

Case Series

RECONSTRUCTION OF NEGLECTED CHRONIC LOCKED POSTERIOR SHOULDER DISLOCATION: TREATMENT OPTIONS AND CLINICAL OUTCOMES.

Ajith K¹, Dino M Joy², Muhammad Hisham³, P M. Poonnoose⁴, Jyothish K⁵

¹Associate Professor, Department of Orthopaedics Dr. Moopens Medical College, Meppadi, Wayanad, India.

²Assistant Professor, Department of Orthopaedics Dr. Moopens Medical College, Meppadi, Wayanad, India.

³Assistant Professor, Department of Orthopaedics Dr. Moopens Medical College, Meppadi, Wayanad, India.

⁴Professor of Orthopaedics, Christian Medical College Vellore, India.

⁵Assistant Professor, Department of Orthopaedics Dr. Moopens Medical College, Meppadi, Wayanad, India.

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Corresponding Author:

Dr. Dino M Joy

Assistant Professor, Department of Orthopaedics Dr. Moopens Medical College, Meppadi, Wayanad, India.
Email: dinomjoy@hotmail.com

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ABSTRACT

The treatment of a chronic posterior dislocation of the shoulder is often determined by the size of the associated impression fracture of the humeral head. Recurrent instability secondary to humeral head defect in contrast to anterior dislocations is quite common. Depending on the size of the defect and the duration of dislocation, the different treatment options are described. The procedures of choice when the bone defect is between 25% and 50% of the articular surface of the head include autologous bone graft or allograft or subscapularis tendon or lesser tuberosity transfer. In neglected cases in which patients undergo surgery more than 3 weeks after injury, no standard accepted treatment for this injury exists.

This article presents three treatment options; two are modifications of the McLaughlin technique and the other using an allograft cap for patients with neglected locked posterior dislocation of the shoulder. Using these techniques, the shapes of the humeral head were nearly restored. Postoperative rehabilitation included immobilization of the shoulder with an external rotation brace for 6 weeks followed by progressive passive, active-assisted, and active range of motion and rotator cuff strengthening exercises for another 6 weeks. These techniques resulted in pain-free range of motions, stable shoulders, and good joint congruency.

Keywords: Reconstruction of neglected chronic locked posterior shoulder dislocation, Modification of the McLaughlin technique, Allograft cap.

INTRODUCTION

Due to a lack of clear clinical signs compared to anterior dislocation, posterior dislocation of the shoulder is often misdiagnosed during the initial presentation. Inappropriate radiographs add to the misdiagnosis.^[1] The main causes are electrical shock, extreme trauma, and epilepsy.^[1-5] Treatment of posterior shoulder dislocation depends on the time elapsed between injury and surgery, degree of instability and the size of the humeral head impression fracture. Several surgical techniques have been described for the same. Repair can be performed arthroscopically with the patient in the lateral decubitus position through an anterosuperior viewing portal, using suture anchors to anchor the

torn labrum, and occasionally with an additional posterior bone block. If bony defects are present in the humeral head, and require attention, procedures such as elevation of the defect, bone grafting, McLaughlin procedure, rotation osteotomy or arthroplasty can be performed. Percutaneous technique for reduction of the anterior impaction fracture, using percutaneous balloon dilatation and cement fixation is another option. Surface replacement may be a valuable treatment option for fracture-dislocations of the shoulder with articular surface involvement. A delay in diagnosis and presence of associated injuries leads to poor prognosis to this condition.

We present three cases of neglected posterior dislocation of the proximal humerus operated by the

first author from two institutes. Two of the cases were done in Christian Medical college, Vellore under the guidance of 4th author and one from Dr Moopen's Medical College, Wayanad in year 2024. We consulted our institutional review board and because of the retrospective nature of the study no formal ethics approval was required. This research conforms to the Declaration of Helsinki as revised in 2008. By reviewing the charts from the medical records section of the institution all preoperative and postoperative data were obtained. In two cases, an open reduction and modified Mc Laughlin's repair of the shoulders were done under GA through a deltopectoral approach. The other had an allograft cap.

