

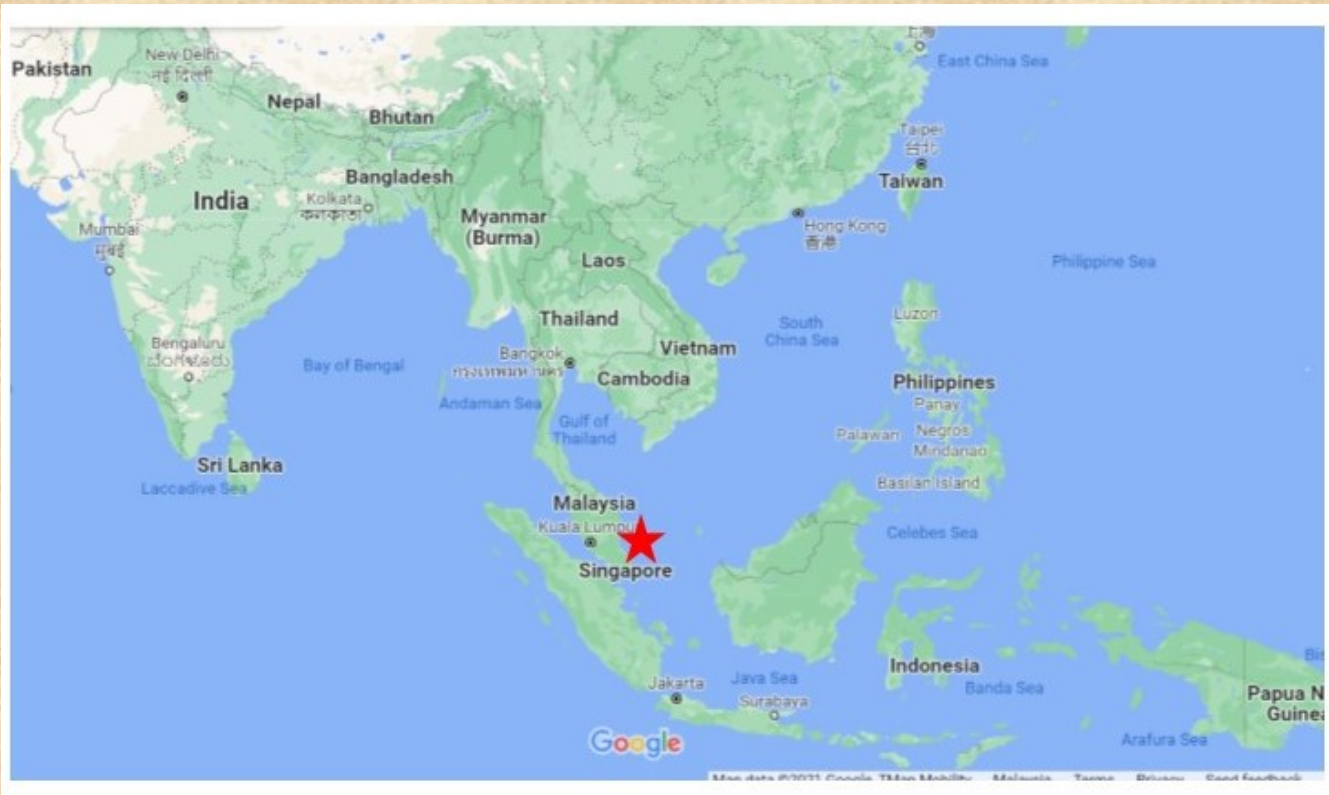
# Combined Ilizarov frame and flap in the tibia

