



Infected non union in an operated compound fracture of shaft of humerus: A case report

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General Note



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ABSTRACT

Introduction: Infected non-union of humerus is a chronic disorder, which pose many difficulties to the patient and the surgeon and the treatment is long term and time consuming. It is one of the most common complications of humerus fractures. Some risk factors include age, sex, tobacco smoke, metabolic disorders, nutritional deficiencies, fracture type, soft tissue injury, type of surgical treatment and presence of infection. We present the case of infected non-union in an operated case of compound fracture of shaft

of humerus treated in two stages with Infection control in first stage and then definitive treatment in second stage. *Case:* A 35 year old female presented to AVBRH OPD with complains of pain and fullness over right mid-arm who was follow up case of compound grade II shaft humerus fracture right side and she was managed with ORIF with plating at govt hospital in Chandrapur 9 months ago. On examination, tenderness and abnormal mobility was present at fracture site, overhead abduction and forward flexion was 90 degrees and further movements were painful and restricted. The radiograph showed Non-Union of mid-shaft of humerus with implant in situ. The patient, in first stage was managed with Debridement of Non-Union site and Sinus tract excision and insertion of Calcium sulphate antibiotic (Vancomycin) beads at and around the fracture site. Postoperatively, patient's arm was immobilized by above elbow slab. The pus culture shows No growth. Patient continued having copious amount of discharge from the wound for around 2-3 weeks and suture removal was done after 3 weeks of surgery. Patient was continued on antibiotics for 6 weeks. On follow up at 6 weeks, wound was completely healed and discharge was absent and the pain and swelling was reduced but still the tenderness and abnormal mobility at fracture site was present. Functional humerus brace with mobilization of shoulder, elbow, wrist and fingers was advised with continuation of antibiotics. Then the patient was recalled after 6 weeks for definitive treatment. After 6 weeks, the patient was managed with removal of old plate and ORIF with LCDCP with cancellous bone grafting. Then the patient was discharged with continuation of functional humerus brace application and finally showing an excellent outcome. *Conclusion:* The treatment of humerus-infected non-union is a challenge for the orthopedic surgeon. The use of an antibiotic-impregnated bead, associated to systemic antibiotic therapy, is a valid option of treatment.

Keywords: Non-Union, Humeral shaft fracture, Limited-Contact Dynamic Compression Plate (LCDCP).

1. INTRODUCTION

Infected non-union of the humerus is a chronic and debilitating disorder, which represents a very complex problem for the surgeon both in terms of costs and time-effective treatment. It is one of the most common complications of humeral fractures with an incidence ranging between 2% and 30% (Bassiony et al., 2009). The rate varies between 2%-13% in non-operative approaches, and between 15% to 30% in surgical treatments (Volgas et al., 2004). Several risk-factors have been identified, some of them being patient-related such as age, sex, tobacco smoke, metabolic disorders and nutritional deficiencies. Patient independent risks include: fracture type and location, soft tissue injury, type of surgical treatment and the presence of an infection. Many attempts have been done to identify specific fracture patterns that could predispose to non-union; transverse and short oblique fractures appear to be the most susceptible to non-union (Healy et al., 1987). We present the case of infected non-union of the humerus treated in two stages with an excellent functional outcome.

2. CASE REPORT

A 35 year old female who had history of RTA 9 months back sustaining compound grade II shaft humerus fracture right side came to our hospital 9 months after RTA and she was managed with ORIF with plating at govt hospital in Chandrapur. Patient was apparently alright 6 months after the primary surgery but then after 6 months, she gradually developed pain and discharging sinus from lateral aspect of right mid-arm and patient took further treatment from Chandrapur hospital for 3 months.

Patient presented to AVBRH OPD with complains of pain and fullness over right mid-arm. 10 cm surgical scar mark was present over the antero-medial aspect of right mid-arm and ulcer of size 1 x 1cm with discharging sinus present with sero-purulent discharge on lateral aspect of arm with history of discharge of bony spicules present. On examination, tenderness and abnormal mobility was present at fracture site, overhead abduction and forward flexion was 90 degrees and further movements were painful and restricted and distal neurovascular status was intact. On investigating, her Hb was 11.5gm%, TLC was 9500, ESR was 110 and CRP was positive but pus culture was suggestive of No growth. X ray showed Non-Union of mid-shaft of humerus with implant in situ (Fig.1).

The patient, in first stage was managed with Debridement of Non-Union site and Sinus tract excision and insertion of Calcium sulphate antibiotic (Vancomycin) beads at and around the fracture site. Postoperatively, patient's arm was immobilized by above elbow slab. The pus culture shows No growth. Post-operative x ray was done which showed fracture gap filled with antibiotic beads (Fig. 2). Patient continued having copious amount of discharge from the wound (Fig. 3) for around 2-3 weeks and suture removal was done after 3 weeks of surgery. Patient was continued on Tab Linezolid 600mg BD and Tab Septilin 1 TDS postoperatively and the amount of discharge reduced when patient was discharged and was continued on above 2 mentioned drugs for 6 weeks.



