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ENDODONTIC BULLETIN



THE OFFICIAL PUBLICATION OF THE
MALAYSIAN ENDODONTIC SOCIETY

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Huwaina Abd Ghani

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MES ENDODONTIC BULLETIN

MALAYSIAN ENDODONTIC SOCIETY COMMITTEE 2018/2019

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Muhamad Halil**

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Dr. Sultan Omer Sheriff

Dr. Nur Laila Sofia Ahmad

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PRESIDENT'S MESSAGE



بسم الله الرحمن الرحيم
السلام عليكم ورحمة الله وبركاته

All praise is due to Allah, the Almighty. May Allah's peace and blessings upon His Prophet and Messenger Muhammad S.A.W, his Companions, his family members, and those who followed them until the Day of Judgment.

Dearest honorable guests, dental colleagues, members of Malaysian Endodontic society and students.

As the President and on behalf of the organizing committee, I am delightful to welcome you to the 31st Annual Scientific Conference and AGM. We are pleased to have you here to participate and share the spirit of expansion of knowledge and discoveries.

This conference is entirely devoted to empower dental clinicians to take ownership of learning throughout conducting research, from addressing the problem to solving them effectively. With the theme of "Endodontics: A voyage to finesse", we believed clinicians will pursue to become better clinicians to lead to a breakthrough in the future.

We are honored to bring Dr. Domenico Riccuci, Prof. Dr. Nessrin Taha, Prof. Dr. Gary Cheung Shun Pan, Assoc. Prof. Dr. Chang Seok Woo and our own Assoc. Prof. Dr. Kacharaju Kranthi Raja.

This event would not been possible without the strong support in sponsorship of our vendors and dental suppliers. I would like to take this opportunity to thank them for their continuous support. I wish you a pleasant and fruitful conference.

Capt. (R) Asst. Prof. Dr. Mohd Haikal Muhamad Halil

President

Malaysian Endodontic Society (2018-2019)

MES SECRETARY'S ANNUAL REPORT 2018/2019

Introduction



The 30th Annual General Meeting (AGM) of the Malaysian Endodontic Society (MES) was held on Sunday, 25th November 2018 at Pullman Kuala Lumpur City Centre Hotel and Residences, 4 Jalan Conlay, Kuala Lumpur, Malaysia. The MES executive Committee members for the year 2018-2019 as listed to the Registrar of Societies (ROS) are as follows: -

NAME	POST
Capt. (R) Asst. Prof. Dr. Mohd Haikal Muhamad Halil	President
Dr. Siew Kai Ling	Vice President
Dr. Muhamad Azri Bin Md. Saion	Secretary
Dr. Wong Lishen	Treasurer
Dr. Nurul Ain Ramlan	Assistant Secretary
Dr. Mohd Rusman Adlan A. Rahman	Assistant Treasurer
Dr. Huwaina Abd. Ghani	Editor
Assoc. Prof. Dr. Kranthi Raja	Committee member
Dr. Asfand Ali Khan	Committee member
Dr. Sultan Omer Sheriff	Committee member
Dr. Shekhar Bhatia	Committee member
Dr. Abhishek Parolia	Committee member
Dr. Nur Laila Sofia Ahmad	Committee member
Dr. Afzan Adilah Ayoub	Hon. Auditor I
Dr. Marlena Kamaruzaman	Hon. Auditor II

MES COMMITTEE 2018/2019

MALAYSIA ENDODONTIC SOCIETY



Committee Meetings

During this 2018-2019 term, committee members discuss regularly via emails and WhatsApp groups starting on the 1st day of tenure (27th November 2018). Six face-to-face meetings were scheduled at MDA Kelana Jaya, Royal Chulan Hotel Damansara and University of Malaya either during the weekdays or weekends. Combination of these virtual and face-to-face meetings became more active towards the end of the term discussing matters pertaining to organizing one major event of the new term; the 31st Annual Scientific Conference and AGM 2019. Listed below is the table depicting the issues discussed among the committee members.

a. via WhatsApp application

Month	Among the issues/topics discussed	Sender/Initiator
Dec 2019	'2019 MES Committee group' was created announcement official MES in FB	Dr. Azri
	Planning on first meeting - Conference and speakers, location, study club meeting and other matters	Dr. Haikal
Jan 2019	Requesting update details from committee members to fill the committee member form for the eROSES	Dr. Azri
	APEC subscription and membership	Dr. Haikal
Feb 2019	Update organizational chart	Dr. Haikal
Mar 2019	1 st MES study club meeting	Dr. Omer
	CPD points	Dr. Ain
	Conference date locked	Dr. Haikal
	Invitation letters to speakers for conference	Dr. Azri
April 2019	MES budget for incoming conference	Dr. Lishen
May 2019	2 nd MES Study club meeting and cpd points	Dr. Ain
	1 st announcement flyer for conference	Dr. Haikal
	Dr.aft Tentative program	Dr. Haikal
June 2019	Venue for Conference	Dr. Haikal
	Budget for conference	Dr. Lishen
July 2019	MES Bulletin	Dr. Huwaina
	Trade booth discussion	Dr. Ain
Aug 2019	MES Study Club discussion	Dr. Sofia
	Conference registration fees	Dr. Lishen
Sept 2019	MES brochures & forms	Dr. Haikal
	Student helper and photographer for event	Dr. Haikal
Oct 2019	Early bird rates	Dr. Haikal
	Speakers and sponsorship update	Dr. Ain
	Accommodation and airport transfer for speakers	Dr. Kranthi
	Conference fees rate for awaiting graduates	Dr. Haikal
	Early bird extension date	Dr. Kranthi
	Accommodation for committee members	Dr. Kranthi

b. Meeting

Date	Venue	Agenda	Attendance
23/12/2018	MDA Kelana Jaya	a) Committee member task b) 31 st Annual Scientific Conference and AGM 2019 c) MES Study Club meeting d) Objective of MES e) IFEA discussion	8/13
16/3/2019	MDA Kelana Jaya	a) Conference date b) Speaker line up c) Venue for conference d) Conference charges e) Account issue f) E-poster discussion g) MES study club meeting	8/13
18/5/2019	MDA Kelana Jaya	a) Confirmation of last minutes b) Pre-conference c) Workshops d) Booth trades e) Table clinic f) Contest g) MES AGM h) IFEA	7/13
25/8/2019	MDA Kelana Jaya	a) Confirmation of dates b) Trader's sponsorship c) Proposed speakers' budgets d) Promotion e) Estimated expenses f) CPD points	7/13
6/10/2019	Royal Chulan Damansara	a) Committee member tasks b) Study club meeting c) Conference and workshop d) Bulletin and promotions	8/13
27/10/2019	University of Malaya	a) Previous meeting matters b) Workshop c) Registration d) Event management e) Lucky draw f) Bulletin and conference g) Early bird extension h) Dinner with speakers	7/13

Activities

1) MES Study Club meeting

A total of 4 successful MES study club meeting sessions has been held in the year 2019.

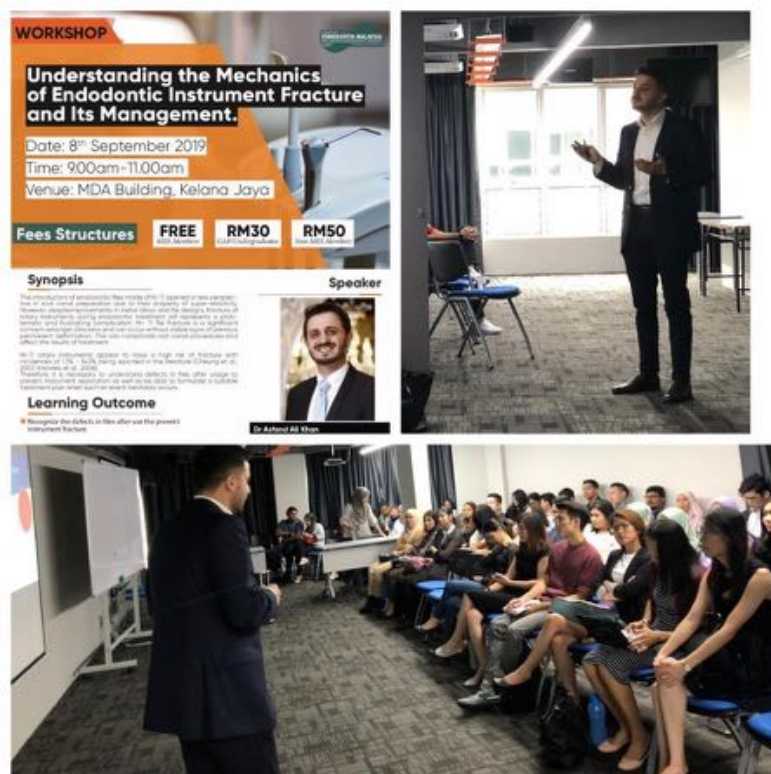
- a) On 16th March 2019, Dr. Sultan Omer talked about 'Rubberdamology 101'. Fifty participants were attended and 4 CPD points were awarded.



- b) Dr. Nurul Ain's topic was 'Give revascularization a chance: An update' on the 18th May 2019. 63 participants attended and 4 CPD points were awarded.



- c) Dr. Asfand talked about 'Understanding the mechanics of Endodontic instrument fracture and its management' on the 8th September 2019. A number of 56 participants attended and 1 CPD point were awarded.



- d) Dr. Nur Laila Sofia talked about 'Pulpotomy in mature permanent teeth' on the 29th September 2019. A total number of 70 participants attended and 4 CPD points were awarded.



2) 11th MES-SES Biennial Joint Conference & 30th AGM 2018

This event was held on Saturday 25th and Sunday 26th November 2018 at the Pullman Kuala Lumpur City Centre Hotel and Residences, 4 Jalan Conlay, Kuala Lumpur, Malaysia.

The International speakers were Dr. Marino Sutedjo (Indonesia), Dr. Leung Sie Fai (Hong Kong), Dr. Mohammad Hammo (Jordan), Dr. Lim Wen Yi (Singapore) and Dr. Yoshitsugu Terauchi (Japan). Dr Tan Boon Tik represent Malaysia as a speaker.

Dr. Hammo started by giving lectures on successful preparation of root canal treatment. He touched on various aspects that may go wrong in the management of endodontic cases and discuss on how to prevent and manage them in appropriate manners. Dr. Tan Boon Tik then gave a lecture on periapical lesions of endodontic origin and how to treat them effectively. Many interesting cases were shared to the audiences.

Dr. Marino Sutedjo then talked about clinical impact of missed anatomy of the root canal system and touch about prevalence of second mesiobuccal (MB2) canal in maxillary molars. On the second day, Dr. Yoshitsugu Terauchi gave a lecture on 'Predictable and Minimally Invasive Removal of Separated Instrument'. Dr. Leung Sie Fai talked about 'Bioceramics in Endodontic' and lastly Dr. Lim Wen Yi gave a talk on dental pulp exposure.

Both Dr. Yoshitsugu Terauchi and Dr. Marino Sutedjo conducted a pre-conference workshop on the 23rd November 2018 at the Faculty of Dentistry, Universiti Teknologi Mara (UiTM) while Dr. Hammo conducted a workshop on the 1st conference day.



Dr. Leung Sie Fai giving his lecture at the 11th MES-SES Biennial Joint Conference & 30th AGM 2018.



