa tear was done. The associated injuries were facial bone fracture, lung contusion, humerus fracture, and radius fracture.

Renal infarction due to renal artery injury after blunt trauma is rare. Revascularization of renal artery can be done by either endovascular or surgical approach. Timing of revascularization is crucial.

Vascular Trauma EP-2065 EP-2061 ~ EP-2067

Bifurcated axillary vein and brachial artery reconstruction using GSV spiral vein graft

Won Gong Chu, Dong Hyun Kim, Sukyung Kwon, Je Hyung Park, Sang Su Lee

Department of Vascular surgery, Pusan National University Yangsan Hospital, Korea

Introduction: Autologous graft is well-established and widely used to reconstruct various types of vascular lesions. Using autologous blood vessels, long-term patency is superior to that of artificial blood vessels, and better patency can be maintained even at sites with many movements such as joints.

Method: The patient was 174 cm, 120 kg at age 25. He was leaning against the window, and when the glass broke, he fell over the broken glass and deep laceration occurred in the left armpit. At the physical examination, the left hand was immobilized and accompanied by desensitization.

Result: Angiography confirmed that blood vessels were completely cut in the left axillary artery. At the surgical field, visually, the brachial artery, axillary vein, median nerve, and ulnar nerve were completely cut and the missing gap was 3 cm. In the case of vein, the site where basilic vein and brachial vein merged into axillary vein was damaged. A great saphenous vein of the left leg was harvested about 15 cm for autologous graft repair. About 3 cm of harvested GSV was used for end-to-end anastomosis of brachial artery, and the remaining 12 cm was wound on 9 mm graft tunneler sheath to make spiral vein graft. The spiral vein graft was anastomosed to the axillary vein in the proximal direction, and the basilic vein and brachial vein were anastomated in the distal direction in Y shape. The patient was discharged on POD 14 without any additional complications.

Conclusion: Small bifurcated vessels in the joint area can be reconstructed using a saphenous vein spiral graft.

Vascular Trauma EP-2066 EP-2061 ~ EP-2067

Pseudoaneurysm of popliteal artery as a delayed complication of JETSTREAM atherectomy

Je Hyung Park[1], Sang Su Lee[1], Su-Kyung Kwon[1], Dong Hyun Kim[1], Wongong Chu[1], Jin-Ho Mun[2]

[1]Division of Vascular and Endovascular, Department of Surgery, Pusan National University Yangsan Hospital, Korea,
[2]Department of Surgery, Pusan National University Yangsan Hospital, Korea

Introduction: Peripheral atherectomy is utilised for the treatment of heavily calcified plaques in peripheral arterial lesions. Of the various atherectomy devices, The JETSTREAM Atherectomy System (Boston Scientific Corporation) is commonly used in lower extremity percutaneous interventions. As complications of JETSTREAM, embolization (9.9%) and dissection (8%) were reported, but the formation of pseudoaneurysm was rare.

Method: We report the case of a 73-year-old male who developed a 24×20×27 mm sized popliteal arterial pseudoaneurysm after JETSTREAM atherectomy. He was an outpatient with intermittent claudication as a chief complaint. In preoperative CT angiogram, severe calcified lesion was found in the popliteal artery. We performed atherectomy with JETSTREAM in this lesion as endovascular treatment. After surgery, the ABI improved and he was discharged without and specifics.

Result: Six days after atherectomy, he visited the emergency room, complaining of calf pain and swelling. Pseudoaneurysm and hematoma was found in popliteal artery by CT angiogram. The vital signs were stable, and there was no decrease in hemoglobin. During the follow-up after hospitalization, the pain and swelling of the lower extremities worsened, and emergency surgery was performed due to suspected popliteal arterial rupture and compartment syndrome. Patch angioplasty was performed to repair popliteal arterial rupture through posterior approach.

Conclusion: It is important to know the rare complications associated with JETSTREAM, since endovascular therapy in peripheral arterial disease has become increasingly common. Pseudoaneurysm is one of the rare complications associated with the use of JETSTREAM atherectomy device.

Vascular Trauma EP-2067 EP-2061 ~ EP-2067

Surgical revascularization using an autogenous vein in patients with popliteal artery injury: Lessons learned from eleven consecutive cases

Young Sun Yoo

Department of Surgery, Chosun University Hospital, Korea

Introduction: Popliteal artery injuries remain a challenging entity and have the greatest risk of limb loss among traumatic lower extremity vascular injuries. This study assessed the clinical outcomes of therapeutic management and amputation rates among patients with popliteal artery injuries treated by surgical revascularization using autogenous vein.

Method: A single-institution, a retrospective review was performed of all patients with popliteal artery injury who was performed surgical revascularization presenting January 2015 and December 2018. Seven patients (two female and nine male), with an average age of 58.1 years (range, 22-80 years) at the time of injury, who underwent surgical revascularization due to blunt popliteal artery injuries were evaluated for clinical characteristics, concomitant injuries, methods of surgical revascularization, complication, and limb salvage rates.