Prof Dr Nazri Mohd Yusof

Advanced Trauma and Limb Reconstructive Surgery

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# SASMEC @ IIUM

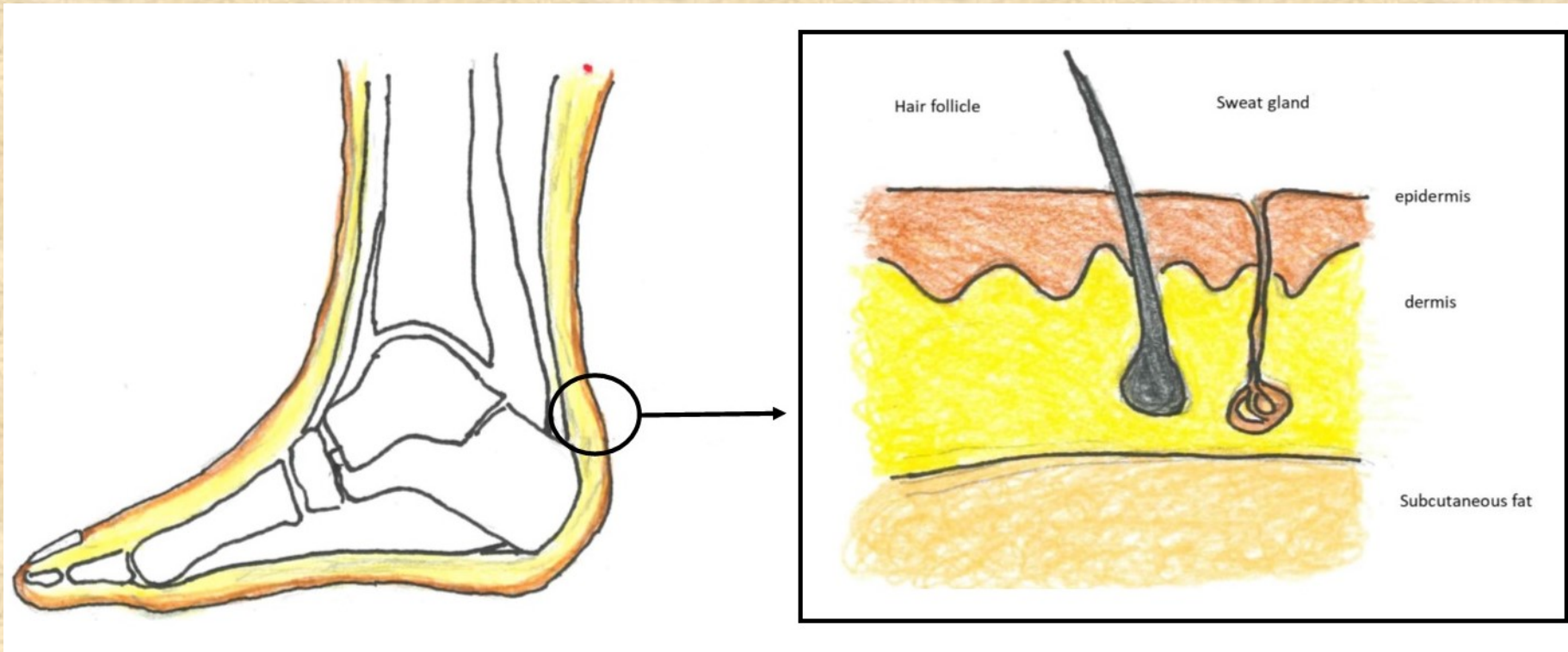


# Objective

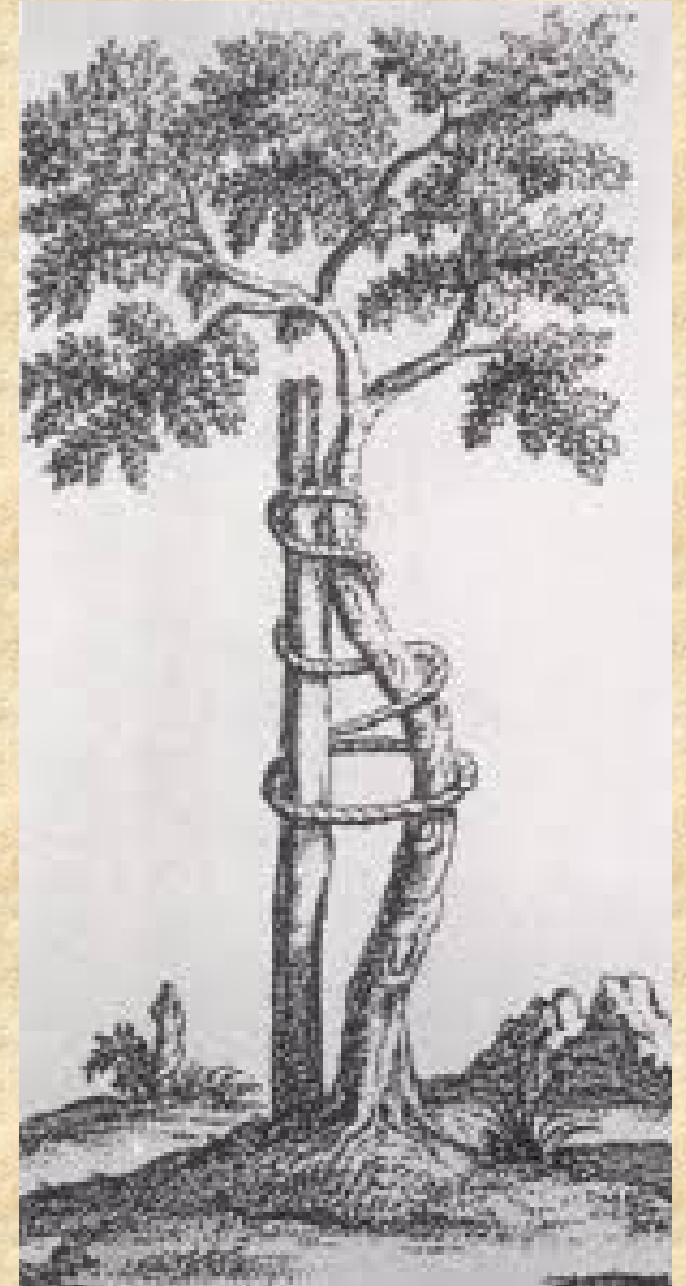
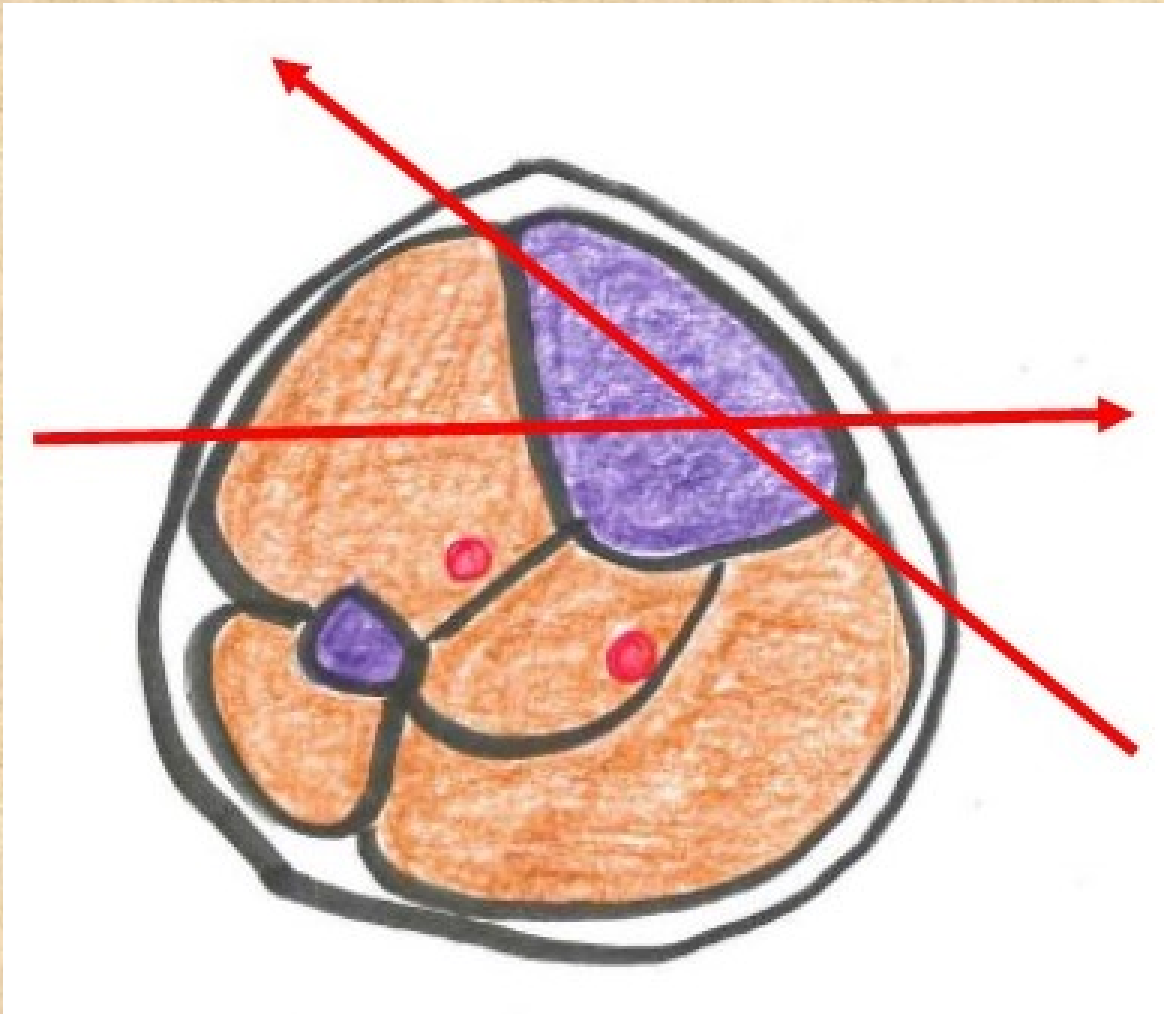
- Principles of tissue transfer and tissue regeneration
- Advantages of combining flap with Ilizarov frame
- Case example