Dr. Marino Sutedjo then talked about clinical impact of missed anatomy of the root canal system and touch about MB2 in maxillary molars during the 11th MES-SES Biennial Joint Conference & 30th AGM 2018.

Report prepared by:

Dr. Muhamad Azri Md. Saion

MES TREASURER'S ANNUAL REPORT 2018/2019

Dear members,

The financial status of the Malaysian Endodontic Society remains positive with profit amount of RM145, 541.19 from the events carried out in our financial year while our net assets stand at RM 906,633.86.

We are looking forward to organise more seminars and conference with the help from more volunteers and continuous support from our members in the near future.

Report prepared by:

Dr. Wong Lishen

PERSATUAN ENDODONTIK MALAYSIA
(MALAYSIAN ENDODONTIC SOCIETY)

REVENUE AND EXPENDITURE STATEMENT
FOR THE MONTH OF SEPTEMBER 2018 TO AUGUST 2019

	2019 Jan - Aug RM	2018 Sept - Dec RM	TOTAL RM
REVENUE			
Annual Subscription and Entrance Fees	10,318.00	3,410.00	13,728.00
Conferences and Courses Fees	10,550.00	107,416.20	117,966.20
Interest on Deposits	16,888.09	6,585.67	23,473.76
Sponsorship	0.00	0.00	0.00
Production	0.00	0.00	0.00
Trade Exhibitors	36,500.00	33,000.00	69,500.00
UTM - MES 2017 Seminar	0.00	0.00	0.00
Purchases - Production	0.00	(200.00)	(200.00)
	<u>74,256.09</u>	<u>150,211.87</u>	<u>224,467.96</u>
EXPENDITURE			
Accounting Fees	0.00	1,000.00	1,000.00
Insurance	39.00	0.00	39.00
Bank Charges	104.49	149.50	253.99
Committee Meeting Expenses	1,200.00	1,492.00	2,692.00
Conference and Clinical Meeting Expenses	49.50	54,572.56	54,622.06
Rental	1,335.40	0.00	1,335.40
Tax Computation	500.00	0.00	500.00
Printing & Stationery	10.00	6,944.00	6,954.00
Lecture Fees	0.00	3,000.00	3,000.00
Gift & Donation	0.00	6,339.00	6,339.00
Subscription Fee	444.62	0.00	444.62
Postage & Courier	48.80	0.00	48.80
Telephone	0.00	20.00	20.00
Transportation & Travelling	50.00	0.00	50.00
Souvenirs	1,200.00	0.00	1,200.00
Web Hosting	427.90	0.00	427.90
	<u>5,409.71</u>	<u>73,517.06</u>	<u>78,926.77</u>
Surplus of Revenue over Expenditure	<u>68,846.38</u>	<u>76,694.81</u>	<u>145,541.19</u>

I certify hereby that the statement given above is true to my knowledge and belief.

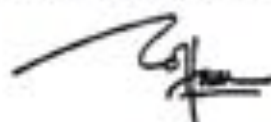
Lishen

Dr Wong Lishen

PERSATUAN ENDODONTIK MALAYSIA
(MALAYSIAN ENDODONTIC SOCIETY)

BALANCE SHEET AS AT 31st AUGUST 2019

Fixed Assets	RM
Computer at cost	5,475.00
Computer - Accum Depreciation	(5,474.00)
	<u>1.00</u>
Current Assets	
Balance in Fixed Deposits	560,729.19
Balance in Saving Account	0.00
Balance in Current Account	241,912.71
Cash in Hand	0.00
Trade Debtors	27,110.00
	<u>829,751.90</u>
Other Assets	
Deposit - Conference Hotel Deposit	72,500.00
Current Liabilities	
Accrual Expenses	450.00
Provision of Taxation	(4,830.96)
	<u>908,633.86</u>
Net Assets	
Represented By :-	
Surplus of Revenue over Expenditure b/ forward	837,767.48
Current Period Surplus of Revenue over Expenditure	68,846.38
Surplus of Revenue over Expenditure of forward	<u>906,613.86</u>



Capt(R) Asst. Prof. Dr. Mohd Hakeel
Bin Muhammad Halli
President, M.E.S



Dr. Wong Lishen
Treasurer, M.E.S

AUDITORS' REPORT

The above statement of Revenue and Expenditure for the year ended 31st August 2019 and the Balance Sheet as at 31st August 2019 have been prepared from the books and from the information and explanations given to us and in our opinion the account reflect a true and fair view of the financial position of the Malaysian Endodontic Society as at 31st August 2019

Dated :



Dr. Alzan Adilah Binti Ayoub
Hon. Auditor, M.E.S

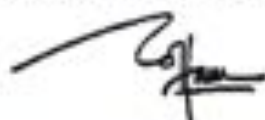


Dr. Mariena Binti Kamaruzaman
Hon. Auditor, M.E.S

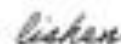
PERSATUAN ENDODONTIK MALAYSIA
(MALAYSIAN ENDODONTIC SOCIETY)

BALANCE SHEET AS AT 31st AUGUST

	2019 RM	2018 RM
Fixed Assets		
Computer at cost	5,475.00	5,475.00
Computer - Accm Depreciation	(5,474.00)	(5,474.00)
	<u>1.00</u>	<u>1.00</u>
Current Assets		
Balance in Fixed Deposits	580,729.19	537,255.43
Balance in Saving Account	0.00	0.00
Balance in Current Account	241,912.71	229,538.30
Cash in Hand	0.00	3,849.65
Trade Debtors	27,110.00	38,260.00
	<u>850,751.90</u>	<u>808,903.38</u>
Other Assets		
Deposit - Conference Hotel Deposit	72,500.00	0.00
Current Liabilities		
Accrual Expenses	450.00	49,262.67
Provision of Taxation	(4,830.96)	(1,450.98)
Net Assets	<u>906,833.86</u>	<u>761,092.67</u>
Represented By :-		
Surplus of Revenue over Expenditure b/ forward	837,767.48	746,457.79
Current Period Surplus of Revenue over Expenditure	68,846.38	12,634.88
Surplus of Revenue over Expenditure c/ forward	<u>906,833.86</u>	<u>761,092.67</u>



Capt(R) Asst. Prof. Dr. Mohd
Hakeel Bin Muhammad Halli
President, M.E.S



Dr. Wong Lishen
Treasurer, M.E.S

AUDITORS' REPORT

The above statement of Revenue and Expenditure for the year ended 31st August 2019 and the Balance Sheet as at 31st August 2019 have been prepared from the books and from the information and explanations given to us and in our opinion the account reflect a true and fair view of the financial position of the Malaysian Endodontic Society as at 31st August 2019

Dated :



Dr. Alzan Adilah Binti Ayoub
Hon. Auditor, M.E.S



Dr. Mariena Binti Kamaruzamam
Hon. Auditor, M.E.S

DEBUNKING ‘DO ROOT CANAL TREATMENT CAUSE CANCER?’: HOW TO ANSWER OUR PATIENTS QUESTIONS?

Afzan Adilah Ayoub, DDS (UKM), MDS (Endo)(HK)

Lecturer, Comprehensive Care Centre of Studies, Faculty of Dentistry, Universiti Teknologi MARA.

ABSTRACT

Have you ever been asked or questioned about "Do Root Canal treatment cause cancer?" in your own clinic. Do you know how to tackle the questions?. This short article shared several steps on how to answer your patients questions. Latetly, a documentary on Netflix entitled ‘Root Cause’ has caused a controversy among the dentists, endodontists and patients. Majority of the viewers have questioned the danger and validity of root canal treatment procedure and the relationship to cancer. The controversy is not something new in the field of dentistry. Even before that, it was well known and established that multiple brochures, booklets or even pictogram circulated among patients about the link between cancer and root canal treatment either by any form of hard or soft copies. All of this misinformation have lead to fear in the treatment itself. Dentists must equip themselves with adequate knowledge to educate their patients daily either on or off side dental chair. The American Association of Endodontist (AAE) had issued the matter on the website together with other reliable resources. This article also discussed about the Focal Infection theory, the beginning of the myth and the oral connection. You may use or cut this article to be circulated in the clinic.

Keywords: root canal treatment, cancer, myth, focal infection

BACKGROUND

Lately, a documentary on Netflix entitled ‘Root Cause’ has caused a controversy among the dentists, endodontists and patients. Majority of the viewers have questioned the danger and validity of root canal treatment procedure and the relationship to cancer. The controversy is not something new in the field of dentistry. Even before that, it was well known and established that multiple brochures, booklets or even pictogram circulated among patients about the link between cancer and root canal treatment either by any form of hard or soft copies. All of this misinformation have lead to fear in the treatment itself. Dentists must equip themselves with adequate knowledge to educate their patients daily either on or off side dental chair. The American Association of

Endodontist (AAE) had issued the matter on the website together with other reliable resources.

The Focal Infection Theory

This theory has been discussed in the documentary, proposing that chronic disease are instigated by localized infections. In the documentary, this theory was used as a foundation to state that because we cannot eliminate all of the bacteria in a root canal-treated tooth, therefore a chronic inflammatory response is induced. This assucations were made that the chronic inflammation associated with these root canal-treated teeth led to systemic diseases such as cancer, arthritis, heart disease, chronic fatigue, endocrine, gastrointestinal and male impotence.

Dr. William Hunter, gave a talk in 1910 entitled “The role of sepsis and antisepsis in medicine”. Although not directly stated by Hunter, his presentation may have associated that teeth with necrotic pulp were seen as one of the main causes of ‘focal infection’. Dr. William Price, a dentist in 1922 coined the focal infection theory. That theory was almost 100 years ago. During that era, the understanding and dental evidence based behind root canals and the techniques applied to treat apical periodontitis has not been developed up to 1965, 43 years after the theory was first circulated (Kakehashi *et al.*, 1965).

During Dr. Hunter and Price’s period, the etiology of apical periodontitis was still unidentified, the procedure of root canal treatment at the period were highly unpredictable with no standard protocol authenticated and the quality of root canals treatment operated at that time cannot be compared to root canal treatment conducted today. In both of the author paper, they encouraged dental extraction than root canal procedures itself. Their recommendation lead to an alarming eon of tooth extraction for as treatment options for systemic disease and as a prophylactic measure against future illnesses.

The modern theories of endodontics that dentists execute today such as irrigation, intracanal medication and microscopic debridement would not have been conventional practice 100 years ago. This theory of focal infection was found to be defective, as the studies performed by Dr. Price lacked control groups, were found to have bias, and generally, had poor experimental design (Pallasch *et al.*, 2000) with induction of unnecessary doses of bacteria (Easlick 1951). His techniques were highly criticized upon publication. Conversely, even if any of your patients still have confidence in

this 100-year-old theory, modern-era root canal techniques would not have authorized the same bacteria in the tooth as the root canals that were performed a century ago. The focal infection theory has been a source of both frustration and inspiration in dental community and research filed (Ørstavik *et al.*, 2008).

“97 Percent Of Cancer Patients Had Root Canal Treatment”

There is no valid, scientific evidence linking root canal-treated teeth and disease elsewhere in the body. Data showing that “97 percent of cancer patients had root canal treatment” has not been published anywhere. There is no causality between root canals and cancer; just because a person has experienced both doesn’t mean a cause-and-effect relationship exists (AAE 2014).