Case reports

The authors used these techniques in three patients who had neglected locked posterior dislocation of the shoulders. All three presented to us at our outpatient clinic of the hospital complaining of persistent pain and stiffness in their shoulders. There were marked restrictions of rotations especially external rotation. The anteroposterior radiograph of the shoulders illustrated marked internal rotation of the proximal humerus (Figure 1). The axillary roentgenogram showed posterior extrusion of the humeral head from the glenoid fossa (Figure 2). Preoperative computed tomography scans were obtained for all three patients. The computed tomography (CT) scan clearly delineated the locked posterior shoulder dislocations with large antero-medial head defects (wedged anteriorly) (Figure 3). According to these findings, open reduction and reconstruction of the proximal humerus was considered necessary. Consent of the patients were taken in view of publication and pre-operative counseling was done.

Case 1: A 31-year old right hand dominant indian male, presented at the outpatient clinic of the hospital complaining of persisting pain and stiffness in his right shoulder. The symptoms began 5 months earlier after a road traffic accident, when he was riding a two wheeler which was hit by a car from the side and he fell on his outstretched hand. The patient reported that the initial clinical assessment at a local emergency department where he sought first aid and the antero-posterior radiograph of the right shoulder did not reveal any significant abnormality and a diagnosis of shoulder sprain and contusion was established and he was given a sling and pain killers. There were no other injuries sustained. He was advised to use the sling for the first 10 days. During the review, the patient was re-examined and physical therapy with active and passive shoulder and upper limb exercises were commenced. On account of no reduction in pain and improvement in shoulder mobility, he was referred to our clinic for a second opinion and further evaluation. He was partly dependent for activities of hygiene and transport. He was unable to perform his activities of daily living involving the right upper limb, specifically the overhead activities. His recreational

and vocational activities were also restricted. There were no co morbid illnesses.

On physical examination, his shoulder looked flattened anteriorly and both acromion and coracoid processes appeared to be prominent at the anterior part of the shoulder. There was loss of contour of the shoulder with posterior fullness and loss of anterior fullness of the shoulder was seen. Posterior axillary fold was seen more prominent. There was tenderness over the posterior aspect of the shoulder. The head of the humerus was not palpable anteriorly, and with the head of the humerus felt more prominent posteriorly. There is global restriction of the movement at the right glenohumeral joint with abduction of 90 degrees, forward flexion 50 degrees, 10 degrees adduction. There was a no external rotation with only 10 degrees of internal rotation. Passive movements were painful and any effort to passively or actively move the glenohumeral joint was extremely painful. Shift and load test was not possible as the humerus was not translatable over the glenoid. The acromion, clavicle, coracoids and scapula were normal. Regimental badge sign was negative. The patient did not have any neuromuscular deficit and his medical history was unremarkable in terms of previous injuries in the shoulder region or other medical co morbidities. A provisional diagnosis of closed posterior dislocation of the right shoulder was made and radiographs were ordered. No attempt to relocate the shoulder was made. Pain on attempted reduction was also present. The anteroposterior radiograph of the right shoulder illustrated the marked internal rotation of the proximal humerus. The axillary roentgenogram showed posterior extrusion of the humeral head from the glenoid fossa. Furthermore, the computed tomography (CT) scan clearly delineated the locked posterior shoulder dislocation with the large antero-medial head defect (wedged anteriorly).

Case 2 and 3: Both had similar findings except that the former had his dislocation secondary to a fall under the influence of alcohol and the latter to an epileptic fit and reported to us after 4 months of conservative treatment. The former had his shoulder reduced initially under general anaesthesia but was not stable and it got dislocated again and got it locked during his withdrawal times.





Figure 1 and 2: Anteroposterior radiograph (A) and axillary radiograph (B) (Patient 1) with a locked posterior fracture-dislocation of the shoulder



Figure 3: Axial computed tomography of the right shoulder (Patient 3) with a locked posterior fracture-dislocation of the shoulder showing an impaction fracture involving 40% of the humeral head and bony buttress at the posterior glenoid rim, at which the humeral head is locked

Surgical technique

Under general anaesthesia, the patients were placed in a beach chair position and the glenohumeral joint was assessed via a deltopectoral approach. The axillary nerves were palpated to ascertain its position but were not mobilized. The long head of the biceps were inspected. Pectoralis insertions were partially cut and cuff intervals opened into. Lesser tuberosity osteotomized and sub scapularis overturned in two cases. In the latter the lesser tuberosity with a part of greater tuberosity was seen fractured with the long head of biceps trapped within the callus which was then cut and secured for a latter tenodesis. The humeral head were found dislocated posteriorly, the posterior labrum pulled out from the glenoid and layers of fibrous tissue were seen covering the glenoid cavity. After meticulous removal of any bony or cartilaginous debris scar tissues, the joint was thoroughly irrigated and the glenoid articular cartilages inspected and the

humeral heads were reduced using long retractors in combination with extra-articular pressure paying attention to avoid further damage to the humeral head and glenoid. In all the cases, intraoperative stability assessment documented instability with a few degrees of internal rotation of the shoulder joint.