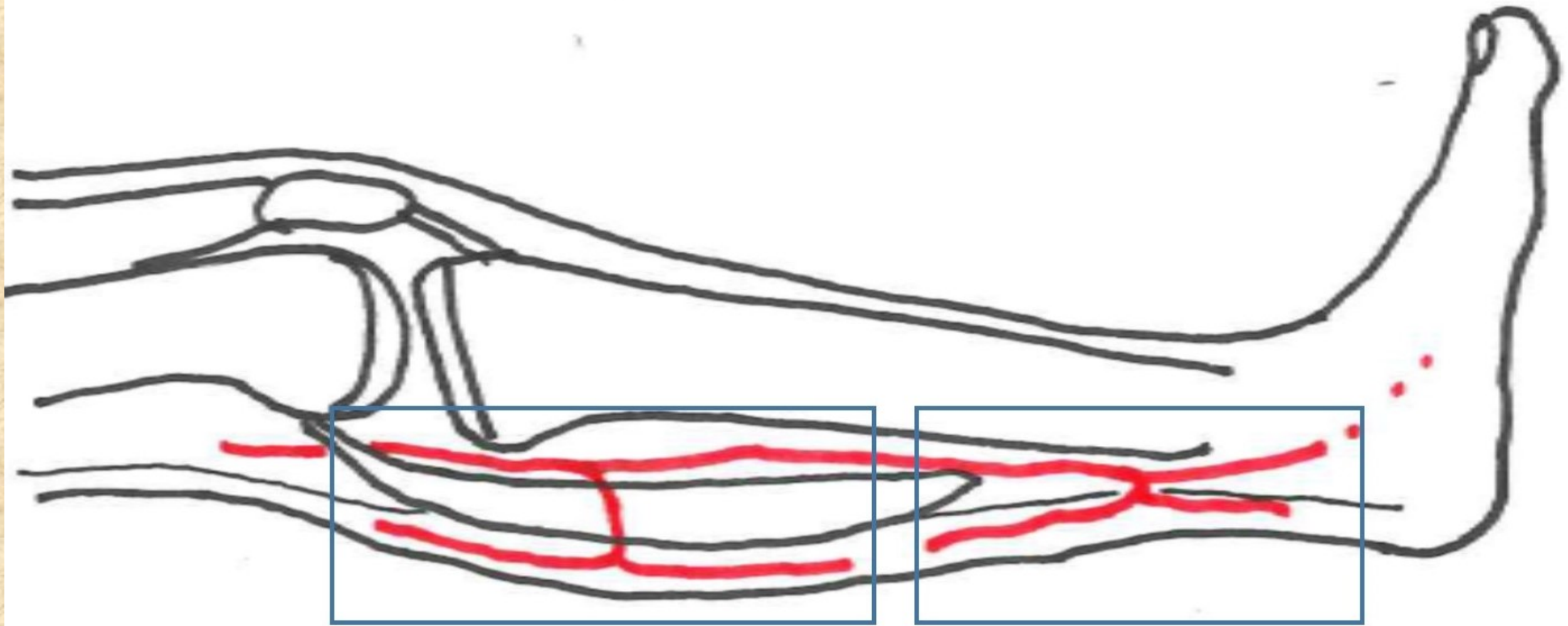
# Anatomy



# Bone and soft tissue



## Types of local flap

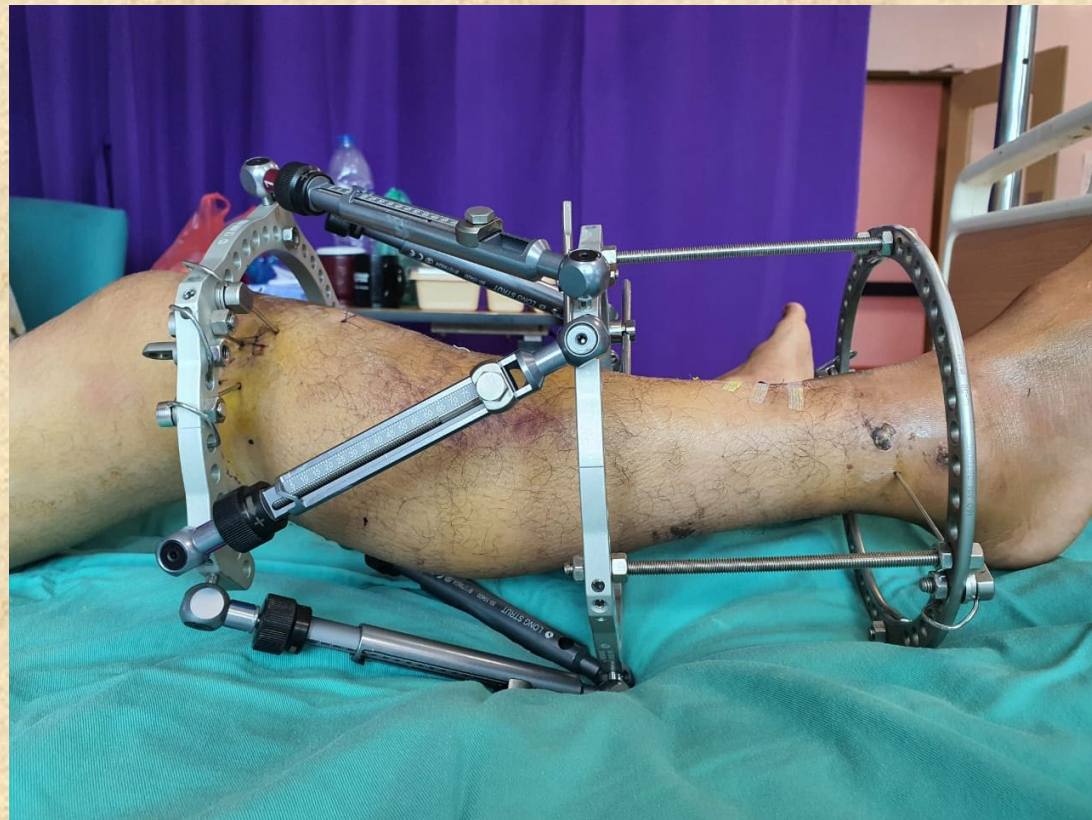