The definition of cause and effect is a relationship between events or things, where one is the result of the other or others. This is a combination of action and reaction. Correlation, on the other hand, is defined as a mutual relationship between two or more things. A confounding variable is defined as an extra variable that was not accounted for in a study that can ruin an experiment and suggest correlation, when in fact there is none.

In the Root Cause documentary, the case report is claimed by one osteopathic physician that 97% of terminal cancer patients (breast cancer) previously had root canal procedures. Because of this percentage, the claim is made that root canals lead to cancer. Cause and effect, clear and simple. The problem with this justification is that the highest incidence of women with breast cancer are in the age range of 50–75 (Noone *et al.* 2015). Correspondingly, the age range that exhibits the highest prevalence of root canal-treated teeth are in this same age range (Hollanda *et al.*, 2008). The proclamation that people with breast cancer

had root canal therapy so root canal therapy causes breast cancer is not a valid statement. This is not cause and effect. This connection is further proved false by the confounding variable of age. In other words, this statement would be similar to a statement that says 97% of the people who had breast cancer had skin wrinkles so skin wrinkles cause breast cancer (Froum *et al.*, 2019).

More recent research continues to support the safety of dental treatment as it relates to overall systemic health. In 2007, the American Heart Association updated its guidelines on the prevention of infective endocarditis, significantly cutting the indications for premedication for dental procedures and excluding endodontic treatment from dental procedures requiring premedication (AAE 2014). Although decades of research had contradicted the beliefs, yet some patients still hear about this long-debunking theory. Therefore, it is our duty as oral health provider to provide the correct information to our patients.

Oral- systemic Connection

The oral cavity is an extension of the mucosal barrier to the external environment. It is often called as the window into the body as multiple systemic diseases noticeable themselves in the mouth first. In the gastrointestinal tract, it would be considered as the first battleground for the body to maintain homeostasis and keep the infection away from the body (Bernard 1927). However, a strong oral-systemic disconnect sentiment still exists in medicine.

Chronic inflammation of tissues in the mouth, especially periodontal disease, has been linked to systemic issues such as diabetes, cardiovascular disease, respiratory diseases, Alzheimer's disease, low-birth-weight babies, pancreatic cancer, and rheumatoid arthritis (Li *et al.*, 2000). Multiple

studies have shown the benefits of treating inflammation in the mouth as a means of treating systemic illness. Kocher *et al.*, (2018) shows how nonsurgical treatment of periodontal disease lowered HbA1c levels in individuals with prediabetes. His study is one of the classic example of how dental treatment can decrease inflammatory cytokines and is thought to have an impact on systemic illness. Contradictory, there are other reports of adverse effects of untreated dental disease, especially in the case of acute abscess infections (Ghezzi *et al.*, 2000).

DISCUSSION

Misinformation grants a menace to public health without sound facts and data based within peer-reviewed science and verified studies. In these eras where from the palm of your hand correct information is as easy to access as false and outlandish rubbish, identifying truthful resources can be a challenge. Unfortunately, sources that rank high on a Google search do not always rank high on truth. There is no valid scientific knowledge linking root canal treatment to any health problems, it becomes clearer that fear-based platforms of fallacy are doing a disservice, are disingenuous to the public, and will be silenced by sound research (Froum *et al.*, 2018).

To emphasize on dispelling patients' myth on the matter, 25 million endodontic treatments are executed every year, safely and effectively. If it were true that root canal treatments caused diseases like cancer, there would be much more information about it available in peer-reviewed scientific publications, and root canal treatments would not be the preferred treatment option to save teeth (AAE 2014). A study published in a journal of the American Medical Association (JAMA Otolaryngology—Head & Neck Surgery) found that a patient's risk of cancer does not change after having a root canal treatment; in

fact, patients with multiple endodontic treatments had a 45 percent reduced risk of cancer (AAE 2014). Even, multiple classical studies have proved to debunk the focal infection theories as soon as it been published.

The advancements in medicine, techniques and technologies have made endodontic treatment a more predictable, successful treatment than ever before. Now day, digital imaging including CBCT, rubber dams, rotary instruments with various file system, powerful disinfectants and medicated filling materials support in guarantee a successful root canal treatment.

When a severe infection in a tooth requires root canal treatment, that treatment is deliberate to eradicate bacteria from the infected root canal, prevent reinfection of the tooth and save the natural tooth. The only substitute to endodontic treatment is extraction of the tooth. Extraction is considered as a traumatic procedure and is known to cause a significantly higher incidence of bacteria entering the bloodstream. Ask yourself this questions to your patients; you wouldn't cut off your hand if you broke a finger, so why would you extract your natural tooth if it could be saved? Nothing looks, feels or functions like your natural tooth - it should be best saved whenever conceivable and promising. Root canal treatment, along with appropriate restoration, is usually faster and less expensive than extraction and implant surgery if the patient put in their budget. Majority of the cases, root canal treatment allows patients to keep their natural teeth for a lifetime.

Another media reports stemming from a study published in the September 10, 2015, issue of Nature claim that the proteins that indicate Alzheimer's disease may be transmitted from one person to another during medical procedures including root canal treatment. Yet, there is no evidence that root

canal treatment is a risk factor for Alzheimer's disease. There is nothing definitive in the Nature study. It involved a small sample of eight patients who died from Mad Cow Disease. The brain tissues of seven patients showed signs of the protein associated with Alzheimer's but they had no symptoms of Alzheimer's. The study authors speculate that the proteins were transmitted when the patients had injections to treat their Mad Cow Disease. While the prion protein has reportedly been transmitted to medical patients through exposure to blood, inadequately sterilized neurosurgical instruments and a variety of cadaver-derived materials, there has never been a confirmed case of CJD transmitted through dental treatment.

There are procedures in place to minimize infection risk from endodontic instruments such as files and reamers. Now days, many endodontists employ single-use instruments and, if not, instruments are thoroughly sterilized prior to each use. The study author said, "It is possible our findings might be relevant to some other medical or surgical procedures, but evaluating what risk, if any, there might be requires much further research. Till now, there has no bearing on dental surgery and certainly does not argue that dentistry poses a risk of Alzheimer's disease." The Alzheimer's Society's director of research issued a statement in response to the Nature report saying, "While these findings are interesting and warrant further investigation, there are too many unknowns in this small, observational study of 8 brains to Dr.aw any conclusions about whether Alzheimer's disease can be transmitted this way. There remains absolutely no evidence that Alzheimer's disease is contagious or can be transmitted from person to person via any current medical or dental procedures (AAE 2014).

In future, there may be more irrelevant correlation about the insecurities of root canal procedure and repetition of the debunked myth.

CONCLUSION

As a dentist, we are required to use the following guidelines suggested by AAE and other reliable sources when asked about the question above.

- Acknowledge the patient's concerns; emphasize that optimum health is the goal for every dental patient when they seek for treatment
- Offer the patient with written information about endodontic treatment, and discuss it. The AAE has a variety of patient education brochures available for purchase (www.aae.org/onlinestore).
- Provide the patient with information from the AAE website about common root canal myths: <https://www.aae.org/patients/root-canal-treatment/myths-rootcanals/>. or other reliable sources.
- Highlight and empower that the patient is in control of his/her own decision to move forward with any dental procedure, and reiterate a commitment to the highest quality dental care.

In order to established a shared informed decision, it is our responsible to update our knowledge and educate our patient by discussing all the risks and benefits of each treatment options provided to the patient grounded on dental evidence based.

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A SURVEY OF THE UNDERSTANDING ON ROOT CANAL DISINFECTION AMONG DENTAL STUDENTS IN KULLIYAH OF DENTISTRY, IIUM.

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ABSTRACT

Introduction: Insufficient evidence in root canal disinfection contributes to differences in clinical practice. Previous surveys have been conducted on general dental practitioners and endodontists but on the undergraduate dental students are not present. This study aimed to assess the understanding on root canal disinfection among IIUM dental students and to come out with a guideline for root canal disinfection procedure in students' clinics. **Materials and methods:** A set of questionnaire, consisted of multiple aspects related to root canal disinfection such as the selection of root canal irrigant, the awareness on the concentration of root canal irrigant, the practice of removing the smear layer and the use of adjunct was given to the 91 dental students (fourth- and fifth-year). **Results:** The majority of fourth- and fifth-year students had completed 1 and 4 root canal treatments respectively. There was no statistically significance difference between fourth- and fifth-year students with regard to the selection of root canal irrigants, but the results showed statistically significance differences for the awareness on the concentration of root canal irrigant, the practice of removing the smear layer and the use of adjuncts in root canal disinfection procedure. **Conclusions:** Dental students who had more experience at providing root canal treatment on patients had sound knowledge and better understanding on root canal disinfection protocol.

Keywords: root canal disinfection, smear layer, root canal irrigants, adjunct to root canal disinfection

INTRODUCTION

The understanding on root canal disinfection among dental students remains unclear because of not thoroughly investigated. Previous surveys had been conducted on general dental practitioners (GDPs) and endodontists (de Gregorio *et al.*, 2015), endodontists only (Dutner *et al.*, 2012) and GDPs only (Savani *et al.*, 2014). Researchers highlighted that a greater understanding on the root canal disinfection protocols as well as adequate grasp on the

properties of irrigants demonstrated a more successful root canal therapy (Paul 2014). Therefore, it is important to comprehend the knowledge on root canal disinfection procedure so that the effective root canal therapy can be achieved.

Some root canal irrigants can promote the removal of microorganism as well as the elimination of necrotic tissue and dentinal debris (Haapasalo *et al.*, 2010, Basrani & Haapasalo 2012) in root canal system due to the properties of dissolving organic debris and

has antimicrobial effects (Haapasalo *et al.*, 2010, Basrani & Haapasalo 2012). It is essential to ensure fluid exchange during irrigation so that debris accumulation at the apical one third can be minimised (Park *et al.*, 2012) and the effective root canal disinfection can be achieved during root canal treatment procedure.

The concentration of sodium hypochlorite (NaOCl) varies from 0.5% to more than 5% but the specific concentration at disinfecting root canal system is still ambiguous (Fedorowicz *et al.*, 2012; Haapasalo *et al.*, 2014). Alternative root canal irrigants include ethylenediaminetetraacetic acid (EDTA), chlorhexidine, sterile water, normal saline (Haapasalo *et al.*, 2014), a mixture of tetracycline, acid and detergent (MTAD), hydrogen peroxide and iodine (Eliyas *et al.*, 2010). Some clinicians may also opt for an adjunct to root canal disinfection such as photo-activated disinfection and electronically activated water (Eliyas *et al.*, 2010). To date, there is insufficient evidence to suggest the superiority of one irrigant over the others and the choice of irrigant should be made based on various factors (Fedorowicz *et al.*, 2012).

Smear layer consists of an organic and inorganic materials produced during root canal preparation (Torabinejad *et al.*, 2002, Violich & Chandler 2010). Removing the smear layer or not has been a subject of controversy for years (Violich & Chandler 2010, Asnaashari & Safavi 2013). However, some researcher supported the removal of smear layer because it allows penetration of the root canal irrigants and intracanal medication into the dentinal tubules and subsequently eradicate the bacteria (Torabinejad *et al.*, 2002, Violich & Chandler 2010). Therefore, it is essential to consider removing this layer as it may contain bacteria and their by-products, thus reinfection may occur and proliferate into the dentinal tubules (Violich & Chandler 2010). Besides that, the

smear layer may compromise the apical seal as it hinders the filling material from adhering to the root canal wall (Violich & Chandler 2010).

