DOUBLE PLATING FOR POST OPERATIVE NON-UNION IN FRACTURE SHAFT HUMERUS – Case report

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Introduction:
Non-Union of fracture of lower shaft Humerus presents an intriguing problem. This becomes a nightmare if the case had been operated before - leading to loss of endosteal blood supply in nailing and soft tissue stripping in plating.

Current treatment options include Exchange nailing, compression plating, ilizarov ring fixator for fixation. Various types of bone grafts have been proposed. These include cancellous bone graft, free fibula, Vascularised fibula and cortical only graft. All these methods have their pitfalls.

In the present report, we describe an alternative management option for a non union of shaft humerus 10½ month following interlocking nailing. For this case, we did 90-90 double plating on anterior and lateral aspect with cancellous bone grafting. The fracture has united with excellent functional results.

Case Report:
A 48 year old male had a road traffic accident and sustained a closed fracture of shaft of humerus without any neurovascular compromise. A closed interlocked nailing was done elsewhere within 4 days of the trauma. The patient had a normal wound healing with an uneventful post-op recovery. On serial radiographs at regular intervals, the fracture failed to show signs of union. The patient was getting calcium supplements, calcitonin, ultrasound stimulation, physiotherapy.

He presented to us 10½ months after the interlocked nailing. Clinically the movements were full at shoulder and elbow, and there was no neurovascular deficit. There was no associated medical illness. A fresh radiograph showed non union with a gap, very scanty callus and a large butterfly fragment. We decided to take him for surgery.

Under general anaesthesia we removed the interlocked nail and exposed the fracture site through Henry’s anterolateral approach. Freshening of the fracture ends was done. After reduction, we fixed it with an Egger’s plate placed on anterior and a semitubular plate on the lateral aspect. Cancellous bone graft harvested from the ipsilateral iliac crest was impacted at the fracture site. A posterior slab was given after closure.

Postoperatively, the slab was removed on 5th day and the patient was discharged subsequently. An arm guard was kept for 6 weeks. The wounds healed well under antibiotic cover and all stitches were removed on 11th day. Active shoulder and elbow mobilisation was given on the 11th day itself.

There was some restriction of shoulder and elbow movement initially, which improved with exercises. We allowed him normal activity after 3 months. At 5½ months follow up the fracture had united satisfactorily with only a terminal flexion lag of 20° at the elbow.

Fig. 1: Pre-op radiograph

Fig. 2: Implants

Fig. 3: Immediate postoperative x-ray

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Discussion:

Non-union in Humeral fracture is not an uncommon situation. In the lower part of shaft, the joint is too close to the fracture site and the mechanical stress at the site during elbow movement is too much. Moreover, the contour of the Humerus in this region makes it very difficult for any single plate to hold the fracture effectively. But to achieve good healing and allow early mobilisation with preservation of the function of elbow and shoulder, a stable and strong fixation is mandatory.

The double plate construct becomes much stronger when 2 plates are applied at right angles to each other. Mear et al showed that this construct is 235 times stronger than a single plate on compression side and 35 times stronger than a single plate on tension side. Rubel et al did a comparative study of 37 cases with mid shaft fracture of the Humerus in whom 19 were treated by single ORIF and 18 by double plate construct. All the non-unions were Supplemented by bone grafts. In biomechanica part of the study they found that a 2 plate construct was stiffer and stronger than the single plate construct in all the test models.

Although a large area of the bone is stripped of soft tissue attachments during double plating, the AO/ASIF has repeatedly emphasised the provision of maximum mechanical stability for good healing and described the stripping of periosteum over large area of bone together with rigid, anatomical fixation of all fracture fragments.

Mast J et al and Perren SM et al have pointed that limited separation of muscle and preservation of the periosteum are important for fracture healing. Their experience shows that the biological determinants of fracture healing are at least as important as the mechanical.

In our opinion, respect to fracture biology is undoubtedly important. But the complex anatomy of the lower part of shaft of Humerus coupled with its proximity to the joint frequently renders a single plate construct unable to provide stable fixation and thus effectively controls movements, specially rotation. In this scenario, double plating can be the answer to difficult non-unions. This provides strongest fixation, rehabilitation is quick, procedure is simple and functional results are excellent.
Dr Gaurav Gupta et al: Double plating for non-union Humerus

References:

2. Mear D C. Material and orthopaedic surgery. Baltimore; William and Wilkins. 1979
3. Rubel et al. Open reduction and internal fixation of humeral non-union, a biomechanical study. JBJS (Am) 2002; 84: 1315-1322
14. Perren SM. The concept of biological plating using Limited Contact Dynamic Compression Plate (LC-DCP): scientific background, design and application. Injury. 1991; 22 (suppl 1); 1-41