Result: The majority of patients were sustained a blunt injury, and orthopedic injuries, including dislocations and fractures. The flow-restored arterial repair was obtained <6 hours in seven patients, and >6 hours in four patients. Fracture fixation was performed before vascular restoration by the use of an external fixator in all patients. Arterial continuity was restored by popliteal artery interposition with an autogenous vein in seven patients, distal femoral to tibioperoneal trunk bypass with an autogenous vein in two patients and distal femoral to posterior tibial artery bypass in one patient. In all patients, the great saphenous vein was used for the graft. Fasciotomy was performed in one patient due to the postoperative compartment syndrome, and then the limb was salvaged after intensive wound care. In all patients, limb salvage was possible after surgical revascularization.

Conclusion: Early diagnosis and prompt revascularization are required to improved limb salvage rates in patients with popliteal artery injury. The method of revascularization should be determined according to the type of injury, and an autogenous vein should be used as a graft as far as possible.

Vein EP-2068 EP-2068 ~ EP-2081

How to effectively use lightweight graduated elastic stockings for venous ulcers

Takahiro Imai[1], Marina Kurose[2]

[1]Department of Vascular Surgery, Nishinokyo Hospital, Japan,
[2]Department of Nursing Department, Nishinokyo Hospital, Japan

Introduction: Compression therapy is essential for patients with chronic venous insufficiency with venous ulcer, treatment is often difficult. We examined the difference between Bandages group and Stockings group in terms of healing of venous ulcers.

Method: Period is between February 2019 and July 2020. After operation for varicose veins, patients using bandages and stockings for venous ulcers were picked up 5 cases respectively. Patients with diabetes were excluded in this study because there is possibility that these diseases make infection worse and lead to a bad condition. Patients with severe perforators in the lower leg were excluded. The ulcer size was 10 cm^2 or more. We compared the bandaged group with the stocking group during the postoperative ulcer recovery period.

Result: There was no difference between Bandages group and Stockings group in terms of Healing period, Ulcer size and depth, and Date of operation. Wearing lightweight graduated elastic stockings as it is, the compression pressure of the ankle is around 22 mmHg. In addition, we put a urethane pad on the inside of the ankle and measured with Pico-press, the compression pressure increased by about 10 mmHg. From here, gauzes with ointment are applied to the wound, and the compression pressure increases by 10 mmHg again. Finally, even with light stockings, the compression pressure of the ankle become more than 40 mmHg. This pressure was the appropriate pressure used for chronic venous insufficiency.

Conclusion: We could not adjust the "influencing factors" and different patient backgrounds this time. This is why accurate examination requires patient background matching between the two comparison groups, but in fact, it is difficult to control multiple factors in ulcer patients. Patients with venous ulcers need to continue high pressure compression therapy for a long period of time. Compression therapy using elastic stockings leads to good self-management for patients with venous ulcers.

Case report: May thurner syndrome patients presenting with multisystemic - cardiovascular, genitourinary, gastrointestinal, and neurologic - symptoms

Kurtis Kim

Department of Vascular Surgery, Mercy Medical Center, fellowship affiliation with University of Maryland Medical Center, United States

May-Thurner syndrome, or iliac vein compression syndrome, is typically associated with left lower extremity venous insufficiency and correlating symptoms. However, there are sub-group of generally younger female patients who present with not only the lower extremity venous insufficiency symptoms, but also with pelvic congestive, genitourinary, gastrointestinal, neurologic and even systemic cardiovascular symptoms. Here, we present representative of two cases of May-Thurner patients who presented with multisystemic symptoms, at times considered atypical symptoms, that demonstrated significant improvement if not complete resolution of symptoms including a patient with POTS whose work up was negative for cardiac etiology that resolved her frequent fainting episodes, multiple recurrent UTI symptoms with consistently negative cultures and negative urology work up, symptoms of IBS with unknown etiology, who significantly improved if not resolved their symptoms after the stent placement for May-Thurner syndrome. These findings stress the importance of and need for comprehensive evaluation and understanding of venous compressions and venous refluxes that occur as a result of May-Thurner, Nutcracker, and Pelvic Venous Congestion Syndromes.

These findings stress the importance of and need for comprehensive evaluation and understanding of venous compressions and venous refluxes that occur as a result of May-Thurner, Nutcracker, and Pelvic Venous Congestion Syndromes.

Vein EP-2070 EP-2068 ~ EP-2081

Initial outcomes of a new device, Impedance Controlled Radiofrequenct Ablation (IC-RFA), for the treatment of the incompetent saphenous veins

Insoo Park, Daehwan Kim

Department of Vascular Surgery, Charm Vascular Clinic, Korea

Introduction: The radiofrequency ablation (RFA), ClosureFast system (Medtronic, USA), is a widely used technique for the treatment of the incompetent saphenous veins. The ClosureFast system shows a high reproducibility with a unified IFU. It causes a heat damage to the vein wall with a constant 120 C for 20 seconds in regardless of environment and resulting in thermal damage and vein fibrosis. However, the same total heat energy in regardless of vein diameter, it can sometimes cause unnecessary over heat damage or insufficient heat energy to the vein wall. A new concept of RFA called impedance controlled – RFA (VENISTAR, Starmed, Korea) is a complementary treatment that detects a surrounding impedance changes in real time and automatically determine the ablation time. The device detects the impedance changes surrounding the catheter and when the impedance and electric current resistance reach the right point, the ablation is finished automatically. And theoretically if the the vein is large, the impedance change takes a long time, and if the vein is small, the impedance change quickly reaches. As a result, the ablation time is automatically determined according to the vein diameter, so unlike ClosureFast system, over heat damage or insufficient heat energy can be prevented. In this study, we would like to introduce the initial outcomes of IC -RFA for the treatment of the incompetent saphenous veins.