Adjuncts are supplementary methods to enhance root canal disinfection in root canal system (Paul 2014, Plotino *et al.*, 2016) and can be done using manual agitation technique and machine-assisted system (Plotino *et al.*, 2016). It is recommended to use a combination of irrigants and adjunct for a better synergistic effect to eliminate microorganisms (Koçani *et al.*, 2012). The activation of the root canal irrigants and constant replenishment greatly increases the effectiveness of the solution (Haapasalo *et al.*, 2014) and as such can maximise the effect of disinfecting the root canal system. However, due to the poor awareness of its importance (Gulabivala *et al.*, 2010) and insufficient clear evidence on the adjunct to the root canal disinfection, these might explain the lack of implementation by the clinicians in their clinical practice (Gulabivala *et al.*, 2010, Dutner *et al.*, 2012, de Gregorio *et al.*, 2015).

This study aimed to assess the understanding on root canal disinfection among clinical year dental students and to come out with a guideline in root canal disinfection procedure in students' clinics.

MATERIALS AND METHODS

Ethical approval from research ethic committee of International Islamic University Malaysia was received on 28th February 2017 with ID Number IREC 724. The survey was conducted among fourth- and fifth-year dental students. Inclusion criteria was primary root canal treatment (RCT) and exclusion criteria were immature permanent teeth and secondary RCT. The clinical experience was defined as the number of complete RCT undertaken in which the procedure was carried out until obturation. In addition to that, incomplete RCT was considered zero RCT undertaken.

There were 5 aspects that had been assessed based on students' knowledge, attitude and practice namely the use of antimicrobial root canal irrigant for disinfecting root canal system, the knowledge on the concentration of root canal irrigant, the removal of the smear layer, the knowledge on the concentration of root canal irrigant meant for removing of smear layer and the use adjunct to root canal disinfection. Students who provided the answers based on the common practice in dental students' clinics were given score of 1 for each aspect.

Convenience sampling method was chosen because it was appropriate for this survey. The sample size was determined using Yamane sample size calculation method as follows.

$$n = \frac{N}{1 + N * (e)^2}$$

$$n = \frac{117}{1 + 117(0.05)^2} = 91$$

n – the sample size

N – the population size

e – the acceptable sampling error

*95% confidence level and *p* = 0.5 are assumed

After rounded off the value of Yamane calculation, 91 dental students were included in the survey. The questionnaires in previous surveys (Dutner *et al.*, 2012, Savani *et al.*, 2014, de Gregorio *et al.*, 2015) were referred prior to formulating the questionnaire assessing the knowledge, awareness and practices with regards to root canal disinfection procedure among undergraduate students.

Prior to the actual study, 10 students were randomly selected for pilot testing. The validity of the questionnaire was established first and the Chronbach's alpha test was carried out later to determine the reliability of the questionnaire. The value for the internal consistency was 0.6. Based on the feedback gathered from pilot testing, slight changes were made to the questionnaire particularly the terminology where the students had some

difficulty to understand. The results from pilot test were not included in the actual survey.

The actual survey was conducted from May to June 2017 involving 91 dental students who were selected randomly. The data were analysed using SPSS version 16.0 and Amos version 23.0. Chi square test and structural equation model was carried out using the aforementioned softwares. A 95% confidence interval with 0.05 *p* value was determined for significant difference.

RESULTS

The fourth- and fifth-year students who were involved in this survey were 49% and 51% respectively with majority of them were female, which was 75%. Majority of fourth-year students had completed one RCT. Only 12 students had not completed any RCT during this survey. Meanwhile, all fifth-year students had completed at least one RCT and the majority of them had completed four RCTs.

Even though there was a small number of students using normal saline as root canal irrigant, majority of them used NaOCl in their practice as shown in Figure 1. About two third of the students were aware of the concentration of sodium hypochlorite used in their practice and the rest had no idea about it. Most of the fifth-year students were aware about this if compared with the fourth-year students, as shown in Figure 2. Majority of the students which was 91% removed smear layer using 17% EDTA and most of the fifth-year students removed smear layer if compared with fourth-year students, as shown in Figure 3. About 42% of the students did manual agitation of root canal irrigant as an adjunct to root canal disinfection whereas 58% of the students did not. Most of fifth-year students practiced this method if compared with fourth-year students, as shown in Figure 4.

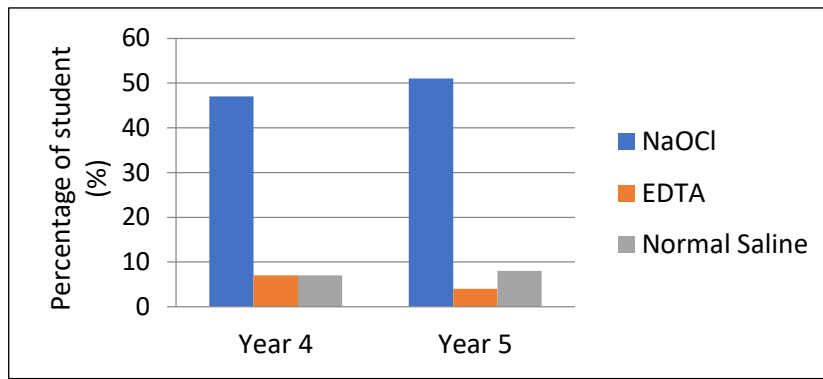


Figure 1: Root canal irrigants used in students' clinics.

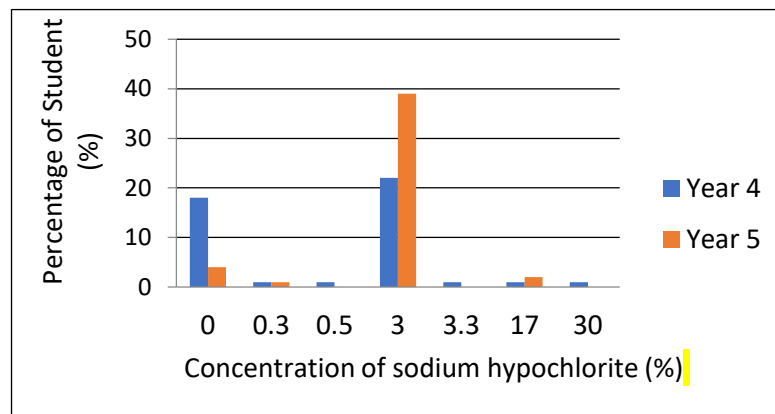


Figure 2: The awareness on the concentration of sodium hypochlorite.

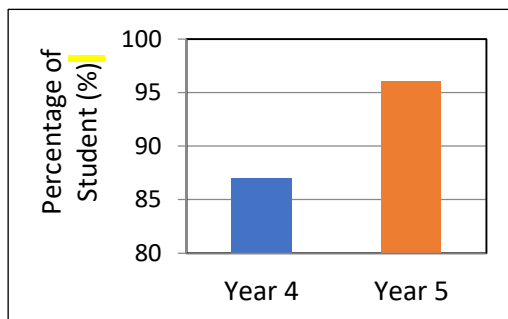


Figure 3: The practice of removing smear layer.

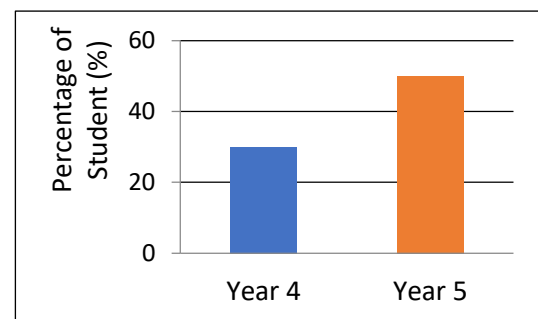


Figure 4: Agitation of root canal irrigant.

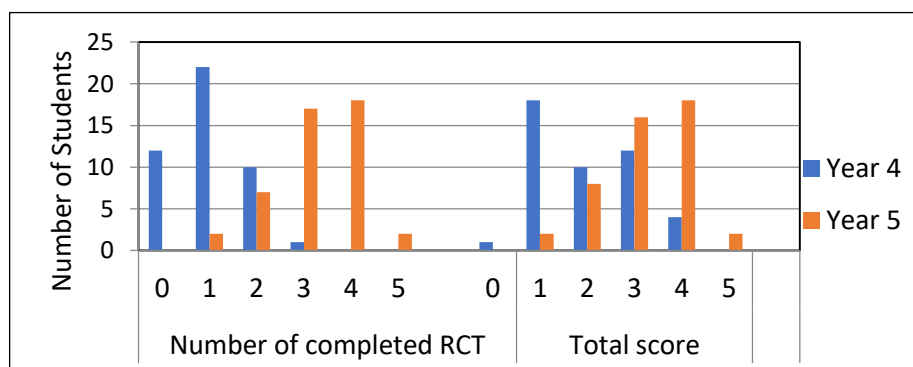


Figure 5: Relation between total score of the understanding on root canal disinfection and number of complete RCT.

Table 1: Result of *P* value of four aspects in root canal disinfection between fourth- and fifth-year dental students by using Chi square test.

Aspects in root canal disinfection	Dental students (knowledge, attitude and practice)				P value
	Fourth year		Fifth year		
	Yes	No	Yes	No	
Selection of root canal irrigant					
i. Normal saline	7%	93%	8%	92%	0.479
ii. EDTA	7%	93%	4%	96%	0.797
iii. NaOCl	47%	53%	51%	49%	0.148
Concentration of root canal irrigant	22%	78%	39%	61%	0.009
Removal of smear layer	87%	13%	96%	4%	0.001
The use of adjunct	30%	70%	50%	50%	0.039

Table 2: Relation between total score of the understanding on root canal disinfection and the number of complete RCT as well as the year of study.

Criteria	<i>P</i> value
The relation between the total score of the understanding on root canal disinfection and the number of complete RCT	0.009
The relation between the total score of the understanding on root canal disinfection and year of study	0.000

The result of *P* value of four aspects in root canal disinfection between fourth- and fifth-year students was shown in Table 1. There was statistically significant difference with regards to the knowledge on the concentration of root canal irrigant, removal of smear layer and the use of adjunct between fourth- and fifth-year students (P value < 0.05). However, there was no statistically significant difference on the election of root canal irrigant between fourth- and fifth-year students ($P > .05$).

The trend between the number of completed RCT and the total score in fourth- and fifth-year students was almost similar. The total score of the understanding on root canal disinfection was higher in more experienced students and lower in less experienced students, determined by the number of complete RCT undertaken. The minimum score for the fourth-year was zero and the maximum number of them scored one. Meanwhile, the minimum score for the fifth-year students was

one and the maximum number of them scored four.

The score of the understanding on root canal disinfection was given based on their knowledge, attitude and practice on the following aspects; the use of antimicrobial root canal irrigant for disinfection of root canal system, the knowledge on the concentration of root canal irrigant, the removal of the smear layer, the knowledge on the concentration of root canal irrigant meant for removing of smear layer and the use adjunct to root canal disinfection. The score of 1 was given to the students if they provided the answers based on common practice in dental students' clinics. These descriptions were shown in Figure 5.