Patient 1: Patient 1 had the large reverse Hill-Sachs lesion addressed by head cartilage elevation and filling the defect with impaction of morselized bone graft taken from the iliac crest. Before packing the bone graft into the defect, one fibre wire was passed through the defect and out through the lateral biceps tendon for anchorage. One double loaded anchor was used from the lateral corner of the defect and passed through the lesser tuberosity for enhanced stability. Subscapularis was then placed into the defect over graft and held in place with the three sutures (Modified McLaughlin's technique).

Patient 2: After preparation of thereversehill sach's lesion using a burr the fractured lesser tuberosity with the sub scapularis was transfixed with two double loaded suture anchors and a 4 mm cannulated partially threaded cancellous screw with a washer (Modified McLaughlin's technique). For enhanced stability another two single loaded anchors and a cortical screw with a washer were used from the lateral corner of the defect.

Patient 3: In order to restore the shape of the humeral head, the defect was packed and elevated with pre fashioned femoral head bone allograft (Figure 4 and 5). This was then fixed using small fragment partially threaded cancellous screws. Here only the superior part of the subscapularis was detached and anchored, with the rest being placed. Finally stability of the shoulders and the constructs were evaluated with direct observation and fluoroscopic views through the entire range of motion. Repair of the rotator interval was the last step performed and routine closure of the wound over a drain were done. An external rotation brace was given postoperatively so that the extremity will be in slight external rotation and abduction. There were no other postoperative complications.

At 4 weeks, passive shoulder and pendulum exercises were initiated and the patients were advised to use the sling for another 4 weeks. At 8 weeks, a more aggressive physical therapy with active assisted range-of-motion and strengthening exercises were instituted as plain X-rays showed maintenance of joint congruency and early signs of bone healing. Post-operative period was uneventful for all three patients. Post-operative x-rays showed good concentric reduction of the humeral head (Figure 6, 7 and 8).

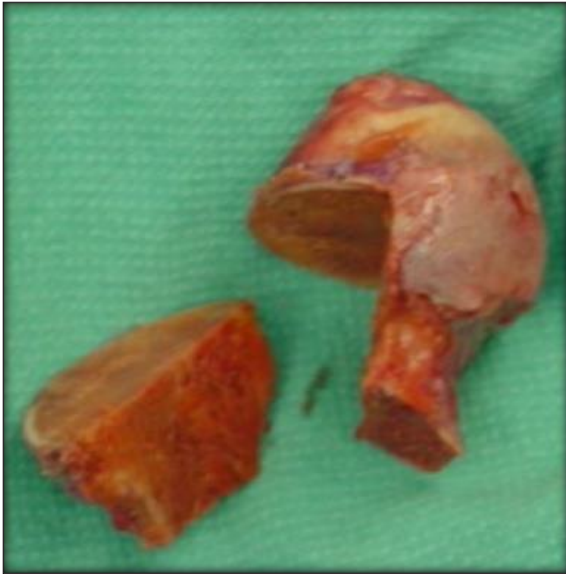
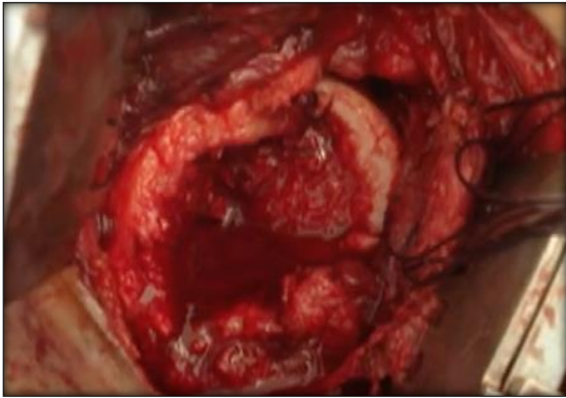


Figure 4 and 5: Intra operative picture showing the shape of the humeral head defect and the pre fashioned femoral head bone allograft designed to restore the defect in the humeral head