Method: 27 limbs were treated under intravenous sedation. Patients revisited the clinic on 1 month and 3 months after tretment. Postprocedural evaluations including numerical pain rating score, revised Venous Clinical Severity Scores (rVCSS) and Aberdeen Varicose Vein Questionnaires (AVVQ) were checked. Duplex ultrasound was performed on 1 month and 3 months.

Result: All treated veins showed complete closure by duplex during the follow-up period. The rVCSS and AVVQ were improved during the follow-up period.

Conclusion: IC-RFA shows a satisfactory early outcomes.

Vein EP-2071 EP-2068 ~ EP-2081

Prevalence of may-thurner variants in patients with symptomatic may-thurner syndrome

Keunmyoung Park[1], Jihee Kang[1], Soongu Cho[2], Jungmin Lee[2]

[1]Department of Surgery, Inha University Hospital, Korea,
[2]Department of Radiology, Inha University Hospital, Korea

Introduction: May-Thurner syndrome (MTS) is typically characterized by the compression of the left common iliac vein (LCIV) between the right common iliac artery (RCIA) and the fifth vertebra. Various types of May-Thurner variants (MTV) have been sporadically documented in case reports. This study aimed to identify the prevalence of MTV among the subset of symptomatic MTS.

Method: Single center data of 173 consecutive patients presented with symptomatic MTS were reviewed from Jannuary 2005 to December 2019. MTS was diagnosed by computed tomographic venography. MTV was defined as compression of the LCIV by other structures than the RCIA or compression of other pelvic veins than the LCIV. MTV were categorized as LCIV compression group if the LCIV is compressed by other structures than the RCIA and non-LCIV compression group if the LCIV is not involved.

Result: Ten MTV were identified (5.8%), including 5 LCIV compression (category 1) and 5 non-LCIV compression (category 2). Patients' median age was 76 years (range, 51-94 years), male/female: 1/1, median follow-up was 388 days (range, 12-4694 days). All patients presented with deep vein thrombosis of the corresponding limbs. In category 1, the LCIVs were compressed by left common iliac artery (LCIA) (n=2), huge myoma (n=1), LCIA aneurysm (n=1) and RCIA aneurysm (n=1). In category 2, the right common iliac veins (RCIVs) were compressed by RCIA (n=4) and L5 osteophyte (n=1). Inferior vena cava filters were inserted in 4 patients. Endovascular management with balloon angioplasty and stent insertion were performed in 6 patients, 3 of each category. Follow-up images were available for 6 patients and all of them had patent venous outflow.

Conclusion: This study brings attention to the relatively high variant of symptomatic MTS population. Vigilance of different anatomical MTV is essential for correct diagnosis and treatment. Endovascular management is safe and effective and should tailor the lesion anatomy.

A prospective comparison of a cyanoacrylate glue and high ligation and stripping for the treatment of great saphenous vein insufficiency

Sungsin Cho, Jin Hyun Joh

Department of Surgery, Kyung Hee University Hospital at Gangdong, Korea

Introduction: Cyanoacrylate (CAC) ablation is the nonthermal vein ablation technique for the treatment of venous insufficiency. The one-year results of a prospective comparative study of a new CAC versus high ligation and stripping (HLS) for the treatment of great saphenous vein (GSV) insufficiency is presented.

Method: A total of 94 adult subjects were treated with CAC ablation or HLS. The clinical outcomes were collected prospectively. The primary endpoint of this study was complete occlusion of the great saphenous vein. Secondary endpoints were procedural pain, ecchymosis, day 7, adverse events, changes from baseline in Venous Clinical Severity Score (VCSS), and Aberdeen Varicose Vein Questionnaire (AVVQ).

Result: Periprocedural pain was less (3.1±1.6 versus 5.4±2.3, <0.001) in CAC ablation group compared to the HLS group. Ecchymosis at the third day was also significantly less in CAC group (<0.001). Temporary or permanent paresthesia developed in three patients in HLS group and none in cyanoacrylate ablation group (P=0.015). Three, and 12months closure rates were 98.7, and 96.6% for CAC groups and 100% each for HLS group (P=0.183). Although there is a trend of better closure rates in HLS group, this difference did not reach to the statistical difference and none of the patient report recurred symptom. Both groups had significant improvement in VCSS and AVVQ postoperatively (<0.001), but there was no significant difference between the groups at first, third, sixth, and 12 months.

Conclusion: The efficacy and safety analysis shows that CAC ablation is a safe, simple method which can be recommended as an effective endovenous ablation technique. The follow-up data more than one year will clarify the future role of CAC ablation for the treatment incompetent GSV.