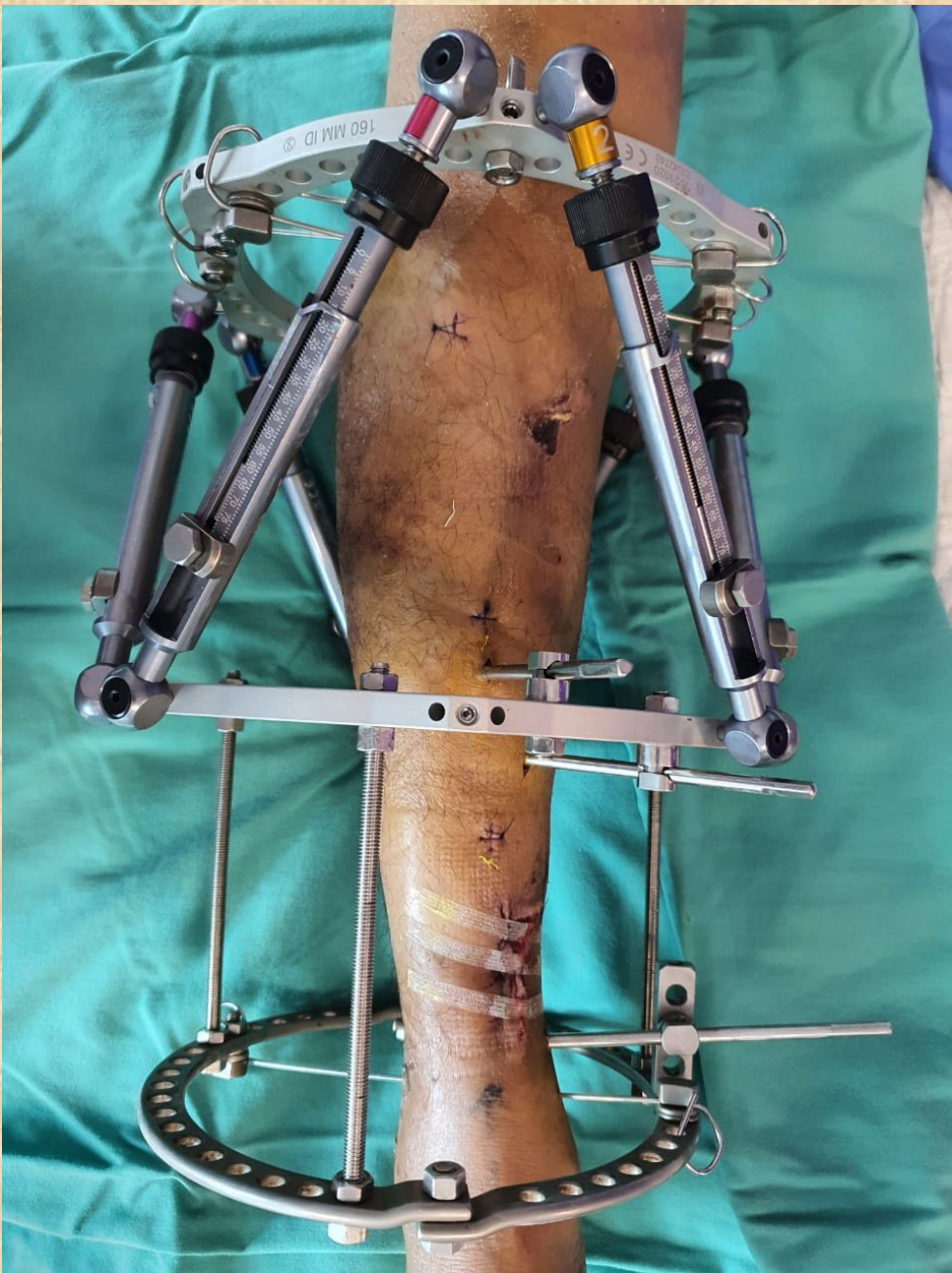


Musculocutaneous flap

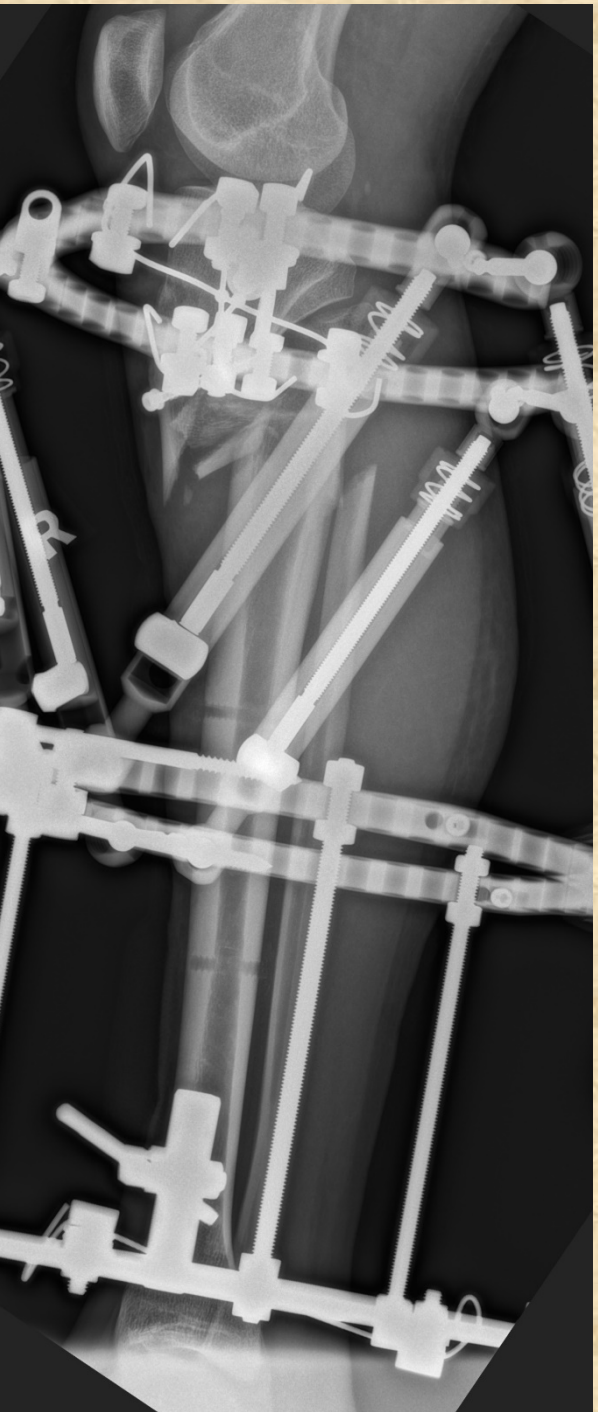
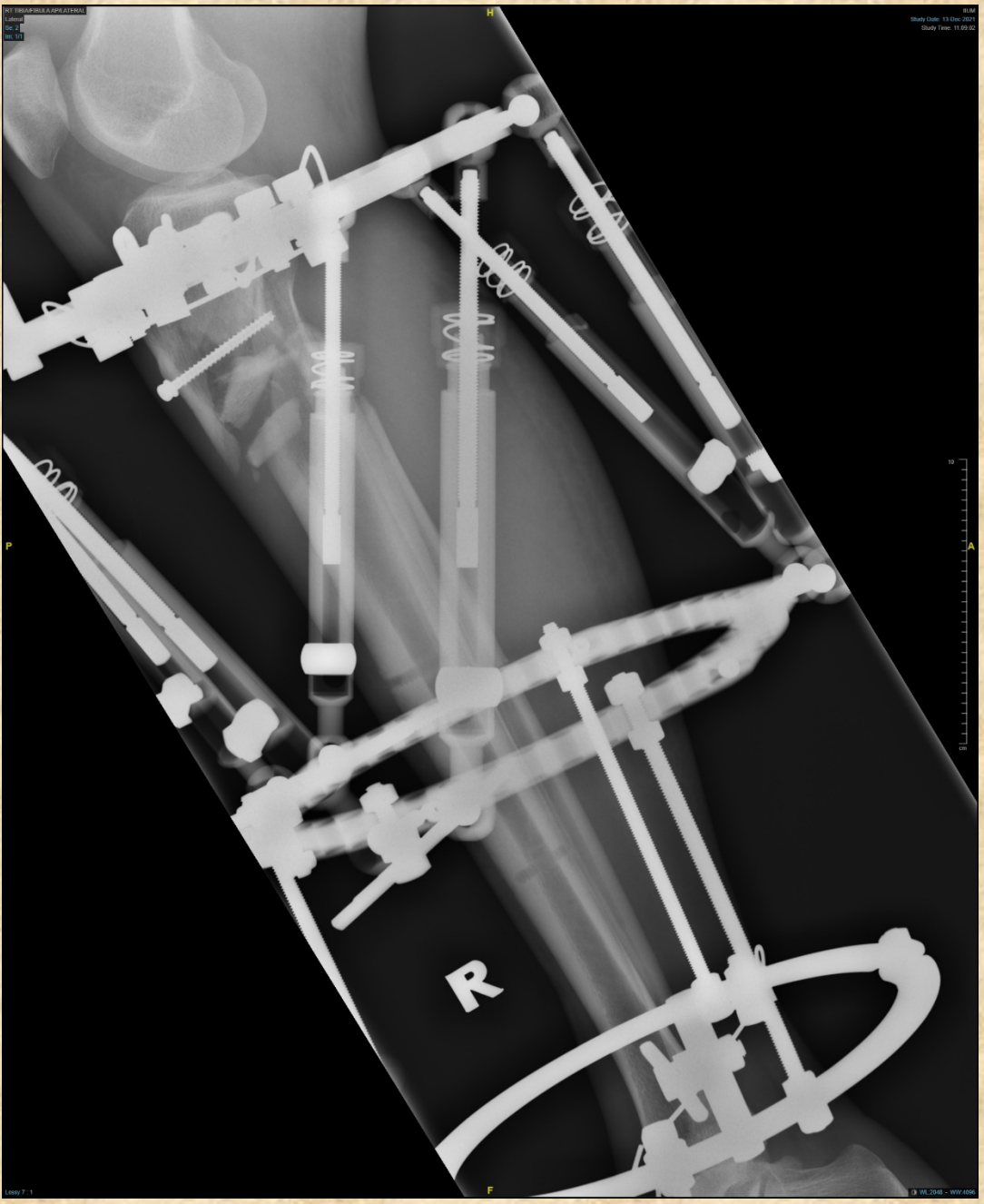
Fasciocutaneous flap