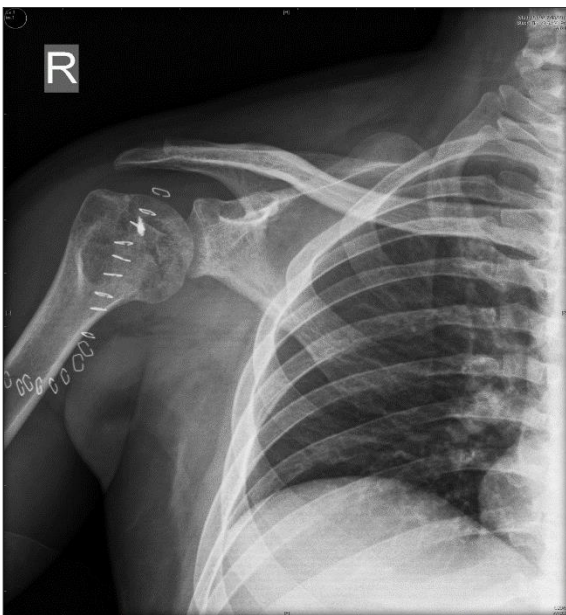


Figure 6: Immediate postoperative anteroposterior radiographs (Patient 1) showing normal humeral head shape and excellent joint congruency



Figure 7: Immediate postoperative anteroposterior radiographs (Patient 2) showing normal humeral head shape and excellent joint congruency

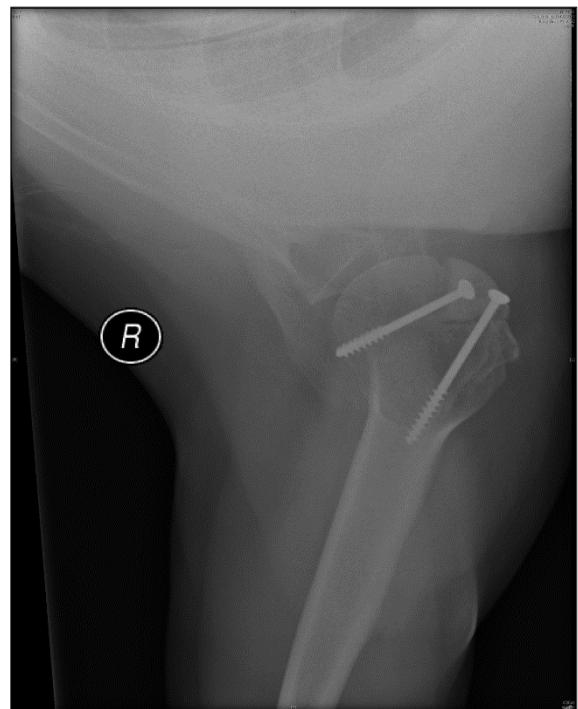


Figure 8: Immediate postoperative anteroposterior radiographs (Patient 3) showing normal humeral head shape and excellent joint congruency

RESULTS

Mean follow-up was 5 months. At last follow-up, all three patients were asymptomatic with painless and stable shoulder joints without apprehension or recurrence of instability. After the mean follow-up all three patients did not report a redislocation or resubluxation or a persistent feeling of instability. The clinical tests for posterior instability (jerk

test/Kim test) were negative. Mean Constant score used to evaluate patient satisfaction was good; all three were very satisfied with their level of function with no restrictions in activities of daily living. (Figure 9). In all the cases, radiographs of the affected shoulder in true anteroposterior, axillary and y views showed the humeral head to be concentrically reduced in relation to the glenoid and in the third case complete incorporation of the allograft into the defect.



Figure 9: Clinical photographs (Patient 3) at 5-months follow-up showing abduction (135°)

DISCUSSION

The potential for delay in diagnosis of posterior dislocations may be attributed to its rarity of incidence and lack of enough clinical awareness of this entity. This is despite the advances in imaging techniques and the continuous flow of information about the risk of missed diagnosis. McLaughlin called these injuries a diagnostic trap due to their high rate of misdiagnosis and rarity. An important feature of the physical examination is identification of the patient's inability to externally rotate their arm. In young patients, all efforts should be made to retain the humeral head and restore its shape, roundness and normal anatomy. The management of this injury once diagnosed, must be individualized depending on the amount of the defect of the humeral head and the time from injury. Checchia et al. emphasized the importance of the time interval between injury and diagnosis. The size of the humeral head impaction fracture is a key to the decision process (reverse Hill-Sachs lesion).^[6] Final prognosis is further affected by the rarely

encountered erosion of the posterior margin of the glenoid fossa. Closed reduction and immobilization in external rotation can be successfully done in fracture dislocations presenting early (less than 3 weeks) and in those with 25% articular defects. Dislocations presenting late (more than 3 weeks) may need operative intervention. Defects larger than 50% of the articular surface or when the humeral head is very soft and not viable may often need to be treated with shoulder arthroplasty.^[7-9]