The relation between total score of the understanding on root canal disinfection and the number of complete RCT as well as the year of study was shown in Table 2. Fifth-year students and the students who completed

more RCT had better understanding on root canal disinfection procedure ($P < .05$).

DISCUSSION

Irrigation is regarded as one of the most important parts of root canal treatment. The success of RCT is affected greatly by the chemomechanical debridement of the root canal system (Haapasalo *et al.*, 2010; Stojicic *et al.*, 2010, Borse *et al.*, 2017). The selection of root canal irrigant is crucial as different irrigants have their own relative merits. There is various root canal irrigants available in the market but to date there is insufficient evidence to recommend the superiority of any root canal irrigants. The ideal properties of root canal irrigant are nontoxic, no effect on periodontal tissue, no allergic reaction, has broad spectrum antimicrobial, capable dissolving necrotic pulp tissue, inactivating endotoxin and dissolve smear layer (Zehnder 2006). Many researches have been conducted to determine which irrigant has the properties similar to the ideal one but robust conclusion to suggest the superiority of one root canal irrigant over the others was difficult to make. Presently, NaOCl is widely used due to the tissue dissolution capability and antimicrobial properties (Zehnder 2006, Haapasalo *et al.*, 2010, Stojicic *et al.*, 2010). This was proven in some studies that were conducted on the endodontist and GDPs that demonstrated the use of NaOCl was their primary root canal irrigant of choice (Dutner *et al.*, 2012, de Gregorio *et al.*, 2015).

The results of this study showed that NaOCl was the main root canal irrigant in students practice even though some of them used non-antimicrobial root canal irrigant. This corroborated with previous surveys that demonstrated the use of NaOCl as the main root canal irrigant of choice (Dutner *et al.*, 2012, de Gregorio *et al.*, 2015). Apart from using NaOCl, most students used EDTA as their root canal irrigant for the removal of smear

layer. The use of NaOCl in combination with EDTA was in agreement with other studies that stated NaOCl and EDTA as the effective root canal irrigants (Torabinejad *et al.*, 2002, Zehnder 2006, Haapasalo *et al.*, 2010). Students who used normal saline in their practice were misguided in their understanding of endodontics when using this as root canal irrigant.

Regarding the awareness on the concentration of NaOCl and EDTA used in students' clinic, 61 students were aware about these. The rest had no idea about the concentration of root canal irrigants that they used possibly due to the lack of awareness on its importance and the confusion between multiple concentration of root canal irrigants available in students' clinic. It has been shown that the higher concentration of NaOCl has better effects than the lower concentration (Haapasalo *et al.*, 2010) and most of the endodontist used concentration of 5% NaOCl or greater. This could be due to their more experienced at practicing root canal treatment and more aware of the resistance that biofilms show against lower concentrations. However, there has been much controversy over the concentration of NaOCl to be used in endodontic treatment (Zehnder 2006) and it should be chosen based on various factors such as the clinical cases, the preference of the clinician and their skills and experience of using it.

With regards to the removal of smear layer in root canal system, it can be effectively removed by using EDTA (Wang *et al.*, 2017) and majority of the students this survey removed it by using 17% EDTA. The result corresponded with previous studies on GDPs that majority of them removed smear layer as well (Gopikrishna *et al.*, 2013, Savani *et al.*, 2014, de Gregorio *et al.*, 2015). EDTA has been superior for the removal of smear layer in comparison with other substances in the final irrigation

stage (Zehnder 2006, Vasconcelos *et al.*, 2007, Carvalho *et al.*, 2008). Students who did not remove smear layer after the completion of chemomechanical debridement of root canal system could possibly have limited knowledge on the importance of removing smear layer, lack of experience at providing RCT and not knowing the appropriate root canal irrigants for this purpose. Hence, the lack of implementation by them.

Less than half of the students practiced manual agitation of root canal irrigant by using gutta percha pumping technique as the adjunct to root canal disinfection procedure. Due to lack of awareness and limited evidence on the use of adjunct in root canal disinfection, it was less implemented by the students and this was in agreement with other studies (Dutner *et al.*, 2012, de Gregorio *et al.*, 2015). Manual agitation is the simplest method for agitating root canal irrigant (Gu *et al.*, 2009) and this can be done by introducing an instrument or well fitted gutta percha into the canal to manually redistribute it along the canal (Huang *et al.*, 2008, Gu *et al.*, 2009). The endodontists, almost half of them used an adjunct in their practice such as passive ultrasonic activation, sonic or subsonic activation and negative pressure system which proved the desire and awareness among them and it was contrary with the GDPs (Dutner *et al.*, 2012, de Gregorio *et al.*, 2015). The lack implementation by the GDPs and dental students could be due to the non-availability of the devices in their clinical settings and the lack of awareness on the importance of adjunct to root canal disinfection.

Even though the majority of the students had better understanding on root canal disinfection procedure, some of them, particularly the ones who provided less RCT had low understanding on root canal disinfection. They still used non-antimicrobial root canal irrigant, they had no idea about the

concentration of root canal irrigant that they used, they did not remove the smear layer following completion of chemomechanical debridement of root canal system and they did not use adjunct to root canal disinfection. These could be due to lack of experience at providing RCT on patients and must be improved so that the effective root canal disinfection procedure can be implemented in their future practice.

CONCLUSION

Within the limitation of this study, the conclusions that can be drawn were:

- a. students who provided more RCT on patients had sound knowledge on root canal disinfection procedure.
- b. students who had more exposure on RCT procedure had better understanding on root canal disinfection protocol.

Conflict of interest: None

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RETRIEVAL OF SEPARATED INSTRUMENTS WITH ULTRASONIC DEVICES: A CASE REPORT.

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ABSTRACT

A 60-year-old Malay male was referred to the UKM Endodontic Specialist Clinic for the management of left mandibular first molar with persistent periapical infection. At the time of consultation, tooth 36 was asymptomatic. The patient's medical history was non-contributory. Clinical examination revealed tooth 36 was presented with defective margin PFM crown. A pre-operative radiograph revealed approximately 4mm of separated instrument in the middle third of the mesio-buccal canal of tooth 36. Tooth 36 was diagnosed as previously treated; asymptomatic apical periodontitis. The separated instruments were successfully retrieved from the mesio-buccal canal of tooth 36. Nonsurgical root canal retreatment was performed. PFM crown was constructed for the tooth as final restoration.

Keywords: retrieval, separated instrument, ultrasonic devices

INTRODUCTION

Incidence of separated instrument may happen unpredictably and impede the chemo-mechanical cleaning of an infected root canal. The presence of remaining bacteria and necrotic pulp tissues as a result of inadequate root canal cleaning and shaping could affect the success rate of endodontic treatment (Sjögren *et al.*, 1990)

Various predisposing factors of the instrument separation have been widely reported especially on the instrument design and technique (Bryant *et al.*, 1998; Kosti *et al.*, 2004). In general, the separation of

instruments could occur in two different mechanisms: torsional load and cyclic fatigue. Torsional load occurs when the instrument binds against the canal walls and is usually associated with excessive apical force applied during instrumentation. Whilst cyclic fatigue causes an instrument separates at a point of maximum flexure after excessive use. This type of instrument separation is commonly seen in a curve canal as a result of repeated tensile-compressive stress (American Association of Endodontists, 2008).

There are many different techniques and devices that can be used to remove a

separated fragment. The use of ultrasonic devices with the aid of dental operating microscope (DOM) is one of the methods with reported high success rate (Suter *et al.*, 2005; Ward *et al.*, 2004b). The purpose of this article is to describe the management of a previously treated mandibular left first molar with separated instruments by means of ultrasonic device and DOM.

CASE REPORT

A 60-year-old Malay male was referred to the UKM Endodontic Specialist Clinic for the management of left mandibular first molar with persistent periapical infection. At the time of consultation, tooth 36 was asymptomatic. The patient's medical history was non-contributory.

Clinical examination revealed defective porcelain-fused-metal (PFM) crown margin and gingival recession on tooth 36 (Figure 1A). The probing depth was within normal limit. The tooth was not tender to percussion, palpation or biting and it was not mobile. A periapical radiographic examination revealed tooth 36 had been root canal treated with overhanging margin at the distal aspect of the crown, underfilled root canal fillings in all canals, presence of approximately 4-mm of separated instrument in the middle third of one of the mesial canal with no evidence of root canal filling in the canal and periapical radiolucency associated with the distal root (Figure 1B). The tooth was diagnosed with previously treated; asymptomatic apical periodontitis.

The patient was advised of the clinical findings and various treatment options were discussed. The patient decided to proceed to the following agreed treatment plan which was; non-surgical root canal retreatment with the attempt to retrieve the instrument fragments and followed by a PFM crown. The potential complications during removal of separated instrument such as root perforation

and secondary separation of instrument were explained to the patient.

Written consent for the proposed treatment was obtained from patient. At the first visit, non-surgical root canal retreatment was initiated after local anaesthetic administration of 2% mepivacaine with 1:100000 epinephrine (Scandonest 2% Special, Septodont, France). The existing PFM crown was sectioned completely from the gingival margin on the buccal surface and across the occlusal-lingual aspect using transmetal bur. The sectioned crown was then expanded with plastic instrument and removed. The tooth was provisionally restored with a molar band and a glass ionomer restoration. Subsequently, the tooth was isolated with dental dam. An access cavity was completed for tooth 36. Old root filling was removed completely with the use of chloroform and hand instruments under DOM (OPMI Pico Zeiss Dental Microscope, Germany). The coronal portion of the separated instrument became visible under the DOM (Figure 1C) and a staging platform was prepared at the separated instrument site using modified Gates-Glidden bur (size 2). For this purpose, the tip of the bur was ground using a diamond bur to the level of the largest diameter. Next, ultrasonic tip (ET 25, Endo Success™ Kit, Satelec, Acteon, United Kingdom) was placed on the staging platform between the exposed end of the instrument and canal wall at the "inside curvature". The separated instruments were removed once the ET 25 ultrasonic tip was activated in pulsing motions at the lowest setting. The instruments in the mesio-buccal canal appeared to be a separated barbed broach and a nickel-titanium file. During removal of the separated instrument from mesio-buccal canal, the distal and mesio-lingual canal orifices were plugged with small pledget of cotton wools to prevent the removed instruments from lodging in the canals. Both instruments were successfully

removed using the ultrasonic tip with the aid of DOM (Figures 1D).

Non-surgical root canal retreatment was performed (Figures 2A and 2B). All the canals had been negotiated and glide paths established. However, negotiations of both mesial canals to its full length were unsuccessful due to pre-existing obstruction of the canals by the accumulation of tertiary dentine despite multiple attempts in

negotiation. The working length was then determined using an electronic apex locator (Root ZX mini, J. Morita, Japan) and verified radiographically. All the canals were prepared at determined working length using NiTi rotary files (ProTaper NEXT rotary files, Dentsply Maillefer, Ballaigues, Switzerland). Sodium hypochlorite (2.5%) was used as an irrigant and calcium hydroxide (Calcipex II, Nishika, Japan) as inter-appointment intracanal medicament.