Minimal invasive



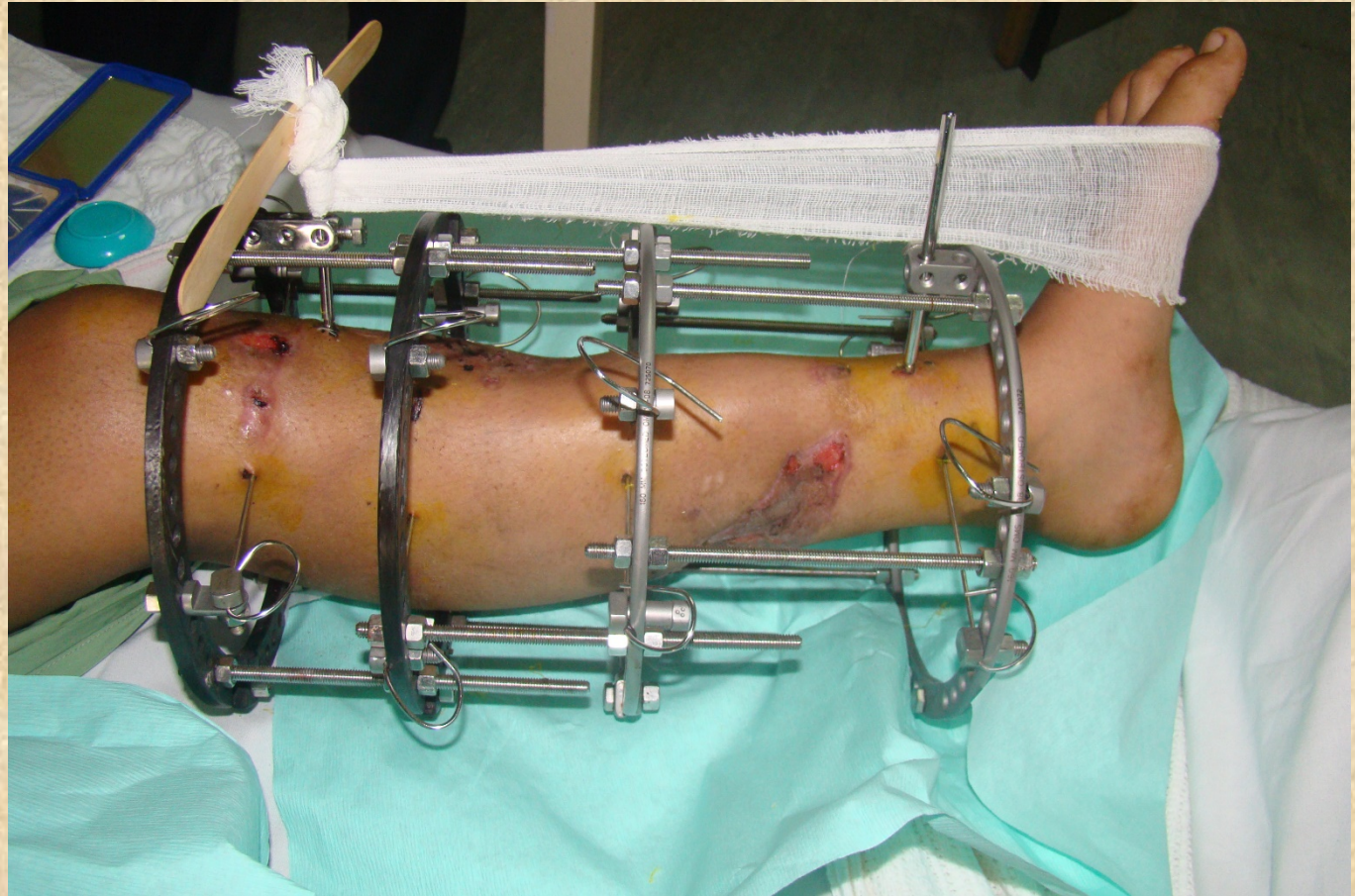




Closed Gradual reduction

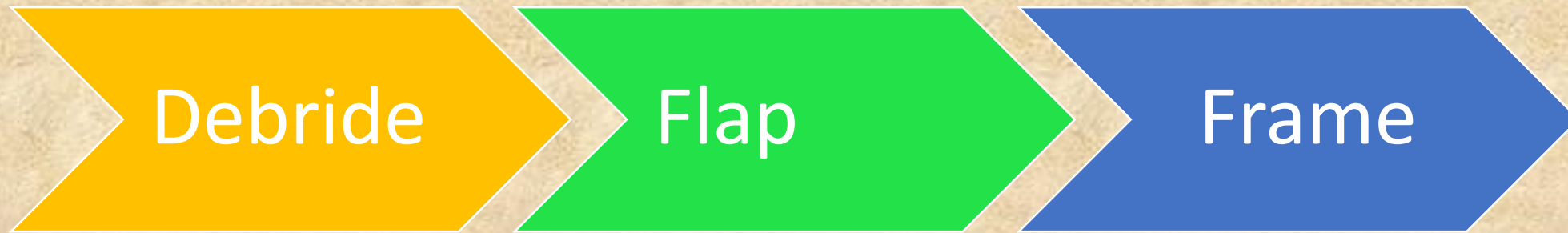


Stable environment and  
tissue regeneration





# Staged procedures



# Case series

- 35 cases
- 27 male, 6 female
- Age 13-60 (mean 35)
- 19 proximal, 7 shaft, 9 distal
- 25 open fracture, 8 infected non-union, 2 infection after plating
- 2 free flap, 33 local flap