Vein EP-2073 EP-2068 ~ EP-2081

Clinical outcomes of venous thromboembolism

Kyung Bok Lee, Hanyoung Lee

Department of Surgery, Seoul Medical Center, Korea

Introduction: Venous thromboembolism (VTE) is a common term for deep vein thrombosis and pulmonary embolism (PE). The object of this study was to to determine the prevalence and clinical outcomes of VTE.

Method: From January 2011 to May 2019, a total of 113 diagnosed VTE by CT venography were enrolled. Unfavorable outcome was defined when at least one of the following criteria was met (1) need for cardiopulomonary resuscitation , (2) hypotension or shock, (3) need for invasive or non-invasive mechanical ventilation, (4) need for inotropic agents, (5) death. The clinical outcomes in patents with DVT and PE were determined. Furthermore 30-day all-cause mortality was also analyzed.

Result: VTE-related unfavorable outcome was observed in 9.7% of all VTE. In addition, PE-related death was 0.9%, and 30-day all-cause mortality was 7.1%. Our study indicated that hear rate ＞100/min and respiratory rate ＞30/min were independent predictors for VTE-related unfavorable outcome. In addition, Regarding all-cause mortality, heart rate ＞100 /min was significant risk factor.

Conclusion: Our findings demonstrate relatively lower prevalence of unfavorable outcome and all-cause mortality in patients with VTE. Our results indicated that, irrespective of comorbidity, unstable vital sign was significant risk factor for VTE-related unfavorable outcome and all-cause mortality.

Vein EP-2074 EP-2068 ~ EP-2081

Endovenous laser ablation with versus without concomitant phlebectomy for the treatment of varicose veins: A retrospective analysis of 954 limbs

Yohei Kawai[1], Sugimoto Masayuki[1], Kiyoshi Aikawa[2], Kimihiro Komori[1]

[1]Department of Vascular Surgery, Nagoya University, Japan,
[2]Department of Vascular Surgery, Nagoya Vascular Surgery Clinic, Japan

Introduction: Endovenous laser ablation (EVLA) with concomitant phlebectomy is commonly performed in many institutions. However, phlebectomy is associated with cosmetic complications such as surgical scarring, haemorrhage, and hematoma. This study aims to compare the need for additional sclerotherapy during follow-up after EVLA with versus without concomitant phlebectomy.

Method: Between November 2013 and December 2018, we performed EVLA on 1,363 limbs in 1,009 patients with symptomatic primary varicose veins, of which 954 limbs in 771 patients with great saphenous vein (GSV) or small saphenous vein (SSV) insufficiency were included in this study. Data were collected prospectively and supplemented with retrospective medical record review. Demographic and clinical characteristic profiles were collected. The outcomes of EVLA with or without concomitant phlebectomy were compared. Logistic regression was used to assess predictors for additional sclerotherapy after EVLA.

Result: CEAP classification ($P < 0.001$), operative time ($P < 0.001$), laser device type ($P < 0.001$), length of the treated vein ($P < 0.001$), linear endovenous energy density ($P < 0.001$) and tumescent local anesthesia volume ($P < 0.001$) differed significantly. Pain after EVLA was significantly more frequent in the non-phlebectomy group than in the phlebectomy group ($P=0.005$). During follow-up, 34 of 954 limbs (3.6%) underwent additional sclerotherapy for residual visible varicose veins after EVLA. No statistical difference was found in the rate of additional sclerotherapy between the groups ($P=0.849$). Logistic regression showed that female sex (odds ratio [OR], 6.18; 95% confidence interval [CI], 1.86-20.6; $P=0.003$) is significantly associated with additional sclerotherapy and concomitant phlebectomy is not a significant predictor of additional sclerotherapy (OR, 0.844; 95% CI, 0.375-1.90; $P=0.682$).

Conclusion: Patient preference for additional sclerotherapy was comparable between those who underwent EVLA with versus without concomitant phlebectomy. This result supports our present strategy of avoiding simultaneous phlebectomy at the time of primary EVLA.

Vein EP-2075 EP-2068 ~ EP-2081

The point of postoperative nursing care of the difference between endovenous ablation and NTNT ablation for varicose veins

Marina Kurose[1], Takahiro Imai[2]

[1]*Department of Nursing Department, Nishinokyo Hospital, Japan,*
[2]*Department of Vascular Surgery, Nishinokyo Hospital, Japan*

Introduction: Since 2011, endovenous ablation for varicose veins has been covered by national insurance system in Japan. Currently, the standard treatment for varicose veins at our facility is endovenous ablation with laser or radiofrequency and endovenous phlebectomy by stab avulsion. Since 2019, NTNT ablation using VenaSeal has been covered by national insurance system in Japan. We started this treatment in our hospital from January of this year. In this study, we compared the difference of postoperative nursing care for endovenous ablation and NTNT ablation using VenaSeal.

Method: The period is from January to March 2020. The subjects were 36 patients (M/F: 12/24, 71.8±9.7) each who underwent endovenous ablation, 18 patients respectively and NTNT ablation using VenaSeal, 18 patients respectively. The items to be examined were via interviews using the VAS scale for patient complaints such as the postoperative pain and numbness. In addition, changes in the postoperative appearance related to the extent of internal bleeding and an allergic reaction.

