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DELAYED PRESENTATION OF FOUR PART FRACTURE- DISLOCATION OF SHOULDER - REDUCTION TECHNIQUES

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Abstract

Introduction: Complex fracture dislocation of shoulder are only rarely encountered. Most of these cases present late because of missed diagnosis predisposing the humeral head to risk of avascular necrosis. Fixation of these fractures involve further damage to the vascularity of these fragments.

Aim: The purpose of our study was to evaluate the feasibility of using Schanz pin and K wires to reduce these fragments so that heavy manipulation of the fragments can be avoided.

Materials and methods: This is a prospective study involving 11 patients in the age group of 22 to 55 years with a M:F ratio of 9:2. There were seven anterior, two posterior and two inferior fracture dislocations. Schanz pin was used to lever out the dislocated fragment and K wires were used to maintain the reduction. Fixation was done with PHILOS /T-buttruss plate.

Results: We achieved good reduction and good functional outcome in all our patients. The follow up period extended upto 5 months.

Conclusion: Gentle manipulation of tissues and bone fragments provide good healing of the tissues. Simple instruments like Schanz pin and Hohmann's retractor can aid in easy reduction of these fragments so that the risk of avascular necrosis is reduced.

Keywords: four-part, fracture-dislocation, shoulder, delay, reduction, osteonecrosis, proximal humerus.

Introduction

The shoulder dislocation associated with three or four part fractures of proximal humerus are termed as complex fracture-dislocations. Complex anterior fracture dislocations are more common than complex posterior fracture dislocations. The incidence of posterior dislocations accounts for only 5% of all shoulder dislocations and the posterior fracture dislocations are even lesser, about 0.9%^{1,2,3}. The patients with posterior fracture dislocations usually are diagnosed late since the dislocations are commonly missed in upto 80% of patients^{4,5}. The injury pattern for complex posterior fracture dislocations has been described by Brackstone et al⁶ as triple E syndrome : epilepsy, electrocution and extreme trauma.

The common problem associated with both anterior as well as posterior fracture dislocations is partial or total avascular necrosis of head fragment. Humeral head arthroplasty has often been preferred to open reduction and internal fixation because of the high risk of osteonecrosis^{7,8,9,10}. However recent studies have shown that prevalence of these complications are lower than previously appreciated¹¹⁻¹⁸, while others have also shown that the functional results after arthroplasty maybe poorer than those achieved by successful open reduction and internal fixation.

Several approaches have been described in literature including deltopectoral approach¹, modified deltoid splitting approach³, posterior approach and superior deltoid splitting approach^{19,20} and double approach²¹.

There is a paucity in literature regarding the reduction tools and techniques that can successfully reduce the fragments and at the same time avoid further de-vascularisation of the

dislocated fragments. The purpose of this study is to evaluate the feasibility of various reduction techniques in managing complex anterior and posterior fracture dislocations of shoulder.

Materials and the methods

This is a prospective study done over a period of two years in a tertiary care hospital involving 11 patients in the age group of 22 to 55 years (mean- 36 years) with male:female ratio of 9:2. There were seven patients in the anterior group, two in the inferior and two in the posterior group. These patients presented late after a period ranging from two weeks to four weeks, causing a delay in the management. All patients were managed with open reduction and internal fixation. Constant score was used to evaluate the outcome.

Procedure

The patient was supine and the C arm was positioned to obtain good quality AP and axillary lateral views (Figure 1). Through standard deltopectoral approach, with gentle tissue handling, the fracture site was exposed.

Step 1 (Relocation of dislocated head fragment): A 4.5 mm Schanz pin attached to T handle was inserted into the head fragment. The pin was advanced so that it just penetrated the articular surface to obtain a good purchase (Figure 2). A Hohmann's retractor was gently insinuated between the glenoid rim and dislocated fragment (Figure 3). The Hohmann's and Schanz pin were manipulated to gently lever out the dislocated fragment and aid in reduction. (Figure 4)

Step 2 (Reduction of fracture fragments): The reduced dislocated

fragment was temporarily stabilized to the glenoid surface with a horizontally placed k-wire passing through the fragment into the glenoid. Now the greater tuberosity fragment was retrieved anteriorly with the help of an Allis forceps (Figure 5). Next, the shaft fragment was reduced to the head fragment using bicipital groove as a guide for an anatomic reduction. The lesser tuberosity fragment was also reduced anatomically. Two or three K wires were used to maintain the reduction of fracture fragments (Figure 6).

Step 3 (Fixation): Either PHILOS plate or T-buttress plate was used to fix the fracture fragments after confirming a valgus reduction using C arm image (Figure 7). In some cases antero-posterior position screws were used to fix head splitting fractures (Figure 8). The K wire transfixing the head fragment to the glenoid as well as the other K wires were removed.

Step 4 (Stability): The stability of fixation as well as reduction of dislocation was checked by moving the shoulder in all directions. After closure of the wound, the limb was immobilized in neutral flexion, neutral abduction and neutral rotation (internal rotation was avoided in posterior fracture dislocations by placing a small pillow between the forearm and abdomen).

X-ray was taken postoperatively and repeated on 2nd, 4th and 8th postoperative weeks. Gentle pendulum exercises were started 2 weeks postoperatively. By 6 weeks range of motion exercises were started and after 3 months full movements were allowed. Constant score was used to evaluate the functional outcome.

Results

We achieved good reduction in all

our cases using the above technique. Follow-up X-rays at 3 months and 5 months showed no evidence of avascular necrosis (Figure-6). The constant score was very good in seven patients, good in two patients and fair in two patients (Figure 7).