# Results

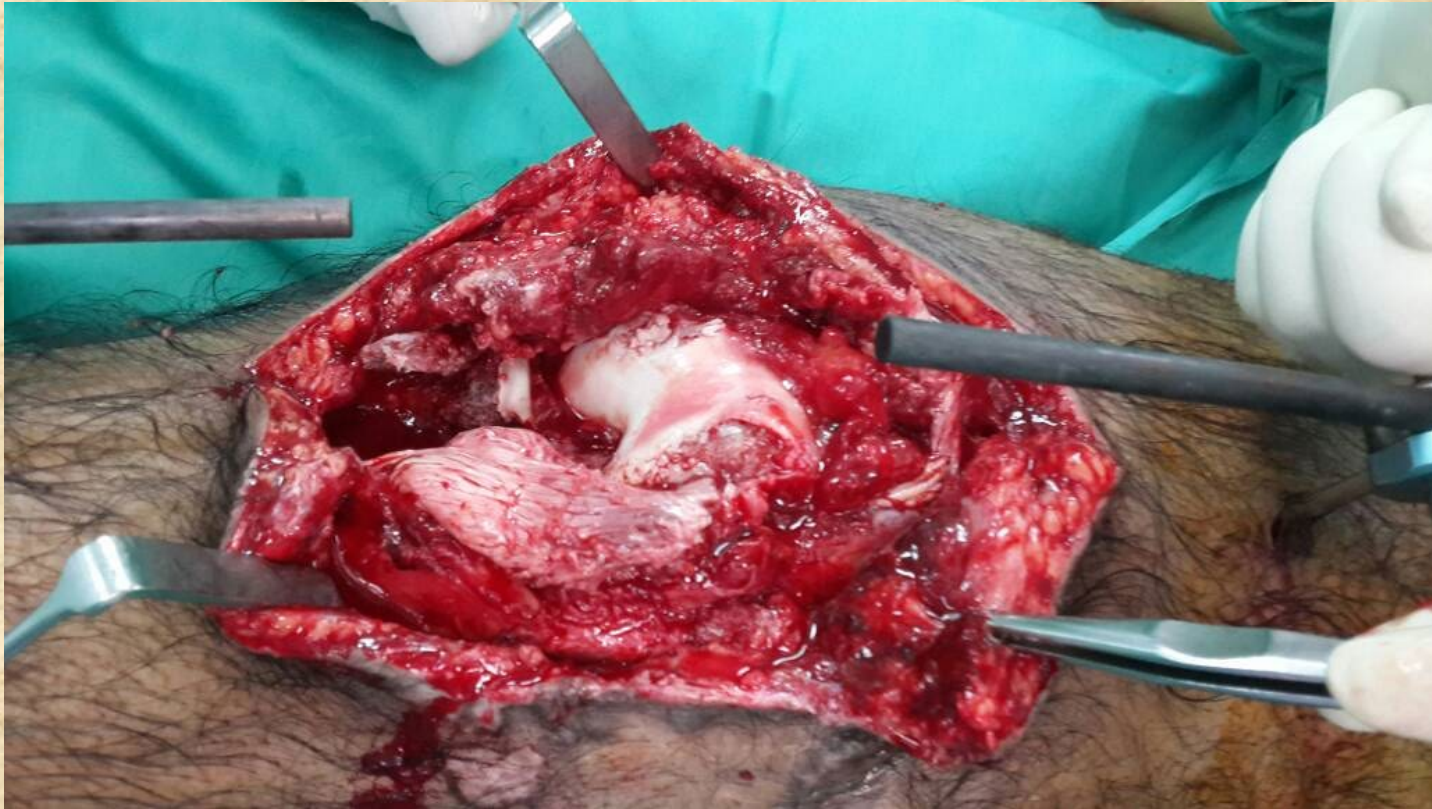
- 32 united
- 2 non union
- 1 above knee amputation



# Open fracture tibial plateau



with extensor disruption



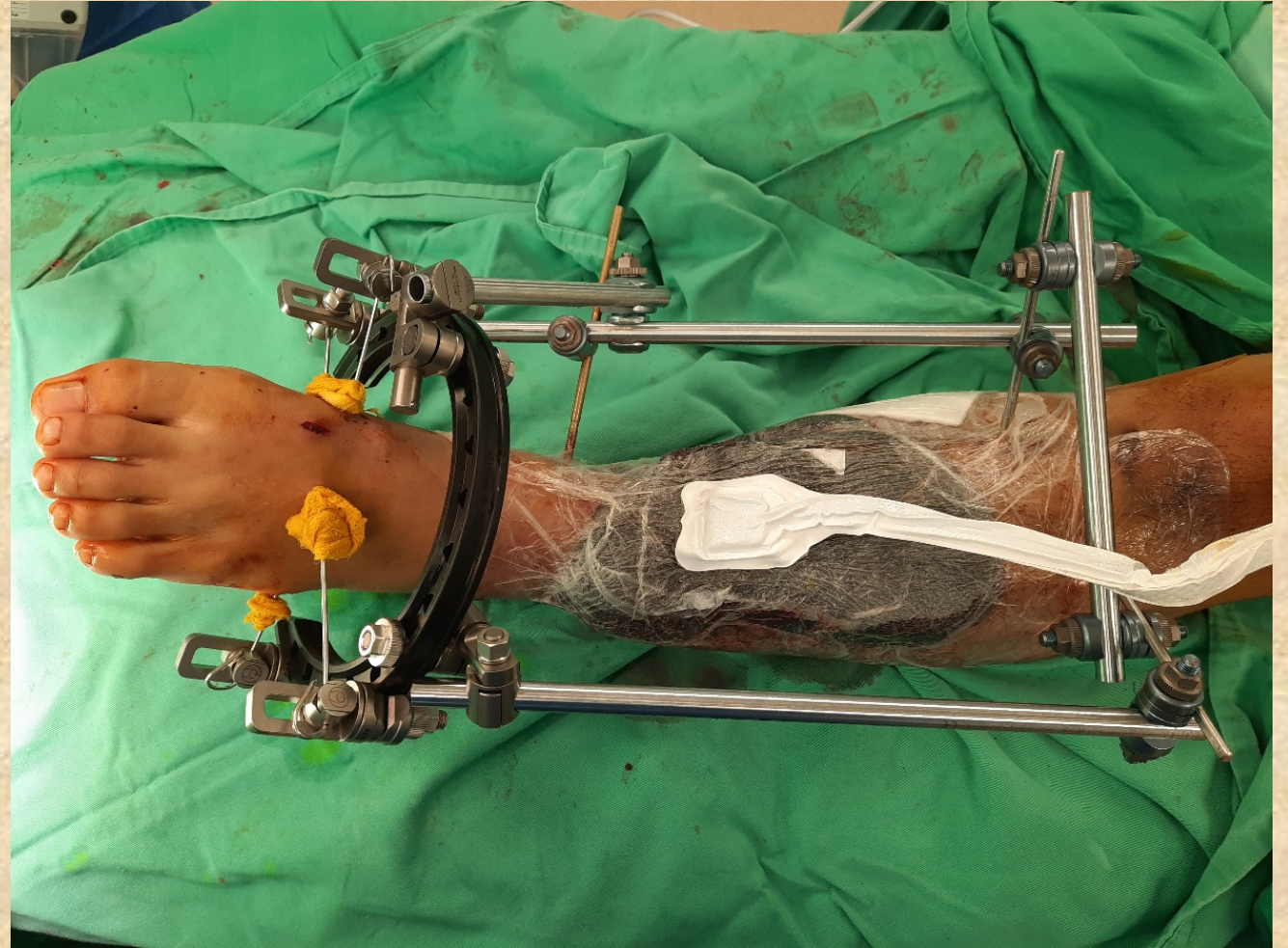
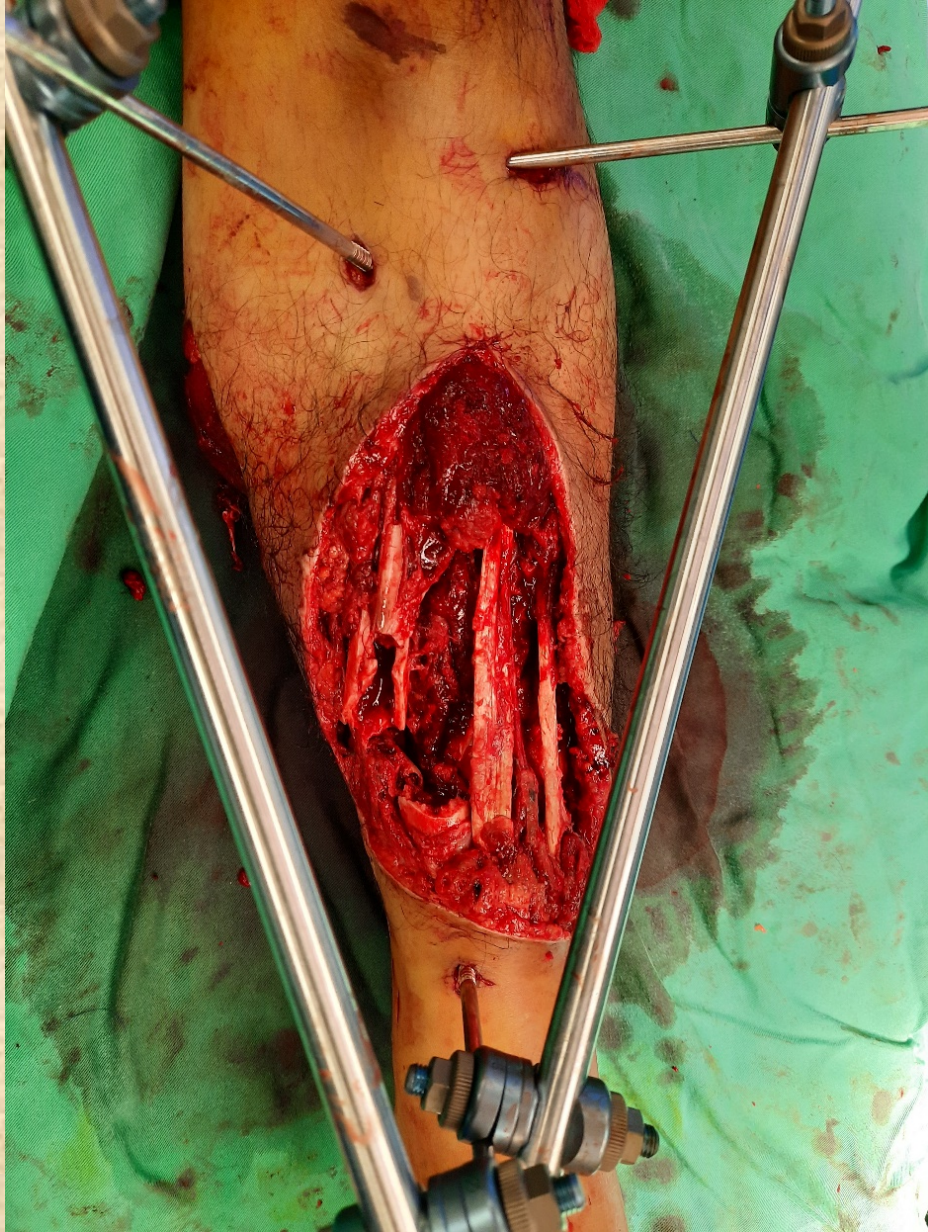


Flap covers the joint and bone and reconstruct the tendon. Fracture stabilise by cross knee circular frame.