Result: Immediately after operation, the average VAS on endovenous ablation was 1.1±2.2, which declined after peaking at 30 days. On the other hand, in NTNT, it was 0.7±0.8 immediately after, which was a continuously low value. In result, internal hemorrhage and neuralgia were seen early after operation (7±4.3 days) in endvenous ablation cases. On the other hand, complication cases were caused 32.6±5.3 days on average after operation in NTNT ablation using VenaSeal.

Conclusion: The point of nursing care is to understand the difference between postoperative complications and the onset process due to the surgical procedure, and explain it to the patient before operation.

Vein EP-2076 EP-2068 ~ EP-2081

A rare encounter compartment syndrome after high saphenous vein ligation and multiple stab avulsion surgery

Rosnelifaizur Ramely[1,2], Lim See Liang[1], Lenny Suryani Safri[3], Mohamad Azim Md Idris[3], Hanafiah Harunarashid[3], Krishna Kumar Katheraveloo[3]

[1]Department of Surgery, USM, Malaysia,
[2]Department of Surgery, HUSM, Malaysia,
[3]Department of Surgery, PPUKM, Malaysia

Introduction: High saphenous vein ligation (HSVL) with stripping and multiple stab avulsion (MSA) is usually a simple and straightforward technique used to treat varicose vein. Recurrence, wound infection, hematoma, nerve injury can occur after saphenous vein ligation. Here we report a case of limb threatening complication following such procedure.

Method: A 28-year-old male was suffering from right lower limb varicose vein for 6 years. Pre-operative ultrasound assessment confirms the incompetence of saphenofemoral junction. HSVL with stripping of GSV until knee level was performed and followed by MSA over calf region. Patient complain of worsening pain and swelling of right lower limb eight hours post-op, associated with numbness. On examination, distal limb was swollen, appear congested with bluish discoloration of foot and toes. Both his DPA and PTA non-palpable and no signal from doppler. Clinical judgment of compartment syndrome was made and decided for four compartment open fasciotomy. During fasciotomy presence of oedematous calf muscle in lateral and posterior compartment, however muscles are viable. Postoperatively both PTA and DPA pulses were palpable with biphasic doppler signal. The fasciotomy wound managed with dressing and later closed with split skin graft after two weeks.

Result: Diagnosis of compartment syndrome was a challenge initially as such complication is extremely rare and have not been reported much. In our case, we hypothesize that surgery induce tissue trauma causing inflammation and tissue oedema within leg compartment, and on top of that, application of elastic bandages prevents expansion of the compartment, had led to increase in compartment pressure. This vicious circle resulting in reduced blood flow and eventually tissue hypoperfused and ischemia.

Conclusion: High index of clinical suspicion in such rare complication remains the cornerstone for diagnosis. Timing for surgical fasciotomy is crucial as delay of more than 6 hours can lead to irreversible myoneural damage.

Vein EP-2077 EP-2068 ~ EP-2081

Endovenous laser ablation of anterior accessory saphenous vein with the 1470-nm laser: A single center experience

Byungseo Choi

Department of General Surgery, Springday Clinic, Korea

Introduction: Endovenous laser ablation (EVLA) have become popular treatment option for varicose vein. Varicose veins are not uncommon in anterior accessory saphenous vein (AASV), but there is a problem that the length of the vein segment that can perform EVLA is short. This study was conducted to report clinical characteristics and short-term outcomes of EVLA of AASV with 1470 nm laser at a single center.

Method: Patients who underwent EVLA from January 2018 to December 2019 were included in the study. Among them, we analyzed the 63 patients with reflux in AASV. For surgery, EVLA was performed for the proximal segment, and phlebectomy was performed for the distal superficial vein segment in which EVLA could not be performed.

Result: The mean age was 46.9±12.2 years. The male to female ratio was 1.33: 1. All patients were in the CEAP stage 2. AASV reflux is observed in 29 cases on the right, 27 cases on the left side, and 7 on both sides. The length of AASV capable of ablation was 15.93±5.37 cm on the right and 15.54±4.56 cm on the left. The mean operation time was 52.3±26.84 minutes. The mean hospital stay was 0.67±0.48 day. The closure rates after 3 months were all 98.4% (1 case of re-canalization). 1 phlebitis, 1 paresthesia and 1 thigh hematoma observed after surgery. There was no deep vein thrombosis or surgical site infection requiring treatment.

Conclusion: EVLA for AAV with 1470-nm laser with distal phlebectomy was effective and safe with acceptable recurrence and low complication during 3-month follow-up in a single center.

Vein EP-2078 EP-2068 ~ EP-2081

Comparison of 1940 nm laser with radial fiber and venasealtm (rendezvous method) in the treatment of incompetent great saphenous vein

Daejung Kim, Jiran Jang, Jinwon Jeon, Shinho Hong, Yong Beom Bak

Department of Vascular Surgery, CheongMac Hospital, Korea

Introduction: Over time, treatment of chronic venous disease (CVD) has shifted substantially from surgical to endothermic treatment. Endonvenous laser ablation (EVLA) in one of most efficient method to treatment of CVD. More recently, Cyanoacrylate closure (CAC) therapy, one of nonthermal and nontumescent, has been introduced. The purpose of our study comparison of EVLA and VenaSeal in the treatment of varicose vein.

