Novel treatment (new drug/intervention; established drug/procedure in new situation)

A fixation of the right humerus to the iliac crest

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A patient with a shattered Gustilo 3B floating shoulder with an intact neurovascular bundle and a reasonably functional hand was encountered in Sri Lanka, following a blast injury. The limb was salvaged by using an external fixator to fix the humerus to the ipsilateral iliac crest. The wound healed well rendering the patient with a limp shoulder but, a functional hand which she could use by supporting the elbow with the left hand. This technique can be an option in rare situations such as the case in discussion to salvage 'floating shoulders' without disarticulation.

BACKGROUND

In the case of comminuted fracture of the head of the humerus and the glenoid fossa, with a severe disruption of soft tissues of the shoulder, this technique of fixation would be a helpful option for the operating surgeon to consider, especially when limb salvage is contemplated.

In this patient, we used this technique for the first time and we were successful in salvaging her limb.

CASE PRESENTATION

A 76-year-old lady was admitted to the base hospital of Trincomalee in March 2009 with a blast injury she sustained in a land mine explosion in the northern part of Sri Lanka.

She had a Gustilo IIIB fracture of the right shoulder with comminution of the head of the humerus and the glenoid cavity. The rotator cuff was completely destroyed (figure 1) and the shoulder was dislocated and hanging by the side with a thin string of connective tissue and the axillary neurovascular bundle. The wound was contaminated with debris from the blast.

Her hand was reasonably functional and all efforts were made on limb salvage. The median nerve function was preserved with sensory impairment of the ulnar nerve and preserved radial nerve function was noted prior to the procedure. The brachial artery was undamaged.

INVESTIGATIONS

X-rays were taken of the patient's shoulder (figure 1) which showed comminution of the head of the humerus as well as of the glenoid fossa.

TREATMENT

The wound was thoroughly debrided using more than 5 litres of saline and all non-viable tissues were removed until healthy bleeding was noted. The humerus was lifted up to the anatomical position and using several pins and cross bars applied on to the lateral aspect of the remnant of the shaft, an external fixator was applied fixing the humerus to the ipsilateral iliac crest, maintaining the humerus in the anatomical position (figures 2 and 3). Soft tissues were

approximated as much as possible. Subsequently, she was transferred to the National Hospital of Sri Lanka and managed. The soft tissues were allowed to contract and when the wound bed was healthy, split skin grafts were used for wound cover.

OUTCOME AND FOLLOW-UP

At 6 months follow-up, the shoulder was supported limply by the soft tissues. The hand remained functional and with the help of the left arm the patient was able to use the

Figure 1 X-ray of the shoulder showing comminution of the head of the humerus and glenoid fossa.

Figure 2 Fixation of the shaft of the humerus to the ipsilateral iliac crest with an external fixator.

right hand to a satisfactory extent to feed herself and grasp objects with a grip strength of 4+. The ulnar nerve palsy improved.

DISCUSSION

The type of injury encountered by the authors is not a common occurrence in the practice of trauma. Using key word combinations of humerus, iliac crest and fixation, no articles were found on PUBMED describing a similar technique. However, Golubovic *et al* described fixation of comminuted humeral head fracture to the ipsilateral scapula using an external fixator in a close range gunshot injury.¹ In this case, the glenoid fossa had been spared enabling a fixation to be undertaken to the scapula.

Given the extent of the bony and soft tissue damage, the damage to the neurovascular bundle of the right dominant hand of this patient was minimal and unique. In this situation the authors determined that rather than a disarticulation of the joint, a salvage attempt would be in favour of the patient.

The cultural background and the nature of the active life most older females are engaged in the rural society of the country further necessitated the attempt at salvage in spite of the poor scoring on standard mangled limb scoring systems.

The next challenge was to figure out a method to support the remnant of the humerus to the scapula allowing the soft tissues to heal and bridge the wound. A plaster jacket was inappropriate due to the extent of the wound and the practical difficulties of wound care.

Figure 3 Close up view of the fixation complex.

The authors decided upon fixing the humerus bringing it close to the scapula as possible and maintaining its position with the aid of a long cross bar held to the iliac crest from the posterior aspect. This allowed good support for the bones to heal as well as wound care was made easy due to the access of the wound. Lying supine was not possible for the patient due to the bars of the fixator on the posterior aspect. However, the patient was accustomed to sleeping on her side and this eliminated the practical problem for the authors of having to revise the fixation.

We wish to state that in injuries to the shoulder where a surgeon encounters a floating shoulder, this technique would be a valuable option in the armamentarium to be considered.

Learning points

- In severe comminuted fractures of the head of the humerus and the glenoid fossa in the presence of considerable soft tissue damage, this technique would be an option to consider.

Competing interests None.

Patient consent Obtained.

REFERENCES

1. Golubovi Z, Vukašinovi Z, Stani V, *et al*. [External fixation in the treatment of shooting proximal humeral fracture with bone defect: a case report]. *Srp Arh Celok Lek* 2011;**139**:370–5.

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