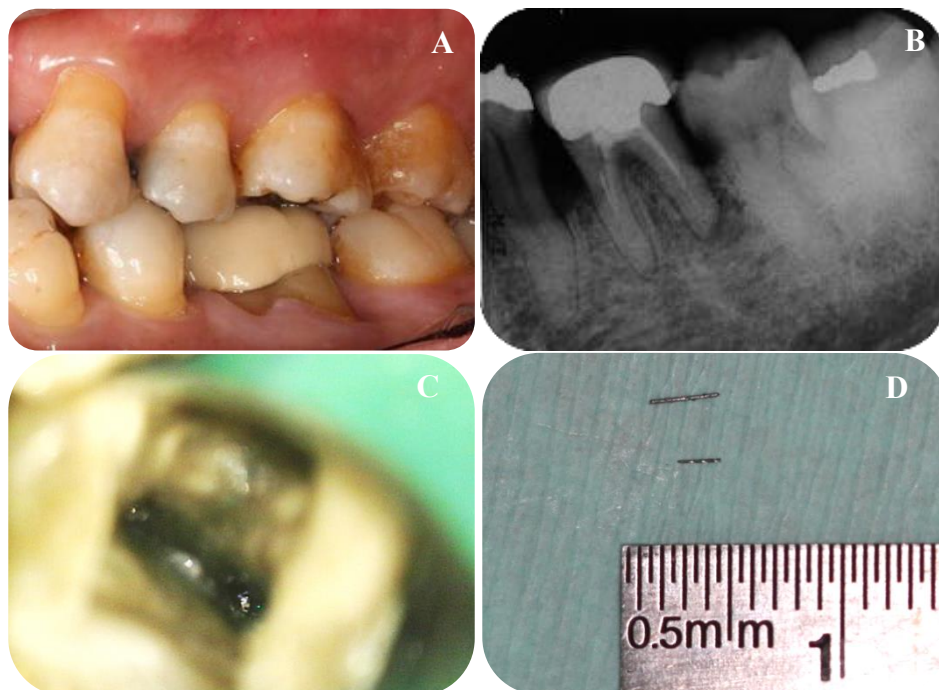


Figure 1. A) Buccal view of tooth 36; B) Preoperative radiograph: Separated instrument is visible in middle third of mesio-buccal canal of tooth 36; C) Coronal portion of the separated instrument is visible under the DOM; D) Removal of the fragments from the root canal.



Figure 2. A) After removal of separated instruments; B) Working length radiograph.

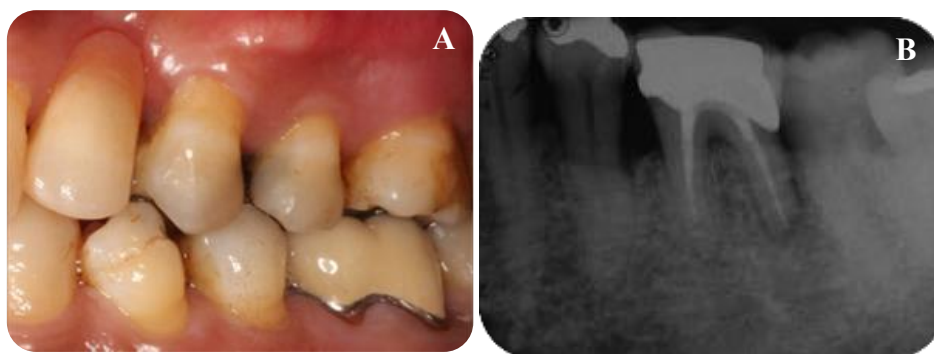


Figure 3.A) Buccal view of tooth 36; B) Periapical radiograph six months after treatment completion.

The access cavity was restored with temporary restoration (Intermediate Restorative Material, Dentsply Caulk, Milford, United States). After a week, the root canals were re-entered and irrigated with 2.5% sodium hypochlorite to remove the intracanal medicament. Fitting of master gutta-percha was verified radiographically. Prior to obturation, all canals were irrigated with 2.5% sodium hypochlorite, 17% ethylenediaminetetraacetic acid, copious normal saline and 2% chlorhexidine (final irrigation protocol) using passive sonic irrigation (EndoActivator System Kit, Dentsply Maillefer, Ballaigues, Switzerland). The root canals were dried with absorbent paper points and single matched cone technique was used to obturate all canals with epoxy resin-based sealer (AH Plus, Dentsply Maillefer, Ballaigues, Switzerland) as root canal sealer. Composite (Filtek™ Z350 XT Universal Restorative, 3M ESPE, United States) radicular core foundation was subsequently placed on the tooth. A new PFM crown was constructed as the final restoration a week later.

At 6 months review, patient was asymptomatic. He expressed his satisfaction with the treatment from aesthetic point of view (Figure 3A). Clinically, the crown was satisfactory and there was reduction of apical pathology in periapical radiograph (Figure 3B).

DISCUSSION

The present case report described the favourable outcome of a non-surgical root canal retreatment following successful retrieval of the separated instruments in the mesial canal of a mandibular first molar. The success of the management on separated instrument depends on the ability to remove or at least by-passing the obstructing fragment in the canal. The location of the separated instrument in relation to the root canal curvature, position of the instrument within the root canal and the angle of the curvature of the affected root (Cujé *et al.*, 2010) are of great importance in decision making for fragments retrieval. As in this case, the removal of the separated instruments was the choice of treatment when considering its favourable location within the root canal i.e.: in the middle third of the root canal, coronal to the canal curvature; and at the angle of 0° – 20° curvature of the affected root (Cujé *et al.*, 2010). Furthermore, removal of the separated instrument could effectively eliminate the residual micro-organisms and its by-products especially in a case with radiographic evidence of pre-existing periapical lesion.

However, blockage has been encountered during instrumentation on the mesial canals due to the pre-existing obstruction by the tertiary dentine, and thus, causing the root canal preparation short from the apex of the mesial root. Nevertheless, the prognosis of tooth 36 is still considered as favourable as

reported high success rate (87%) in teeth with calcification (Gorni and Gagliani 2004).

Good lighting and magnification provided by the DOM are important to allow for a better control of dentine removal and ensure correct positioning of the ultrasonic tip alongside the separated instrument at the “inside curvature” of the mesial root. A correct positioning of the ultrasonic tip could help to prevent secondary fracture and pushing the fragment further apically. If a clear visualisation on the fragment could not be well obtained, the option to remove the fragment is not recommended due to the higher risk of root perforation and extensive canal enlargement, particularly when the separated instrument is located in the apical third of the canal or beyond the canal curvature.

CONCLUSION

This case report intended to share information on the management of previously treated mandibular first molar with separated instruments using ultrasonic tip and DOM. With correct diagnosis, appropriate treatment planning and good execution of non-surgical root canal retreatment, tooth 36 is expected to have favourable long-term prognosis.

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A HOPELESS TOOTH TO TOOTH SUPPORTED OVERDENTURE: A CASE REPORT

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ABSTRACT

Over-denture was dated back since 1950s incorporating natural tooth to support a complete denture on the maxillary and mandibular arch. It is also known as preventive prosthodontic treatment to complete denture. This case report illustrates a geriatric patient with several retained mandibular teeth which is prognostically questionable. Due to patient's motivation, the initially planned for extraction tooth 33 was then converted to tooth-retained partial over-denture and it will serve as transitional denture. Tooth 33 was endodontically treated and crown lengthening surgery was conducted to relocate restorative margin supra-gingivally without compromising the crown root ratio. After period of healing, the abutment tooth was prepared to receive base metal metal coping and was cemented. The mandibular partial over-denture was then constructed. Retaining tooth proprioception under a denture is beneficial physiologically and psychologically, concomitantly enhance the motivation towards dental care. The risk of abutment tooth loss is high and patient's must have attained a considerable level of plaque control and engagement to routine recall interval is essential. Despite the advancement in implant dentistry, tooth supported over-denture is still a valid option in order to delay vicious cycle of restorative treatments.

Keywords: overdenture,

INTRODUCTION

Overdenture, has been reported since 1950s, traditionally regarded as a complete denture supported by one or more retained tooth usually of a strategic location and the residual alveolar ridge (Lord and Teel, 1974). In a recently revised version of Glossary of Prosthodontic Terms ninth edition published in 2017 by The Academy of Prosthodontics defined overdenture as any removable prosthesis that covers and rests on one or more remaining natural teeth, the roots of natural teeth, and/or dental implants. It was initially developed to enhance the patients'

experience in complete denture, it was also extended to be incorporated into the partial denture (Reitz *et al.*, 1977).

Overdenture has a proven successful track record over the years and is being continued as one of the treatment options (Morrow *et al.*, 1969; Lord and Teel, 1974; Toolson and Smith, 1978; Samra *et al.*, 2015) as such, a valid alternative treatment to complete denture (Reitz *et al.*, 1977). Some authors regard this treatment modalities as a preventive prosthodontics to complete denture (Morrow *et al.*, 1969; Dodge, 1973; Shinde and Wadkar, 2012). Despite all the recent advances in the

field of dentistry, the role of overdenture is still relevant nowadays. After the introduction of osseointegration system by Brånemark, implant supported overdenture especially for the mandibular overdenture become increasingly relevant (Burns, 2000; Thomason *et al.*, 2009).

Several advantages that are identified compared to conventional complete dentures includes alveolar bone height preservation, psychological benefits (Lord and Teel, 1974; Budtz-Jørgensen, 1996) and maintenance of masticatory function (Jacobs and Van Steenberghe, 1991; Chen *et al.*, 2002). It can be argued that denture adhesive can improve masticatory activity significantly among complete denture wearers as shown in a local study by Ahmad and Kamarudin (2010), however, other biological factors contributes to the retention and stability of dentures (Jacobson and Krol, 1983a) hence, denture adhesive must not be misused and the technical aspect to produce a stable and retentive denture is essential considering the biological limitation of each particular patient (Burns, 2000). When incorporating tooth as an overdenture abutment, denture stability and support improved and indirectly, the denture border seal is maintain throughout during function, thus positively influencing the retention (Lord and Teel, 1974). The sense of proprioception are preserved with tooth supported overdenture, gives greater benefits in term of contraction of muscle of mastication and it implied a better masticatory function (Chen *et al.*, 2002) plus the feeling of still owning their own teeth (Lord and Teel, 1974).

A longitudinal prospective cohort study of tooth supported overdenture conducted by Ettinger and Qian (2004) with follow-up up to 22 years reported 20% of tooth loss likelihood. Caries was the main reason for abutment loss followed by periodontal disease. The team also found that maxillary abutment teeth opposed

by natural dentition of the mandible are at higher risk of developing vertical root fracture. Three risk factors for tooth loss were identified in this study; medical diseases especially immunological related such as diabetes or lupus erythemathosus, sub-optimal fluoride use at home and infrequent visits to practitioner especially when less than once per year. Medical diseases are related to increased periodontal breakdowns and susceptibility to periodontal diseases. Sub-optimal fluoride exposures increases risk for caries development and infrequent visits to dental office can imply a poor compliance to oral hygiene practice at the same time prevent early disease detection. The same complications, in addition to fracture of denture was reported by an earlier studies (Reitz *et al.*, 1977). Ettinger and Qian (2004) concluded a six year survival rate of 88.9% for maxillary and 88.2% for mandibular tooth supported over denture. In certain situations, whereby the patient are at high risk of developing caries such as in hyposalivation, implant supported overdenture are more favourable compared to tooth supported overdenture (Zitzmann *et al.*, 2008). Patients should be made known of the risks and benefits, surgical point of view and the implication behind each treatment options including biological and financial costs (Zitzmann *et al.*, 2008).