Method: In our hospital, EVLA was performed 1940nm with radial fiber and VenaSeal treatment was performed Rendezvous method. Exclusion criteria were follow up loss, recurrent varicose vein, vascular abnormality including KTS. Characteristics, Symptoms, CEAP, vein diameter, treated vein length, operation time, Post-operative (2 hours, 1 day, 7 days later) pain score, adverse effect (DVT, bleeding, wound infection, nerve injury, hematoma), recurrence were recorded and analyzed. Duplex ultrasound was done in all patients at preoperatively, 1 month, 6 months.

Result: EVLA groups and VenaSeal groups performed in 212 patients, 394 limbs and in 84 patients, 156 limbs respectively. Treated GSV mid-, distal- diameter was EVLA and VenaSeal mid 5.17 mm, distal 4.27 mm and mid 5.48 mm, distal 4.01 mm. Treated GSV length 49.50 cm and 47.67 cm, respectively. Operation time was 23.99 minutes and 10.38 minutes, which was statistically significant ($P < 0.001$). Post-operative pain score 2 hours-, 1 day, 7 days later was 2 hours 5.34, 1 day 3.29, 7 days 1.89 and 2 hours 5.02, 1 day 2.39, 7 days 0.58, respectively. Post-operative pain score was statistically significant ($P=0.038$) at 1 days, and ($P=0.02$) at 7 days. There was no complication such as bleeding, infection, DVT, and nerve injury. The recurrence rate was 0% all patients who were followed up for more than 6 months.

Conclusion: Both EVLA and VenaSeal were safe and effective treatments for incompetent great saphenous vein. VenaSeal treatment better results than EVLA in operation time and post-operative pain at 1 day and 7 days.

Vein EP-2079 EP-2068 ~ EP-2081

Comparison between new using method for venasealtm (rendezvous method) and veclose trial

Daejung Kim, Jiran Jang, Jinwon Jeon, Shinho Hong, Yong Beom Bak

Department of Vascular Surgery, CheongMac Hospital, Korea

Introduction: Over time, treatment of chronic venous disorders has shifted substantially from surgical to endothermic treatment. Heat based, including radiofrequency ablastion and endovenous laser ablation. More recently, Cyanoacrylate closure (CAC) therapy, one of nonthermal and nontumescent, has been introduced. It has been approved in Korea since January 2017 and is being used for varicose vein. The purpose of our study was to confirm the significance of the comparison between Recommended VenaSel method (VeClose trial) and Rendezvous method.

Method: We defined surgical method proposed by the company as Recommended VenaSeal method. And the method of operation in our hospital as Rendezvous method. Describe the method, high ligation through small incision at the groin and the direction of catheter insertion in from proximal to distal. We compared it with the existing VeClose trial.

Result: A total of 122 patients with 223 incompetent great saphenous veins were performed VenaSeal therapy. Between January 2017 and August 2018. Exclusion criteria were Recommended VenaSeal method, follow up loss, recurrent varicose vein, vascular abnormality including KTS. A total of 84 patients with 156 incompetent great saphenous veins were investigated. Treated GSV length was 47.7 cm, amount of glue used 1.2 ml. Operation time was 10.4 minutes. Allergic reactions were 48 of the total treated 156 veins (30.7%). There was no complication such as bleeding, infection, DVT, and nerve injury. The recurrence rate was 0% in 156 limbs of 84 patients who were followed up for more than 6 months.

Conclusion: The current Rendezvous method at our hospital, compared with the VeClose trial, has a remarkable short operating time. Relatively little amount of glue was used in long lesion. It can treat more lesion. High ligation through surgical treatment, it is considered to has a great some advantage in that reduce possibility of recurrence, DVT, Stucking, It can be a good option for VenaSeal treatmen.

Vein EP-2080 EP-2068 ~ EP-2081

A popliteal vein aneurysm presenting after saphenous vein ablation

Suh Min Kim

Department of Surgery, Chung-Ang University College of Medicine, Korea

Introduction: Popliteal venous aneurysm (PVA) is a rare disease that can lead to deep venous thrombosis (DVT) and pulmonary thromboembolism (PTE). Surgical resection or lifelong anticoagulation should be considered to prevent DVT or PE.

Result: Case description: A 70-year-old man was admitted due to left calf discomfort lasted for 4 months. He underwent radiofrequency ablation for both great saphenous veins 6 years ago. There was no recurrent varicose veins and other abnormal findings on physical examination. Duplex ultrasound examination revealed an aneurysm of the left popliteal vein with turbulent flow. CT angiography showed a 3.2×2.4 mm fusiform and partially saccular aneurysm of the left popliteal vein. The diameter of normal popliteal vein was 9 mm. The largest diameter of right popliteal vein was 1.3 mm. Surgical treatment with posterior approach was planned. An S-shaped incision was made in the left popliteal fossa and the aneurysm was identified and dissection from the surrounding tissues. After systemic heparinization, tangential resection of the aneurysmal venous wall and direct suturing of the remaining healthy vein wall adjusting to 9 mm in diameter was done. The aneurysm contained a thrombus. Low-molecular-weight heparin was started on the first postoperative day and changed to warfarin 3 days later. Duplex ultrasound at 3 months later demonstrated no evidence of recurrent aneurysm in the left popliteal vein measured 1.1 cm in diameter. The diameter of right popliteal veins was not increased. There was no evidence of thrombus or reflux. He received warfarin with therapeutic range for 3 months, and then changed to an antiplatelet agent. He has been followed-up 10 months without symptoms.