Open fracture grade IIIB with  
anterior compartment injury





# ALT free flap and Ilizarov bone transport









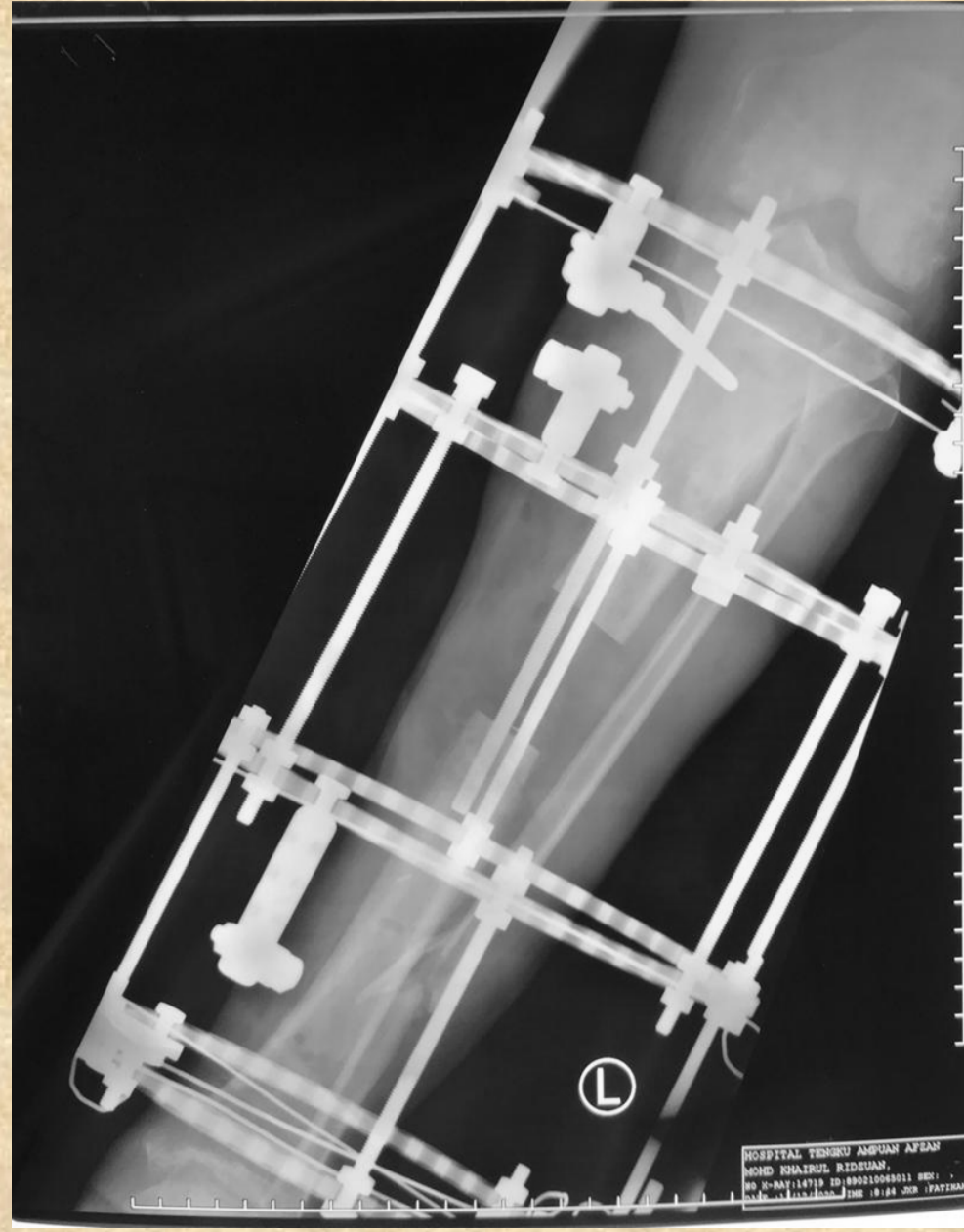
Infected  
non-  
union







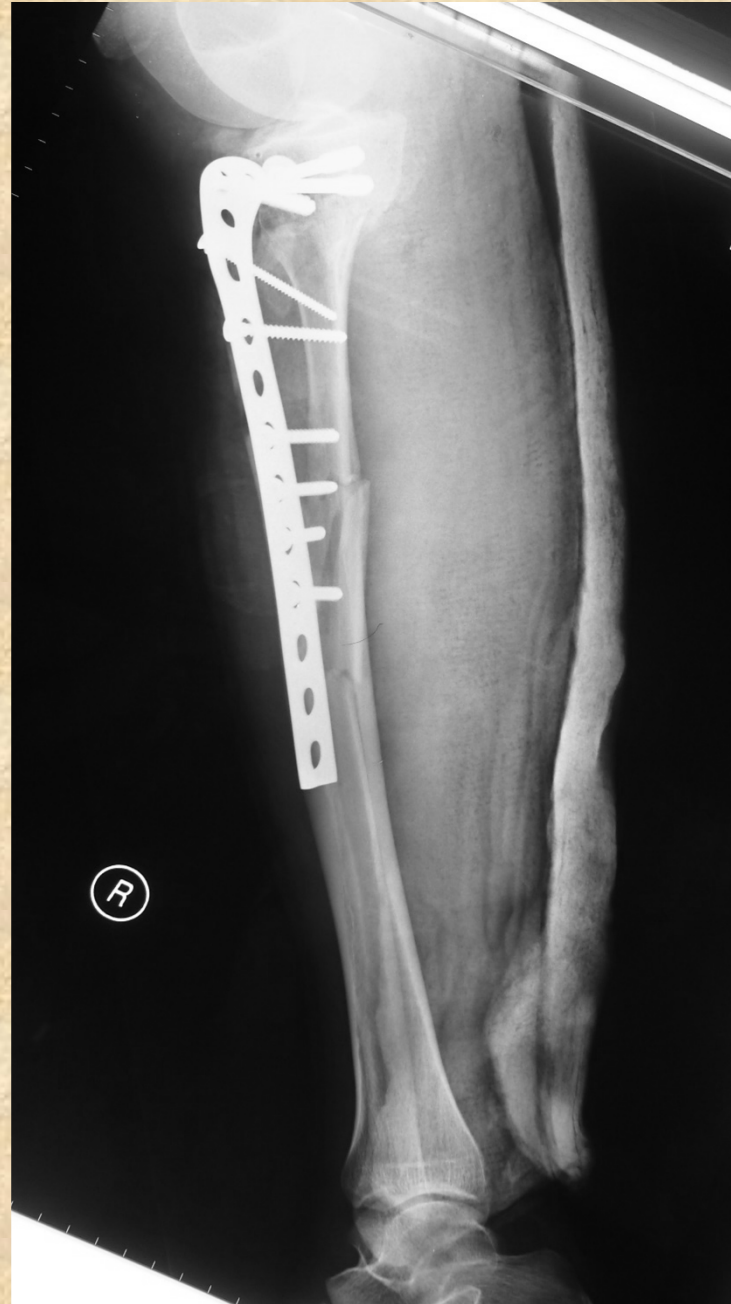
# Gastrocnemius musculocutaneous flap







Infection  
after  
plating

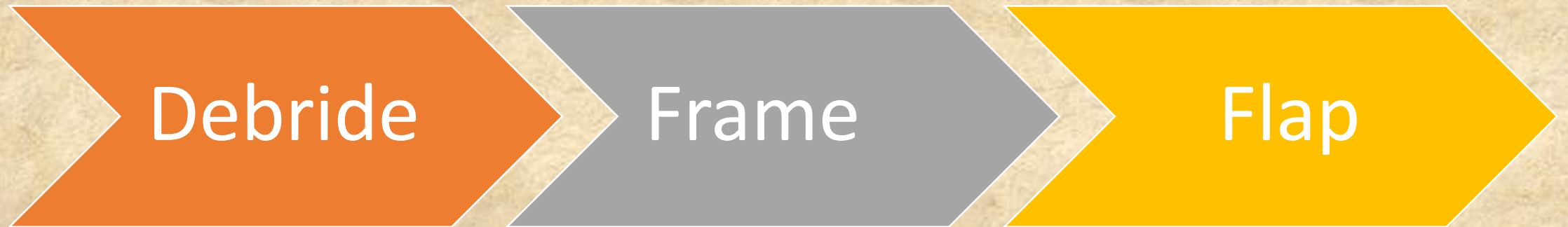






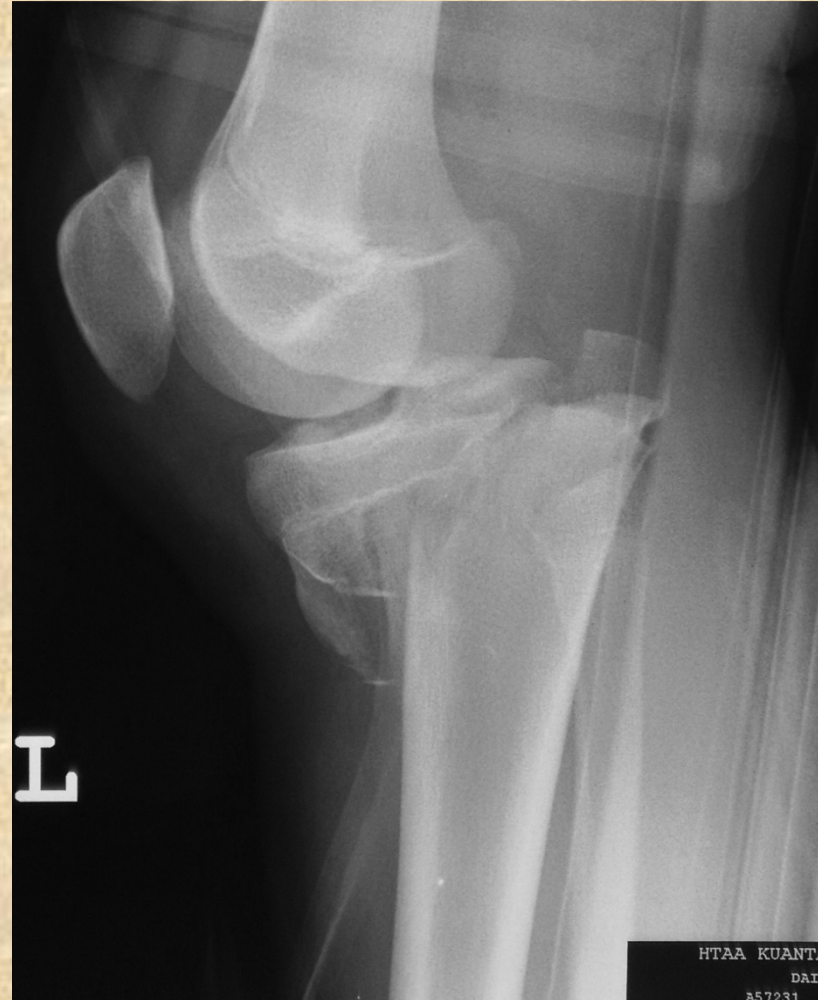


# Flap after frame





# Open fracture, physeal and vascular injuries

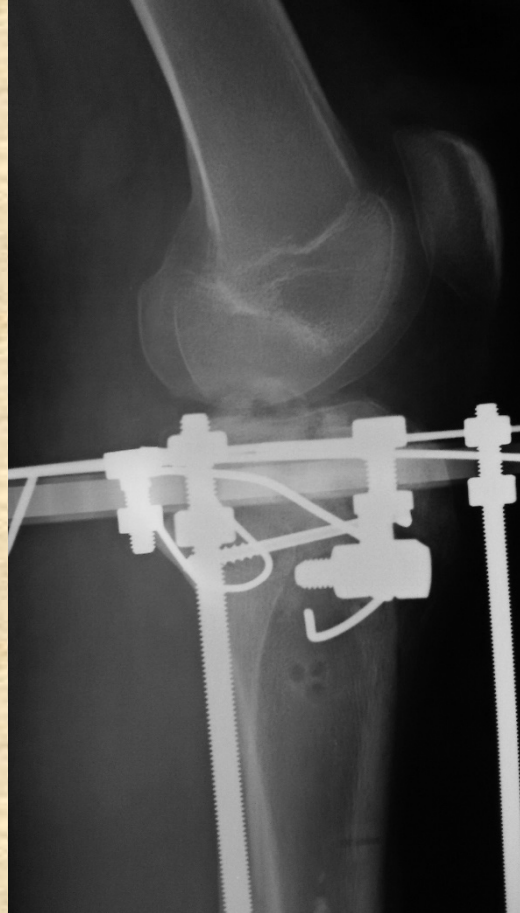
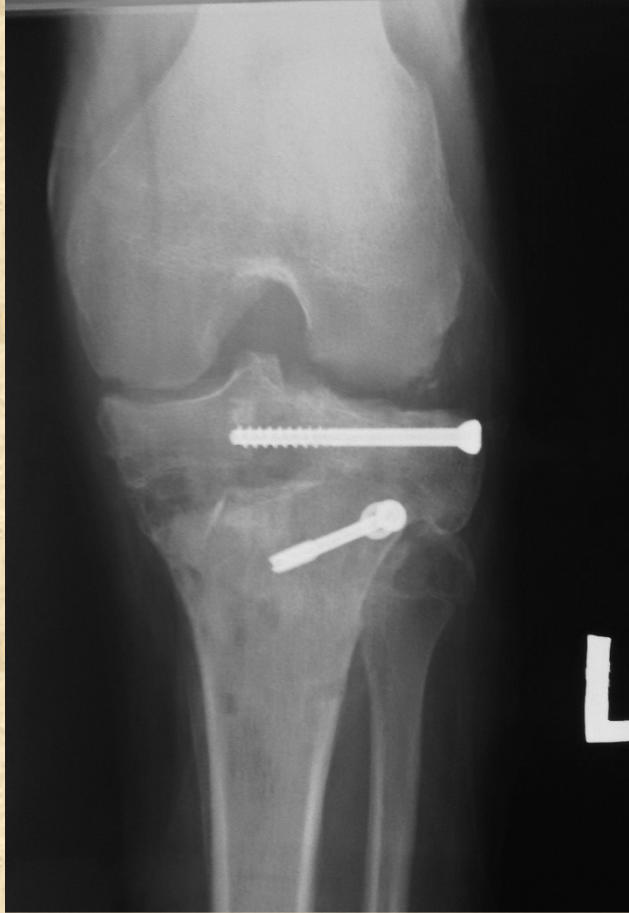
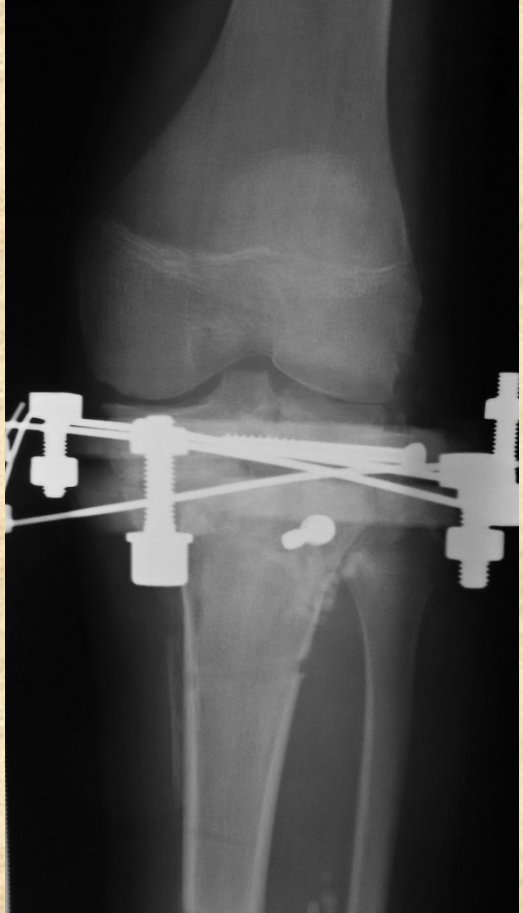




Fasciotomy and ilizarov frame. Gastrocnemius flap to cover the **wound breakdown**.