The case illustrated below showing the use of a badly carious tooth being modified and converted into tooth supported mandibular partial denture.

CASE REPORT

A 70-year-old Chinese man presented to the post-graduate student clinic with chief complaint of poor chewing ability and wished to replace the missing teeth. He previously had a mandibular partial acrylic denture and is no more fitting well due to dental extraction about a year ago. Since then, he did not wear

any mandibular denture. He has no preference over types of prostheses might be removable or fixed and he is expecting to have a replacement denture in which he is able to eat with. His upper jaw is fitted with implant supported partial denture which was constructed about 8 years ago. He has type II diabetes mellitus, hypertension and ischaemic heart disease with regular review in Hospital

USM. His blood sugar level is fairly controlled with oral hypoglycaemic agent while his blood pressure is in good control and his cardiac condition is not in failure. He retired from work many years ago and maintained as non-smoker. He is highly independent despite polymorbidities and able to commute daily with his motorcycle.



Figure 1: Panoramic radiograph show a generalised bone loss about 50%-75% affecting the partially edentulous maxilla and mandible. Tooth 27 and 28 has extensive bone loss. Note the extensive carious lesion on tooth 33 and 34 involving root surface. Four implants in the maxilla with three being loaded while implant at 11 position was left embedded below gingiva. Implant crestal bone level is good while the unloaded implant shows radiolucency around the implant which probably indicating poor osseointegration.

Generally, he was alert and ambulating well with no abnormal gait. Extraoral examination was unremarkable. Intraorally, maxillary implant retained partial acrylic overdenture in situ supported by three units of implant. Tooth 27 was carious with excessive mobility together with tooth 28. The mandibular arch is partially edentulous with Kennedy class I modification 1. Basic periodontal examination (BPE) reveal a score 4*. Teeth 33 and 34 were carious with carious margin located sub-gingival. Both 33 and 34 has no clinical mobility, not tender to percussion and not

sensible upon examination. Hence a clinical diagnosis of pulp necrosis, asymptomatic apical periodontitis due to caries on teeth 33 and 34 was made. Tooth 34 was judged to be hopeless and require extraction. Panoramic radiograph in Figure 1 was taken during initial presentation.

Tooth 33 despite having an extensive caries, minimal remaining coronal tooth structure and sub-gingival caries but in view of the favourable position in the arch, acceptable crown:root ratio (after it was decoronated), relatively positive endodontic prognosis, and

most importantly, the patient's motivation in improving his oral conditions (Figure 2A). A joint decision between prosthodontist, periodontist and endodontist to preserve tooth 33. It was planned to convert tooth 33 onto overdenture abutment supporting a partial acrylic denture. This denture will serve as transitional or temporary denture while the prognosis of remaining mandibular teeth is being assessed throughout phases of periodontal therapy.

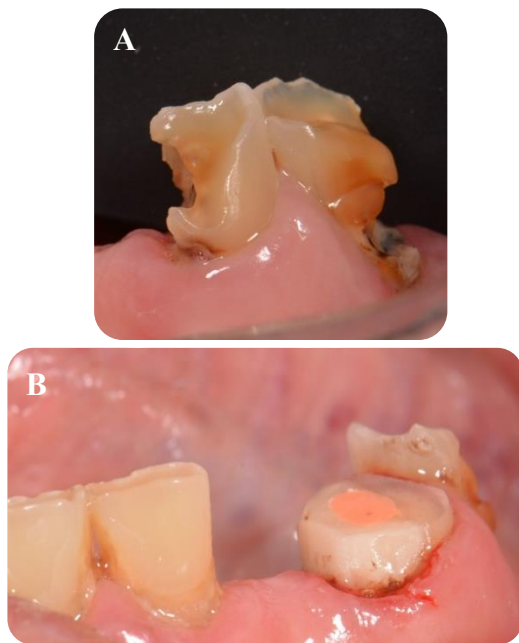


Figure 2. A) Labial view of tooth 33 and 34 Note the extension of caries to sub-gingival and less than 50 % coronal tooth structure; B) Interim restoration on tooth 33 was placed. Patient was being referred to periodontic unit for further management. Note, tooth 34 was planned to be extracted.

The initial plan was to improve plaque control by oral hygiene instructions and coaching, advising the use of high fluoride tooth paste (more or equal to 1450ppm fluoride) and denture care instructions. The patient was then referred to periodontic unit for complete periodontal evaluation and therapy with consideration for crown lengthening surgery on tooth 33. However, prior to referral, initial

stabilisation of tooth 33 was done. Carious tissue was removed completely and coronal height was reduced to half to ease root canal treatment and placement of rubber dam clamp. The mesial cavity margin was noted to be extended to the level of mesial alveolar crest; hence good rubber dam isolation was difficult and resin modified glass ionomer restorative cement (Fuji II LC, GC Japan) was used to restore the tooth prior to canal access. Canal was accessed and irrigated with 2.5% sodium hypochlorite. Non-setting calcium hydroxide (ApexCal, Ivoclar Vivadent, Leichtenstein) was placed as intracanal medicament and the canal access was double sealed with temporary restorative material (Cavit, 3M ESPE, US) and glass ionomer cement (Fuji VII, GC Japan) (Figure 2B). It was informed that the blood sugar control and glycated haemoglobin level (HbA1c) of the patient was not satisfactory and required referral to family medicine specialist clinic for stabilisation. After 4 months, patient attained a satisfactory blood glucose level and crown lengthening surgery was conducted. Intra-operatively, it was noted that crestal bone loss adjacent to cavity margin occurred probably due to supra-crestal attachment tissue violation during earlier restorative intervention and it developed periodontal pocket of 5 mm. Hence, gingivectomy was done to reduce the mesial pocket and root surface debridement was carried out while crown lengthening on distal and osteoplasty on labial to create a positive bone contour. Healing was unevenful.

While the periodontium was allowed to stabilised, root canal treatment on tooth 33 was continued. Under rubber dam isolation, coronal structure was reduced further to facilitate treatment. After working length determination using electronic apex locator (Root ZX, Morita, Japan), the canal was shaped using XP-Endo Shaper (FKG, Switzerland) size ISO 30 0.04 taper. Canal was irrigated with

copious amount of 2.5% sodium hypochlorite and final rinsing with 17% ethylenediaminetetraacetic acid. The canal

was obturated using cold lateral condensation technique with AH Plus sealer (Dentsply Maillefer, Ballaigues, Switzerland).



Figure 2. A) Occlusal view of tooth 33. Note, the crown tooth was reduced to gingival level, prepared with all around chamfer margin; B) Impression for tooth 33. Note, extension of impression material into canal extension; C) Intra-oral view immediate post-operatively; D) Frontal view of mandibular partial acrylic overdenture opposing and old implant supported maxillary partial acrylic overdenture during 1 month review.

After a period of healing, tooth 33 was re-accessed to remove about 4mm of gutta percha from the coronal part of the canal and was sealed with thin layer of cavity lining material (Fuji Lining, GC, Japan) under rubber dam isolation. The coronal portion was further reduced to gingival level and all around chamfer margin was prepared using chamfer bur (Shofu, Japan) as in Figure 2A. Impression was taken using dual viscosity single step light and heavy body polyvinylsiloxane impression material (Examix, GC, Japan) after sulcus expansion with retraction cord (Ultrapak, Ultradent, US) (Figure 2B). The impression was

sent to lab for fabrication of dome shaped Nickel-Chromium (Bego, US) base metal coping. Fabricated metal coping was tried and adjusted accordingly. Cementation was done using glass ionomer luting cement (Ketac Cem, 3M ESPE, US) (Figure 2C). Impression for denture fabrication was done using monophasic polyvinylsiloxane impression material (Examix, GC, Japan) with customised tray (Trayplast, Vertex, Netherlands). After several clinical stages for acrylic partial denture fabrication, the overdenture was issued. The patient was put under close review and recalls for monitoring of caries status and periodontal

maintenance. The maxillary denture, despite poor aesthetically, the patient has no concern and he is tolerating well with it. Figure 2D showing completed partial acrylic denture intraorally.

DISCUSSION

Although initially overdenture was design for complete denture, however, it is also beneficial in partially edentulous patient particularly, when the residual dentition has a reduced periodontal support, questionable prognosis or poor distribution over the arch (Budtz-Jørgensen, 1996). When the abutment tooth is decoronated to the level of gingiva, the crown:root ratio become favourable (Morrow *et al.*, 1969). Furthermore, a better force distribution in which it is oriented axially along the long axis of the abutment tooth (Reitz *et al.*, 1977; Budtz-Jørgensen, 1996). Despite the tooth chosen for over denture abutment in this patient is extensively carious which was not highly recommended due to the negative influencing factor in retaining this particular tooth (Lord and Teel, 1974), but it is not a definite contraindication. In view of the contemporary management of dental caries, the holistic approach to treat at individual level rather than the carious lesion itself (Pitts *et al.*, 2014). This patient was put under preventive regime; high fluoride tooth paste, proper tooth brushing method, application of fluoride varnish and diet counselling to reduce the likelihood of developing new caries. The patient will be monitored regularly which also include motivational engagement.

The main risk of incorporating tooth supported overdenture is periodontal disease and caries progression (Budtz-Jørgensen, 1996). Thus, control of disease is essential coupled with patient's motivation to improve his or her oral condition. This is often a challenge as the potential patient to receive overdenture are generally from the older cohort (Ettinger and Qian, 2004). This group of

patient might be having poor or reducing motor coordination and poor eye sight which hinder the personal care for the abutment tooth and also the remaining dentition (Jablonski and Barber, 2015). Level of dependency directly affect the availability of the patient to present for recall appointment (Geddis-Regan and Walton, 2018). However, it shall be remembered that biological age is not a sole determinant factor for tooth loss but the individual health itself is the main factor (Allen, 2019). For example, the patient in this case, a 70-year-old man who is able to commute by his own compared to a 60-year-old who suffered from cerebrovascular accident who is dependent on their care taker. All these factors shall be considered prior to providing overdenture as a treatment option (Morrow *et al.*, 1969; Budtz-Jørgensen, 1996).

In term of abutment selection, preferably the tooth is of strategic location for example canine or first premolar which are able to give support and stabilise the overdenture (Morrow *et al.*, 1969; Lord and Teel, 1974; Budtz-Jørgensen, 1996). Morrow *et al.*, (1969) also suggest the use of both canine and second molar to create a rectangular distribution to maximise support and stability. Besides, at periodontal point of view, the proposed abutment shall be with minimal mobility and manageable periodontal sulcus depth plus adequate band of keratinised tissue (Lord and Teel, 1974). Then, the caries status of the abutment should be manageable or restorable (Morrow *et al.*, 1969). It is not always to have an ideal tooth selection and sometimes, a single overdenture abutment is better than none. Care should be taken when using both approximating abutment as the cleaning can be arduous (Morrow *et al.*, 1969).

One of the unwanted complications of using mucosal supported conventional removable denture either partial or complete denture is the accelerated resorption of

residual alveolar ridge (Budtz-Jørgensen, 1996). Conventionally, when designing conventional removable denture, the preference is over tooth supported rather than mucosal supported. When mucosal support is inevitable, the denture is designed to distribute the masticatory forces over the corticated part of the residual ridge instead of the cancellous bone to reduce the rate of bone resorption (Jacobson and Krol, 1983b). It is advantageous to have natural teeth to maintain alveolar bone level as long as possible for a better experience with denture wear.