Conclusion: Surgical treatment and perioperative anticoagulation are recommend for PVA. Tangential aneurysmectomy with venorrhaphy is the most common and simple surgical method. Preopeartive evaluation both extremities and careful postoperative follow-up are necessary.

Association between diameter of saphenous vein and venous reflux on computed tomography venography in patients with varicose veins

Ji Yoon Choi, Oh Jung Kwon

Department of Surgery, Hanyang University Medical Center, Korea

Introduction: Three-dimensional computed tomography venography (CTV) is considered as useful tools for identifying increased saphenous vein diameter and venous reflux, and complementary road maps for surgery patients with varicose veins. In this study, we examined the correlation between saphenous vein reflux and diameter changes on CTV.

Method: We enrolled 152 patients (213 limbs) who underwent endovenous laser ablation therapy following high ligation of the saphenofemoral junction from January 2014 to December 2019. All patients were evaluated with CTV as a preoperative evaluation. The diameter of the saphenous vein was measured on CTV and the presence of venous reflux was evaluated by Doppler US in operating room.

Result: Among 152 patients, 61 patients showed varicose veins on bilateral limbs. Among 213 limbs, 165 (77.5%) limbs were in GSV and 48 (22.5) limbs were in LSV. Among all limbs, 172 (80.8) limbs showed venous reflux. The mean diameter of GSV with reflux and without reflux were 8.07±1.89 mm and 5.11±1.20 mm, respectively ($P < 0.001$). The mean diameter of LSV with reflux and without reflux were 7.64±1.74 mm and 5.04±1.80 mm, respectively ($P=0.007$). In ROC curve, a GSV threshold diameter of 6.075 mm had the best positive predictive value for reflux. The sensitivity and specificity was 88.3% and 82.9%. The best LSV diameter for predicting reflux was 4.48 mm. The sensitivity and specificity was 87.5% and 75%.

Conclusion: The GSV diameter over 6.075 mm and the LSV diameter over 4.48 mm reflects the presence of venous reflux significantly. CTV can be useful for follow-up before and after treatment.

Visceral EP-2082

Case report: Coil embolization endovascular treatment of renal artery pseudoaneurysm

Charley Simanjuntak[1], Akhmadu Muradi[1], Dedy Pratama[1], Raden Suhartono[1], Hendy Mirza[2]

[1]Department of Vascular and Endovascular, Cipto Mangunkusumo Hospital, Indonesia,
[2]Department of Urology, Persahabatan Hospital, Indonesia

We presented two cases with renal artery pseudoaneurysm after percutaneous nephrolithotomy. Both cases were treated with coil embolization. Follow up angiography shows the obliteration of pseudoaneurysm with the cessation of symptoms in both cases.

In this study, we report the successful treatment of renal artery pseudoaneurysm with a literature review considering the use of coil embolization in renal artery pseudoaneurysm. We conducted literature searching in online databases. Keywords for literature searching are "coil-embolization" AND "pseudoaneurysm" AND "renal artery". Related articles considering renal artery pseudoaneurysm and endovascular therapy were included in the study.

We found 23 pieces of literature related to coil embolization therapy in renal artery pseudoaneurysm. Nineteen studies are either case report or case series reporting the pseudoaneurysm of renal artery treated by coil embolization. There are three retrospective studies with a total of 90 subjects and one review study. Most of the studies show the successful treatment of renal artery pseudoaneurysm with coil embolization.

Coil embolization is a potentially effective and safe treatment option for renal artery pseudoaneurysm as shown in the case series.

Visceral EP-2083 EP-2082 ~ EP-2085

No antithrombotic strategy may be beneficial for conservative treatment of spontaneous isolated superior mesenteric artery dissection

Young Sup Yoo[1], Ho Kyun Lee[2], Soo Jin Na Choi[2]

[1]*Department of Surgery, Chonnam National University Hospital, Korea,*
[2]*Division of Vascular and Transplant Surgery, Department of Surgery, Chonnam National University Hospital, Korea*

Introduction: Recent reports show success with conservative treatment initially and selective endovascular or surgical intervention in treating spontaneous isolated superior mesenteric artery dissection (SISMAD). Benefit of antithrombotic therapy as a part of conservative treatment has not been clarified. This study aimed to investigate clinical course of SISMAD patients to find difference in clinical outcome between antithrombotic group and no antithrombotic group.

Method: We retrospectively reviewed 79 cases of SISMAD that were treated conservatively from January 2004 to December 2019 at OOO University Hospital. And compared the clinical outcome between antithrombotic group and no antithrombotic group. Clinical outcome included length of hospital stay, pain resolution time, image remodeling and maximal remodeling time.