The defects between 25% and 50% are more difficult to manage. The lack of evidence-based management strategies increases the challenge. McLaughlin recognized the importance of the impaction fracture of the humeral head in patients with shoulder dislocation and recommended a subscapularis tendon transfer into the defect.^[3] Hawkins et al,^[2] described a more secure fixation of the subscapularis tendon into the defect, obtained through a modification of McLaughlin's technique. They recommended the transfer of the lesser tuberosity with the attached subscapularis tendon into the defect. The results were reported to be excellent. The technique offers better filling of the defect by the transfer of lesser tuberosity and more secure reinsertion of the tendon. Another modification of McLaughlin's technique that involves plication of the subscapularis tendon into the humeral head defect using suture anchors rather than detachment and reattachment of the tendon into the defect was described by Charalambous et al. In literature these techniques have been criticized as they alter the humeral head anatomy, can compromise an eventual secondary prosthetic reconstruction and may lead to limitation of internal rotation of the shoulder joint. The transfer of lesser tuberosity into a nonanatomic position leads to loss of concavity compression and alteration of joint biomechanics. This in turn may cause a donor site morbidity. The treatment should comprise of elevation of the cartilage with the adjacent bone from the impressed area and subsequent subchondral support. Gerber,^[12] used autogenous iliac bone graft to reconstruct the joint and reported satisfactory results in 2 cases of acute traumatic dislocation. Anatomical restoration of the humeral head surface by allograft impaction and fixed with two or three partially threaded cancellous screws has been described.^[10] The defect can also be filled with a mixture of tricalcium phosphate and carboxymethylcellulose.^[11] This technique avoids donor site morbidity and potential risks with allograft use, while maintaining normal shoulder joint anatomy with preservation of the rotator cuff muscles for less complicated prosthetic reconstruction if required in the future.

Rotational osteotomy of the proximal humerus (in addition to allograft reconstruction of the humeral head) were suggested by few as additional procedures.^[12-13] However, these are technically demanding and the risk of devascularization of the

humeral head is high. Begin M et al used an iliac cortico-cancellous autograft to fill the defect with preservation of the patient's cartilage.^[14] Three years later, the clinical and morphological results were excellent in his study group, providing enough substantial evidence for our third case.

In the presented case, even though the grafts do offer only minimal structural support, it is well suited for filling bone defects and cavities and does get revascularized quickly. We believe that transposition of sub scapularis combined with graft impaction can effectively address humeral defects and decrease the incidence of instability. Using this technique, the shape of the humeral head is nearly restored with impaction of morselized bone graft; two suture anchors inserted into the defect secures the attached and transferred sub-scapularis tendon into the defect.

Postoperative rehabilitation included immobilization of the shoulder with an external rotation brace for 6 weeks followed by progressive passive, active-assisted, and active range of motion and rotator cuff strengthening exercises for another 6 weeks. This technique resulted in a reasonably pain-free range of motion, with a stable shoulder and satisfactory joint congruency.

CONCLUSION

Depending on the time elapsed between the injury and the surgery and the size of the humeral head impression fracture several surgical techniques have been described for the treatment of this specific rare clinical entity i.e: neglected posterior shoulder dislocation. When the bone defect is between 25% and 50% of the articular surface of the head, the procedures of choice are autologous bone graft or allograft or subscapularis tendon or lesser tuberosity transfer. This article describes a modified McLaughlin technique one fixed using the conventional fixation methods and another with non-absorbable suture anchors instead of the standard screw fixation and in the last using an allograft cap being fixed with standard screw fixation. Fresh-frozen femoral head bone allograft was used to fill the impaction defects and reconstruct humeral heads, thus allowing advancing as much subscapularis tendon as necessary to ensure adequate stability. The grafts healed completely, and no recurrent instability occurred.

The modified MacLaughlin procedure in our hands has been shown to be a reproducible technique

allowing good results at medium follow-up. Reconstruction using pre contoured allograft also resulted in optimum functional recovery and patient satisfaction. According to our experience it is possible to adopt these techniques in patients with locked posterior dislocation older than 6 months or in cases with a humeral head defect up to 50% when shoulder prosthesis is not a good indication.

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