Discussion

Since these dislocations are missed in about 80% of patients, CT scans should be routinely done when undisplaced fractures of the anatomical neck are suspected from initial X rays¹⁷. Apical oblique, velpau or modified axial radiographs are the indicated views as they can be taken in an arm with a sling²². Several authors^{23,24} believe that closed manipulation of these injuries should be avoided, except for patients who are medically unfit for surgical intervention.

Hemiarthroplasty carries the risk of tuberosity non-union, mal-union, dislocation, loosening and periprosthetic fracture²⁵. Recent studies suggest that functional outcomes after hemiarthroplasty are often suboptimal^{11,26,13,27,15}.

Hawkin et al⁴ recommended

- closed reduction for <6 weeks old injuries and humeral head impression <20 %.
- transfer of lesser tuberosity into the defect (modified McLaughlin procedure) for defects <45%.
- hemiarthroplasty for impression >45% and injury >6 months.

Recent literature supports fixation of these fractures particularly in young individuals assuming that even though there was injury to the main nutrient arteries^{28,29}, the head retained its vascularity either through revascularization or creeping substitution^{18,28}. T.Aitay et al³⁰

reported excellent results in 9 of the 10 patients in their series. Several instruments including bone lever¹⁷, flat instrument³⁰ and Schanz pin³¹ have been used to reduce the dislocated head fragment. We have used Schanz pin and Hohmann's retractor to reduce the dislocation; K wire to transfix the reduced head fragment to the glenoid; position screw to fix the head splitting fragments and Allis forceps to reduce the shield fragments¹⁷. We were able to achieve good reduction with minimal tissue dissection and minimal manipulation of fragments with this technique. Intraoperatively the reduced fragment was drilled to check for back bleeding as an evidence of vascularity of fragment.

Conclusion

Although many fracture dislocations of shoulder especially posterior dislocations, present late, fixation of these fractures yields better results when compared to hemiarthroplasty, especially in younger individuals. Hemiarthroplasty is recommended for elderly patients. Reduction techniques involving minimal invasion of tissues and gentle manipulation of the fragments leads to good union and functional outcome, at the same time reducing the risk of osteonecrosis.

Figures



Figure 1:A - C arm positioning to obtain good quality axillary lateral views

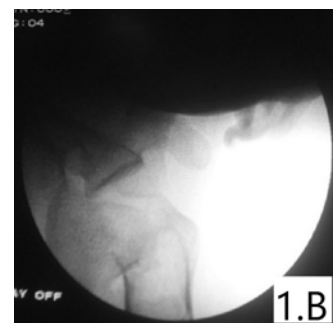


Figure 1:B- Intra-operative C arm image showing fracture geometry in axillary lateral view

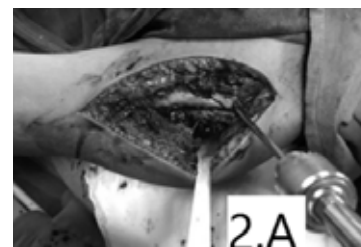


Figure 2:A- Clinical image of a 4.5 mm Schanz pin attached to T handle being inserted into the head fragment (in inferior fracture-dislocation)

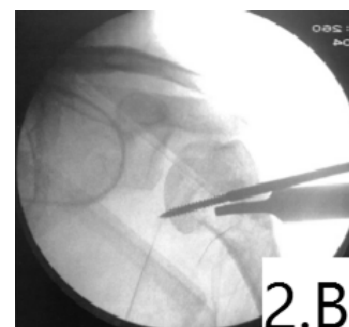


Figure 2:B- Intra-operative C arm image showing Schanz pin just penetrating the articular surface



Figure 3:A Hohmann's retractor was gently insinuated between the glenoid rim and dislocated fragment (in posterior fracture-dislocation)

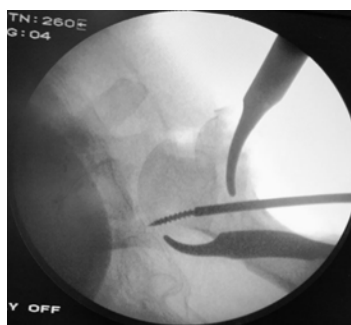


Figure 4: The Hohmann's and Schanz pin were manipulated to gently lever out the dislocated fragment and aid in reduction (in posterior fracture-dislocation)

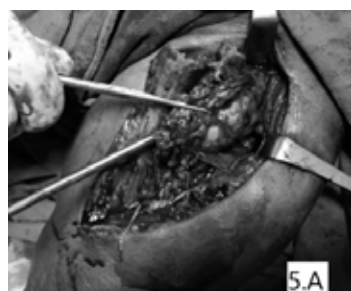


Figure 5:A - Intra-operative clinical image showing greater tuberosity fragment being retrieved anteriorly with the help of an Allis forceps

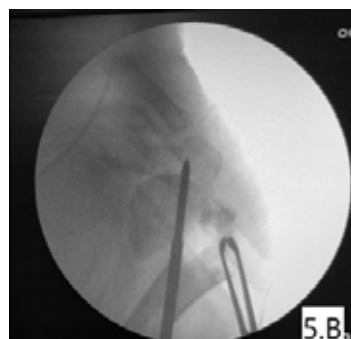


Figure 5:B - Intra-operative C arm image showing greater tuberosity fragment being retrieved anteriorly with the help of an Allis forceps



Figure 6: K wires being used to maintain the reduction of fracture fragments



Figure 7: C arm image showing good valgus reduction of fracture fragments using T-buttress plate



Figure 8: C arm image showing antero-posterior position screws being used to fix head splitting fractures

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