Result: There were 30 patients in no antithrombotic group and 49 patients in antithrombotic group. There was no significant difference between two groups in clinical characteristics except dyslipidemia (P=0.011). Follow up period (14.6 vs 32.6, P=0.009) and imaging follow up period (13.9 vs 31.6, P=0.011) were longer in antithrombotic group than no antithrombotic group. Length of hospital stay (5.1 vs 7.7, P=0.002) was significantly shorter in no antithrombotic group than antithrombotic group. Although not statistically significant, no antithrombotic group tended to have shorter maximal remodeling time (6.8 vs 13.3, P=0.078).

Conclusion: SISMAD patients treated conservatively without antithrombotic therapy may have clinical benefit in length of hospital stay and maximal remodeling time compared to antithrombotic group.

Management of acute mesenteric ischemia with general peritonitis: An evidence-based case report

Akhmadu Muradi, Tiffany Christina, Hilman Ibrahim, Dedy Pratama, Raden Suhartono, Patrianef Darwis

Department of Surgery, Universitas Indonesia - Cipto Mangunkusumo General Hospital, Indonesia

Introduction: Acute mesenteric ischemia is a vascular emergency with high mortality rate. We presented 32 years old male patient with underlying heart disease was diagnoses with acute mesenteric ischemia and general peritonitis. The aim of this study was to compare endovascular modalities, open surgery, and hybrid technique to manage acute mesenteric ischemia with general peritonitis.

Method: The search was conducted on MEDLINE, EBSCO, Science Direct, and Cochrane according to clinical question. The studies were selected based on inclusion and exclusion criteria and led to four useful articles. The selected studies were critically appraised for their validity, importance, and applicability.

Result: Four retrospective cohort studies were found with comparable validity. The first study showed hybrid method have 45% mortality rate without comparing to other technique. The second study showed patient that had endovascular or hybrid revascularization have better mortality rate compared to traditional open surgery (36% vs 50%, $p < 0.05$). The third study also showed better mortality rate in endovascular group compared to open vascular surgery (15.3% vs 21.9%, $P < 0.001$). It was also stated that in acute mesenteric ischemia with general peritonitis, open abdomen after surgery showed better mortality rate compared with primary closure (27.3% vs 72.3%, $P = 0.01$).

Conclusion: Endovascular intervention and hybrid technique showed better mortality rate compared to traditional open surgery. Endovascular intervention only could be considered for acute mesenteric ischemia patient without peritonitis. However, hybrid technique should be done in acute mesenteric ischemia with general peritonitis.

Visceral EP-2085 EP-2082 ~ EP-2085

Pancreaticoduodenal artery aneurysm associated with Celiac axis compression and/ or dissection: Three ruptured cases

Byung Jun Jeon, Jin Young Kim, Hyun Il Kim, Min Gyu Kim, Han Joon Kim, Hong-Gi Lee

Department of Surgery, Hanyang University Guri Hospital, Korea

Introduction: Pancreaticoduodenal artery aneurysms (PDAA) are rare comprising 2% of all visceral aneurysms. True aneurysms are frequently associated with celiac artery stenosis or occlusion caused by median arcuate ligament (MAL), atherosclerosis, fibromuscular dysplasia and rarely connective tissue disorders, vasculitis or dissection. Sutton and Lawton hypothesized celiac artery stenosis or occlusion and subsequent hyperdynamic flow through superior mesenteric artery (SMA) rendered the collateral pancreaticoduodenal arcades susceptible to develop aneurysmal changes.

Method: Report of three ruptured cases of PDAA.

Result: All three patients presented at ER with sudden abdominal pain and hypotension. There were 2 male and 1 female patients and their ages were 75, 40 and 65 years. Abdominal CT showed peri-pancreatic and retroperitoneal hematoma, and a small aneurysm was suspected with the diameter ranging from 5 to 7 mm. In addition, celiac artery showed MAL and / or dissection (CAD); MAL with dissection at the post-stenotic dilated segment in the 1st case, dissection at the celiac axis and common hepatic artery in the 2nd patient, and MAL in the 3rd patient. Angiography showed functional occlusion at the celiac axis in the 1st case and multiple stenosis in the 2nd case. SMA angiography showed prompt filling of PDA collaterals and hepato-splenic arteries. The aneurysms were located at the inferior PDA in all (2 posterior and 1 anterior). They were embolized and the patients' condition stabilized. All patients suffered from duodenal passage disturbance transiently. They are free from aneurysmal recurrence at the last follow-up at 24, 18, and 2 months.

Conclusion: PDAA ruptured at a relatively small size, and embolic therapy alone was sufficient, similar to previous reports, although long-term results are needed. Only several cases of CAD associated with PDAA were reported previously. These cases show the possible contribution of CAD in the development of PDAA.

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2dong 7716, 82, Gumi-ro 173beon-gil, Bundang-gu, Seongnam 13620, Korea
Tel: 82-10-8717-2752, Fax: 82-2-6455-3770
E-mail: ksvs@chol.com
Homepage: www.ksvs.org

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31st Floor, Prime Center, 85 Gwangnaru-ro 56-gil, Gwangjin-gu, Seoul 05116, Korea
Tel: +82-2-325-2093, Fax: +82-2-325-2095
E-mail: info@medrang.co.kr
Homepage: http://www.medrang.co.kr