While implant supported overdenture remain as an option, however it is not always feasible and affordable as in this patient. Keltjens *et al.*, (1993) in his case report in which he maintain two implant supported mandibular partial denture on a Kennedy Class I arch whereby each implant was placed at the most possible posterior location of the free end saddle. He highlighted five benefits of implant supported overdenture on bilateral free end saddle; 1) limits alveolar ridge resorption 2) improving retention for mandibular removable partial denture 3) reduce retentive clasp in denture design 4) reduce torqueing stress on natural abutment tooth and finally 5) improved comfort. Jacobs and Van Steenberghe (1991) evaluated tactile sensory in implant supported overdenture and natural teeth supported overdenture and he concluded that natural teeth gives a better sensation. Masticatory efficiency of implant and tooth supported overdenture significantly outweigh conventional complete denture (Chen *et al.*, 2002).

Endodontic procedure in particular to single root canal is relatively straight forward. When coronal section is reduced apically, the working length become shorter and endodontic treatment is more predictable (Lord and Teel, 1974). Attaining a good general health is always beneficial in the outcome of not only

endodontic treatment but also periodontal outcome hence in this patient, engagement with physician will improve outcome of both dental treatment and general health (Ng *et al.*, 2011; AlJehani, 2014).

Dental treatment in postgraduate clinic do not incur any charges for most of the treatments provided except for certain high cost procedure such as implant rehabilitation which is partially subsidised. Thus, financial cost is not a major factor for consideration in this patient but in other setting it might be a complicating factor to consider while formulating treatment plan. The current lower partial acrylic denture served as temporary denture and at any time where permanent denture is to be constructed, the prepared tooth abutment is ready to be utilised.

CONCLUSION

Tooth supported overdenture is a valid treatment option for the failing dentition as it works as preventive prosthodontics to complete denture. This also delay the vicious cycle of restorative treatment and room for future treatment options remain open.

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AN INCIDENTAL FINDING OF A TOOTH IN THE MAXILLARY SINUS: A CASE REPORT

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ABSTRACT

This case report is about ectopic eruption of a tooth in the maxillary sinus. Patient presented with complaint of pain on upper left first premolar. The tooth was carious, with swelling and tender on the buccal sulcus. On exploration, the pulp was found to be necrotic. Canal cleaning and shaping was done and intracanal medicament placed. On consecutive visit, patient complaint of intraoral pus discharge from upper left region. On examination, all teeth on the upper left quadrant were non tender to percussion, however pain and swelling still persisted on the buccal sulcus. Cone Beam Computed Tomography was ordered and a radiopacity was noted in the left maxillary sinus. The radiopaque foreign body was removed via endoscopy and no more symptoms were present since. Root canal treatment was completed, and tooth was finally restored to function.

Keywords: ectopic tooth, maxillary sinus, CBCT, endodontics

INTRODUCTION

Tooth eruption is a process whereby the forming tooth migrates from its intraosseous location in the jaw to its functional position within oral cavity. Any abnormal tissue interaction during odontogenesis may result in ectopic tooth development and eruption (Bodner L, Tovi F, Bar-Ziv, 1997). The ectopic sites may be nasal septum, mandibular condyle, coronoid process and the palate. But in a non-dentate area like maxillary sinus it is very rare (Buyukkurt MC, Omezli MM, Miloglu O 2010; Di Felice R, Lombardi T 1995). This condition can be symptomatic or non-symptomatic (Persac *et al.*, 2010). The condition may be undiagnosed for years until the patient undergoes radiographic examination for any reasons.

The etiology of ectopic tooth is considered multifactorial. Suggested etiology includes development disturbances such as cleft palate, trauma, odontogenic infection, genetic factors,

crowding or dentigerous cyst surrounding impacted tooth (Buyukkurt MC, Omezli MM, Miloglu O, 2010). However, the exact etiology remains unclear.

CASE REPORT

A 45-year-old Chinese man had received a root canal treatment and crown on his upper right first molar tooth with our department. On review visit, he complained of pain on upper left first premolar (24). There was a swelling on the left cheek that is tender on palpation. On examination, tooth 24 was carious, with tenderness to percussion. Electric pulp testing result was negative and intraoral periapical radiograph revealed a radiolucency at the root apex. Upon exploration, the tooth was found to be restorable and root canal treatment was initiated. On consecutive visit, patient complaint of intraoral pus discharge from upper left region and also yellowish discharge from left nose when he tried to clear the mucus by blowing. On examination, all teeth on upper

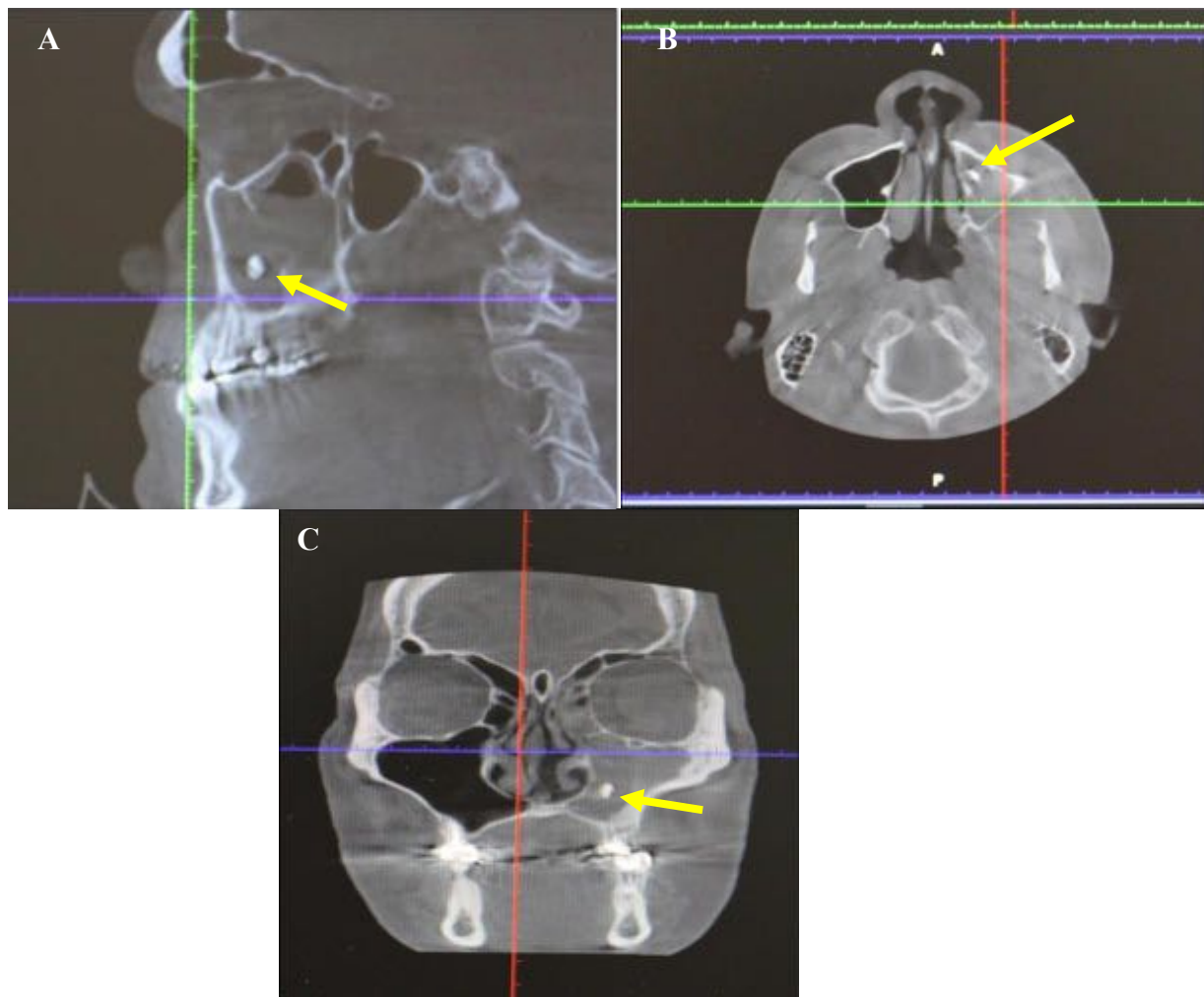


Figure 1. CBCT images from sagittal (A), axial (B) and coronal view (C). The yellow arrow pointed to the foreign body in the left maxillary sinus

left quadrant were non tender to percussion. Pain and swelling persisted on the buccal sulcus. Cone Beam Computed Tomography (CBCT) was then ordered and a radiopacity was noted in the left maxillary sinus (Figure 1). The radiopaque foreign body was removed via endoscopy (Figure 2) at a private hospital and no more symptoms were present since. Root canal treatment was completed and the tooth was finally restored to function (Figure 3).

DISCUSSION

Ectopic tooth in the maxillary sinus area is a relatively rare occurrence. The symptoms caused by the ectopic tooth include unilateral

nasal obstruction, foul smelling, rhinorrhea, crusting, localized ulceration, nasal congestion, epistaxis and foreign body sensation. The presence of an ectopic tooth in the maxillary sinus is often asymptomatic and generally noticed incidentally. Radiopaque image of the ectopic tooth could be easily detected with orthopantomogram (OPG). However, CBCT is essential for exact location of the ectopic tooth and to formulate the best treatment plan. In this case, as the patient was symptomatic, he was referred for removal of the foreign body. It was removed by endoscopy and it appeared as a coronal portion of a premolar without its root (Figure 2).

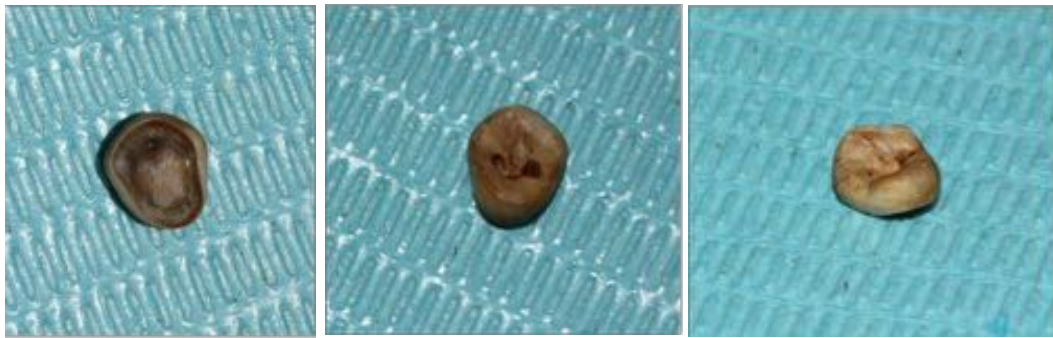


Figure 2. Profile view of the supernumerary tooth removed via endoscopy from the maxillary sinus.



Figure 3. Intraoral view of tooth 24 post-completion of treatment.

CONCLUSION

A thorough knowledge of the relevant pathophysiology is necessary to be able to identify symptoms that does not fall into place with the primary diagnosis. Ectopic tooth eruption in maxillary sinus can be diagnosed radiographically by plain OPG. However, a CBCT scan is able to reveal the exact location to aid in selecting the best treatment approach in removing the ectopic tooth.

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