DOUBLE-BARREL NON-VASCULARISED FREE BILATERAL GRAFT FORDocking Site Non-Union
Following Distraction Osteogenesis
After Femoral Resection in Chronic Osteomyelitis:
A Case Report
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INTRODUCTION
The principles of management of osteomyelitis include commencement of systemic antibiotic and debridement of necrotic bone, which at times necessitate resection of significant amount of the bone. Distraction osteogenesis by bone transport restores back the void left by the resection. However, a long duration of bone transport usually predisposes to docking site non-union. Various technique for management of docking site non-union have been described in literature. To achieve union, the prerequisites include coated bone ends with good contact and favourable osteogenesis capability. Autologous bone grafting is usually favoured because it has osteoconductive, osteoinductive and osteogenic properties.

A 20 years old male presented with left thigh swelling and pus discharge for 3 weeks duration, associated with fever and unable to bear weight using the ipsilateral limb. He had history of furuncle on the similar site 9 months prior, which was treated by superficial debridement and short-course antibiotic by his general practitioner. He was immunocompetent, had no previous illness and denied high risk behaviour. Physical examination revealed a swollen left thigh, with discharging sinus on its distal anteromedial aspect. The swelling was fluctuant, tender and warm.

Laboratory investigations revealed raised infective parameters – with high white cell count (15.9x10^9/L), C-reactive protein (320µg/mL) and erythrocyte sedimentation rate (ESR) (122mm/hr). While there was presence of reactive thrombocytosis (platelet count was 487x10^9/L), other blood investigations were normal.

A diagnosis of chronic osteomyelitis of left femur was made. He underwent excision of infected bone, application of Ilizarov distraction system (LRS) monorail and cement spacer insertion. The resected part measured about 29.5cm. After 2 weeks, the cement spacer was removed and corticotomy for bone transport was done. The culture grew Staphylococcus aureus, and he completed antibiotics regime for 6 weeks. Bone transport was initiated ten days after corticotomy. The patient was instructed for 6-hourly quarter-turning of the compression-distraction unit for the rate of 1mm/day (or 0.25mm/session) of bone transport. Subsequently, the infection was eradicated and bony transport was successful to regenerate new bone at the resected part. Total bone transport duration was about 10 months.

There was a 2-month period during which the docking site was allowed to unite and consolidate. As there was no clinical and radiological evidence of union, he subsequently underwent surgical exploration, during which intraoperatively it was noted that there was abundant of fibrous tissue, with both end of the docking segment and transport segment were blunted and

DISCUSSION
Chronic osteomyelitis is one of the most challenging diages to manage. Early diagnosis may lead to early cessation of infection; however, the subsequent bony reconstruction may be taxing to the patient and the attending surgeon.

Our patient presented with typical clinical and radiological manifestations of chronic osteomyelitis:

- Pain and swelling of the affected limb, coupled with presence of discharging sinus are common presentation.
- Infective markers are normally raised.
- Plain radiograph showing features including radiolucent lesions representing lytic bone destruction, usually surrounded by thick, sclerotic radiopaque changes. While CT scans are beneficial to appreciate infected bony changes such as sequestra, obcicne and involucra. MRIIs are excellent to detect marrow and periosteal changes, sinus and abscesses, even at an early stage.

The principles of management of osteomyelitis necessitate cessation of infection by systemic antibiotic regime and surgical debridement. In chronic osteomyelitis with the absence of life-threatening sepsis, therapeutic antibiotic debridement is advocated as compared to empirical prescription. The spectrum of aggressiveness of surgical intervention varies – from simple percutaneous debridement to radical resection and even amputation. In our young patient, the extensive involvement of the marrow and bone cortices required a large segmental resection. This large defect inevitably requires distraction osteogenesis via bone transport. For the subsequent bony non-union, removal of interposed tissue is inevitable. The subsequent step may differ - one is to address the gap by acute compression, followed by bone lengthening; the other is by filling up the gap using incorriate graft.

We chose the latter, using a non vascularised free bilateral graft due to:

- Feasibility for grafting using open technique as interposed tissue removal was also required
- Accelerating healing time as patient was already subjected to long period of bone transport
- Ability to provide good biological osteoconduction and osteogenic environment
- Large defect requires structural scaffold to resist compressive force – double-barrel orientation conform to larger diameter of femur and bilobar graft has good length to it
- Vascularity of graft has no effect on union rate; vascularised graft if used is more technically demanding and has risk of pedicle vessel kinking if used in a double-barrel orientation

In conclusion, docking site non-union may be a complication after commencement of distraction osteogenesis following resection of infected bone in chronic osteomyelitis. A non-vascularised free bilateral graft, arranged in a double-barrel orientation, is a viable option to manage this non-union, producing excellent outcomes.

REFERENCES