Shatzker VI tibial plateau with with patella tendon disruption. **Wound breakdown.**

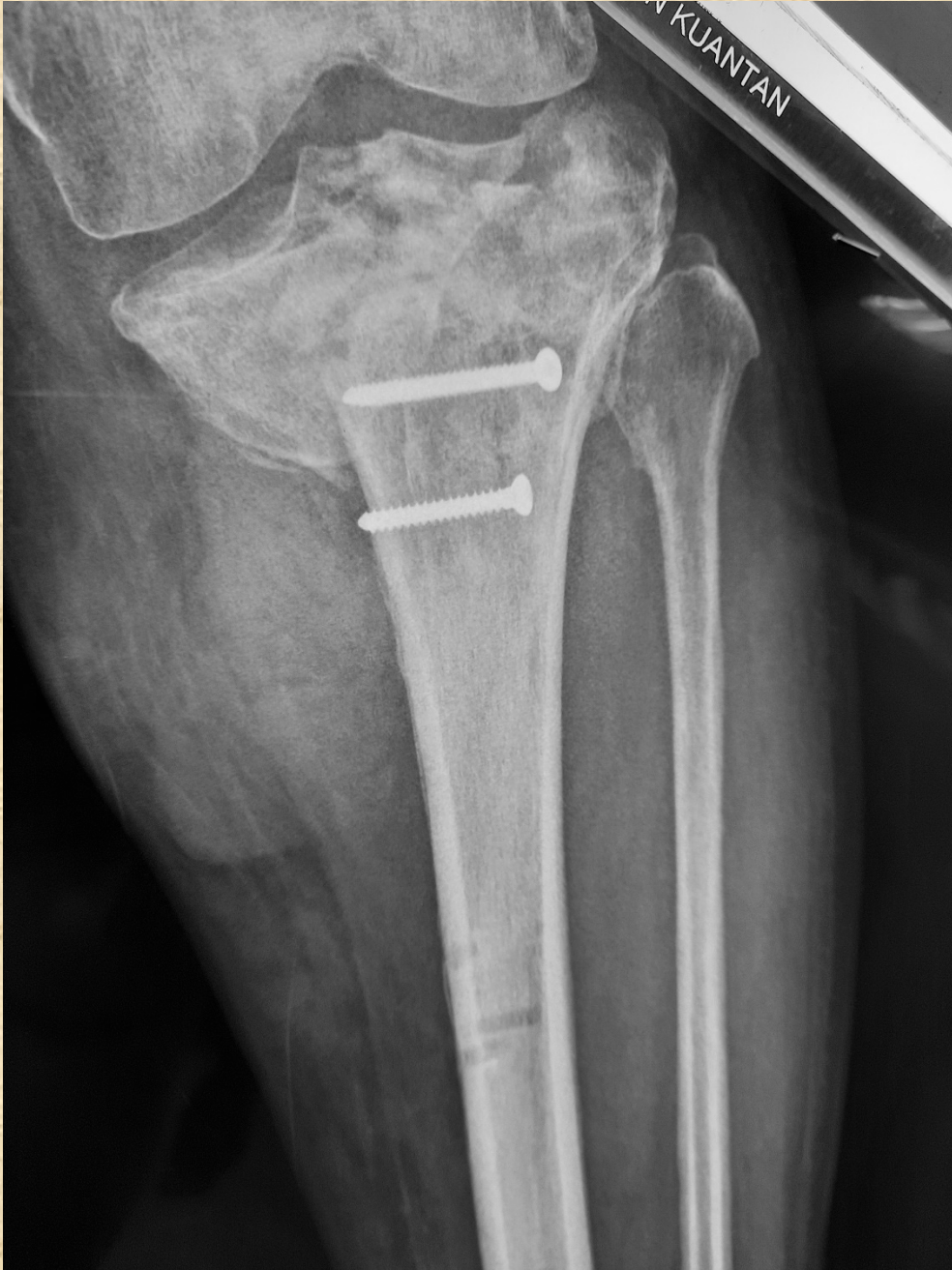




# Gastrocnemius musculocutaneous flap









# Infected open fracture





# Gastrocnemius flap then bone transport









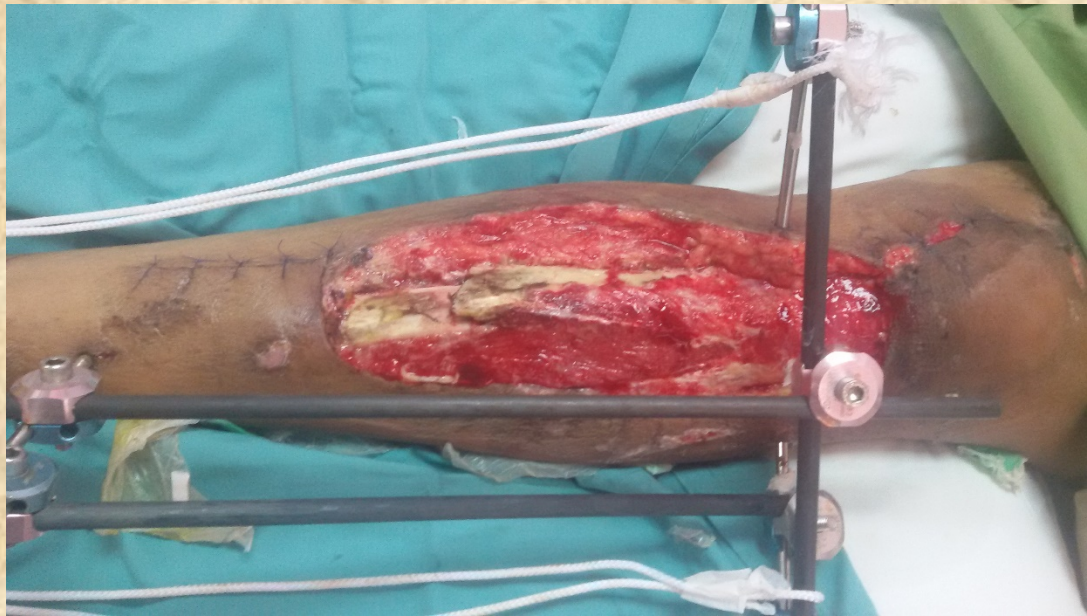
# Flap at docking site





Complication

# Segmental midshaft grade III B with vascular injury





ALT free flap failed. Resection of exposed bone.



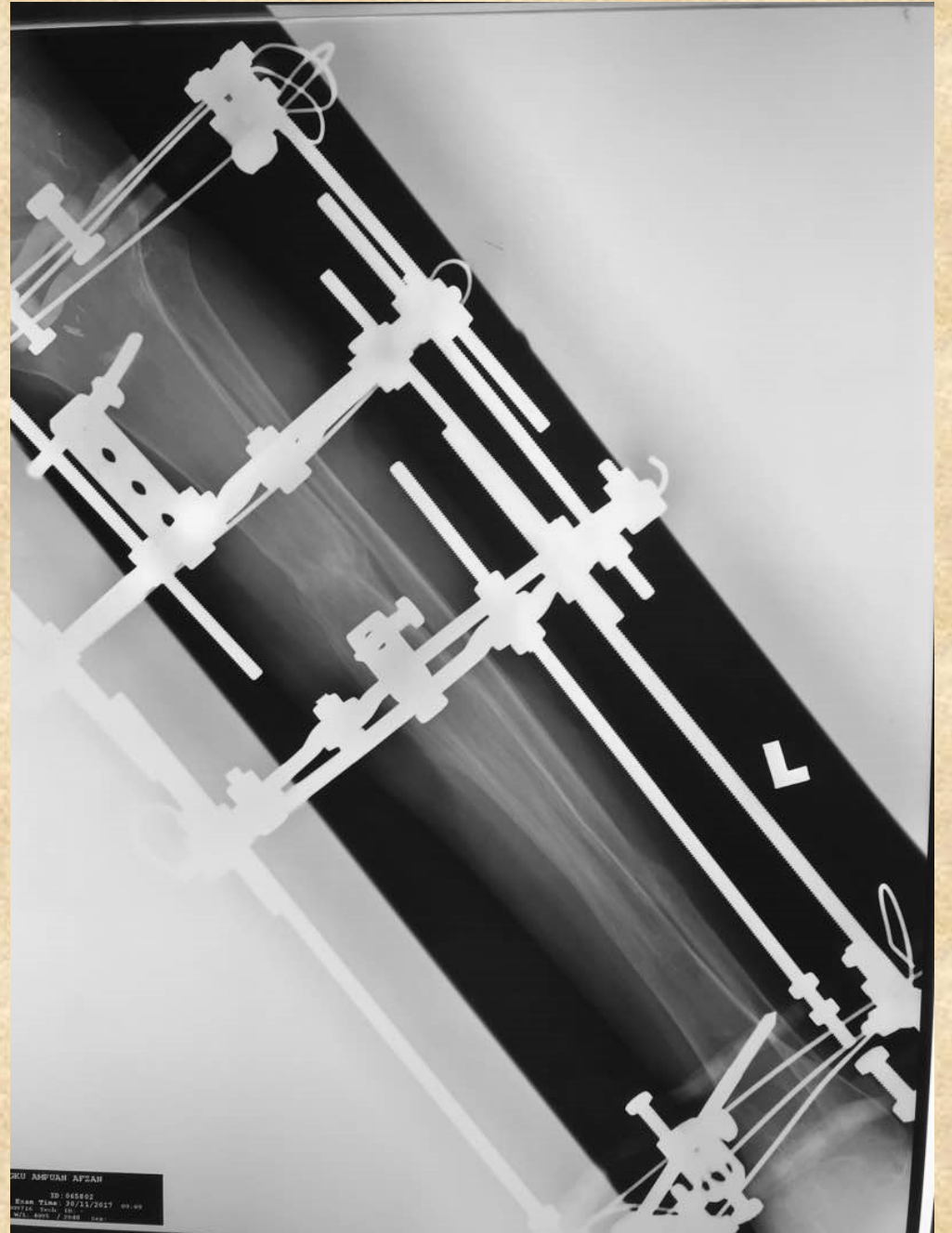




Tibialis anterior flap,  
SSG and Bone transport







# Take home message

- Flap protect tissue from infection and desiccation, and improve healing, immune response and drug delivery
- Frame hold, reduce, provide stable environment for fracture healing and bone regeneration
- Flap and frame work synergistically to improve the survival of the limb