Figure 1 X-ray showing Non-union of mid shaft humerus with implant in situ



Figure 2 Post operative x ray showing fracture gap filled with antibiotic beads and implant in situ.



Figure 3 A -Discharge on 4th post op day.

B - Discharge on 15th post op day.

On follow up at 6 weeks, wound was completely healed and discharge was absent (Fig. 4) and the pain and swelling was reduced but still the tenderness and abnormal mobility at fracture site was present and Hb of patient was 10.2, TLC was 9600, ESR was 60 and CRP came out to be negative. 6 week post op X ray showed absorbed antibiotic beads with implants in situ (Fig. 5). Functional humerus brace (Fig. 6) with mobilization of shoulder, elbow, wrist and fingers was advised with continuation of previous 2 drugs for 3 more weeks was advised. Then the patient was recalled after 6 weeks for definitive treatment.



Figure 4 Clinical image of arm after 6 weeks surgery.

After 6 weeks, the patient was managed with removal of old plate and ORIF with LCDCP after freshening of the bony ends and bone grafting (Fig. 7) which was taken from ipsilateral iliac crest. Then the patient was discharged with continuation of functional humerus brace application and finally showing an excellent outcome on 1 month follow up (Fig. 8). On 1 year follow up x ray showed united fracture with implant in situ without any evidence of infection.



Figure 5 6 week post op x ray showing absorbed antibiotic beads with implant in situ.



Figure 6 Clinical image of patient using functional humerus brace.



Figure 7 Immediate post op xray of anteroposterior and lateral view of humerus showing LCDCP with bone graft in situ.



Figure 8 1 month follow up anteroposterior and lateral x ray showing uniting fracture shaft humerus.

3. DISCUSSION

Various methods have been introduced for the management of humerus shaft fracture and with good results (Muller and Thomas, 1979). Nevertheless, nonunion remained a problem, irrespective of whether fractures were managed conservatively or operatively. Some surgeons used Intramedullary (IM) nailing for treatment of non-union of shaft of humerus fracture. However, unlocked IM nailing was reported in selected cases of delayed union, but not in nonunion, with the disadvantage of poor rotational control of the nails (Foster et al., 1985). Locked IM nailing has been suggested by some authors for management nonunion of humeral shaft fractures due to good rotational stability of nails, although this surgery has a bit disadvantages that have reduced its use, such as radiation exposure, demanding procedure, impaired shoulder range of movements, and possibly, untreatable shoulder pain (Crolla et al., 1993). The use of DCP to fix a non-united fracture of humeral shaft could avoid disadvantages of IM nailing. The use of DCP in combination with cancellous bone graft, usually taken from iliac crest would achieve both good fixation and enhance osteogenesis. Therefore, the problem of non-union could be overcome, and union could be achieved as expected, as was shown in this series. The results of this study also showed a satisfactory functional outcome for same side shoulder and elbow in all patients.

The disadvantages of using a DCP are more soft tissue stripping and an increased incidence of iatrogenic radial-nerve palsy (Pollock et al., 1981). In this series, the incidence of superficial infection was 2.9%, which is comparable with other reports. The incidence of radial-nerve palsy was 3.8%, which is comparable with other reports. For avoiding these soft-tissue injuries, it is

necessary for managing the soft tissue carefully at the time of surgery, especially in cases of nonunion of fractures of the distal third of the humeral shaft.

We did not explore the radial nerve routinely, since this seemed to be of no benefit (te Velde and van der Werken, 2001). Pollock et al. recommended the management must be conservative with regular follow-up to look for nerve function improvements, and that nerve exploration would take place 14-16 weeks after injury if there is no improvement (Pollock et al., 1981). In this series, the 4 radial-nerve injuries were managed conservatively instead of with early exploration, and all patients recovered completely within 6 months.

4. CONCLUSION

The treatment of infected non-union of humerus poses a challenge for the orthopaedic surgeon. The use of antibiotic-impregnated beads, associated with systemic antibiotic therapy, is a valid option of treatment. In conclusion, after controlling the infection completely, removal of a previous fixation device, refreshing the non-union site, and fixation with a LCDCP and a supplemental cancellous bone graft is effective and, therefore, recommended for patients with non-union of a humeral shaft fracture. But the surgeon must ensure complete infection control before thinking of definitive treatment as infection may make the definitive treatment futile.

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Conflict of interest

The authors declare that they have no conflict of interest.

Informed consent

Written and oral informed consent was obtained from participants included in the study.

Data and materials availability

All data associated with this study are present in the paper.

Peer-review

External peer-review was done through double-blind method.

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