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A prospective study of functional outcome of arthroscopic repair of recurrent anterior shoulder dislocation

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Abstract

Background: The causes of anterior dislocation of shoulder are usually trauma; a sports injury, road traffic accident, assault or fall. The arthroscopic Bankart repair offers minimally invasive procedure with less surgical trauma, less blood loss, with improvement in operative time, less perioperative morbidity, narcotic use, hospital stay, time loss from work, decrease in number of complications, cost of surgery and better cosmetic result.

Aim: To assess the functional outcome of shoulder joint following arthroscopic repair of recurrent anterior shoulder dislocation.

Materials and Methods: A hospital based prospective study was done with 30 patients to assess the functional outcome of arthroscopic repair of recurrent anterior shoulder dislocation from January 2019 to June 2020 done using the UCLA (University of California at Los Angeles), ASES (American Shoulder and Elbow Surgeons) shoulder score and the Rowe score.

Results: Patients in the group operated with retro-grade femoral nailing showed similar functional outcome as compared to ante-grade femoral nailing. It was also noted that in patients with retro-grade femoral nailing early mobilization, smaller incision at entry point was possible and there was no need of a fracture table.

Conclusion: Arthroscopic repair in cases of recurrent anterior shoulder instability is a reliable surgical procedure with respect to shoulder function and motion as it offers good clinical outcome, excellent post-operative shoulder range of motion with improved function. This surgical procedure has better patient compliance, and minimum surgical complications in properly selected patients.

Keywords: Recurrent anterior shoulder dislocation, arthroscopic repair, functional outcome

Introduction

The glenohumeral joint of the shoulder is the most commonly dislocated joint in the human body. Anterior glenohumeral dislocation during sports activity or social life is one of most commonly seen pathologies in clinical practice of orthopaedic traumatology.

The incidence of anterior glenohumeral instability has been reported as 2% [1]. The glenohumeral joint has been reported as most commonly dislocated synovial joint in human body [2]. Forced abduction and external rotation of the shoulder can cause dislocation resulting in instability [3]. Participants in athletics can place exceptional demand on the musculoskeletal system, especially shoulder of one who performs overhead activities [4]. Shoulder instability most commonly affect people who are in their late teens to mid-thirties [5]. The major problem following primary traumatic anterior shoulder dislocation is the high risk of recurrence among young patients [6]. Rhee *et al.* (2009) [7] mentioned that these injuries occur at younger age, with higher rate of recurrence and shorter interval between initial injuries and recurrent instability, even in athletes. Because of increasing participation of population from any age in sport activities, health care professionals dealing with trauma patients must have a thorough understanding of anatomy, pathophysiology, risk factor and management of anterior shoulder instability. Degenerative arthropathy in shoulder joint is generally the final result of chronic instability [8]. Shoulder joint by virtue of its anatomy and biomechanics is one of most frequently dislocated joint in body [9].

Bankart's published paper, states that in acute dislocation the humeral head is forced anteriorly out of glenoid cavity and tears not only fibro-cartilaginous labrum from entire anterior half rim of glenoid cavity, but also capsule and periosteum from anterior surface of neck of scapula. This traumatic detachment of antero-inferior glenoid labrum has been called Bankarts lesion^[10].

The Bankart lesion represents the most common form of labro-ligamentous injury in patients with traumatic dislocation of shoulder. The socket deepening effect of glenoid labrum has been an important factor in maintaining stability. Re-attaching the labrum onto the articulating surface restores its socket deepening effect. This is accomplished using suture anchor, either open or arthroscopically^[11, 12]. The surgical treatment by reattachment of labro-ligamentous complex to glenoid either arthroscopically or by an open procedure known as Bankarts repair^[13].

The causes of anterior dislocation of shoulder are usually trauma; a sports injury, road traffic accident, assault or fall. It might occur in any situation where an anteriorly directed force acts on the shoulder with the arm in an externally rotated position, or a strong and sudden externally rotating force is applied on the abducted arm and pull of the surrounding muscles during a seizure^[14]. Traumatic dislocation or subluxation of the shoulder leads to avulsion of the glenoid labrum from the anteroinferior part of the glenoid rim, the so-called Bankart lesion and elongation of the capsular ligamentous restraints, also^[15]. A Bankart lesion is found in over 80% of shoulders with recurrent shoulder instability^[16, 17]. The frequency of dislocation keeps increasing with time and overhead activity, and it is termed as recurrent when dislocation occurs more than once. Several risk factors have been encountered in recurrent dislocations, include traumatic aetiology of the first dislocation, age, anterior labral periosteal sleeve avulsion (ALPSA) lesion and superior labrum anterior and posterior (SLAP) lesion.

Prior to arthroscopy, recurrent dislocations were managed by open repair, and the results of this approach, with only a 4% failure rate, were initially published by Dickson and Devas in 1957^[18]. There have been many studies documenting low recurrence rates ranging from 0% to 11% after open Bankart stabilization.

Several open and arthroscopic techniques have been described to address anterior shoulder instability. These procedures address both capsulo-ligamentous laxity and labral pathology via variety of instruments like suture passages, knot tying techniques, and fixation devices. With debate continuing regarding the indication for arthroscopic shoulder stabilization, several studies have shown favorable outcome with regard to arthroscopic method.

Moreover, with continuing criticism with wide dissection, loss of external rotation and postoperative pain associated with open repair, the demand for arthroscopic surgery has increased over last two decades. Arthroscopic Bankarts repair for treatment of instability of shoulder has become increasingly popular as it is less invasive than open surgery and provides better surgical outcome including range of movement and function^[12].

With the growth in the number of orthopaedic surgeons specializing in shoulder surgery and sports injuries, as well as the advancement in arthroscopic techniques and sports medicine devices, there has been heightened interest in minimally invasive shoulder surgery for recurrent anterior instability. Hence the present study was done at to assess the functional and post-operative outcome of shoulder joint

following arthroscopic repair of recurrent anterior shoulder dislocation.

Aim

To assess the functional outcome of shoulder joint following arthroscopic repair of recurrent anterior shoulder dislocation

Materials and Method

The present study was hospital based prospective study conducted in the Dept. of Orthopedics, D Y Patil University School of Medicine, Nerul, and Navi Mumbai. The period of data collection was spread over one and half year from January 2019 to June 2020. Data collection was done in MS Excel and patients presenting to the hospital IPD or emergency department with history of recurrent anterior shoulder dislocation attending Tertiary care Hospital who fulfilled the inclusion criteria were chosen. 30 patients were selected for this study. The study was conducted after taking due permission from the Institutional Ethics Committee and Review Board and after taking Written Informed Consent from the patients. A strict confidentiality was maintained about the personal details of the participants and information related to the study.

Inclusion criteria

- Study subjects Patients with age between 18 to 85 years.
- Both male and female patients.
- Patients with at least two or more shoulder dislocations.
- Patients with history of epilepsy.

Exclusion criteria

- Glenohumeral fractures and dislocations.
- Fracture dislocations of proximal humerus.
- Associated Proximal Humerus deformity.

Assessment Parameters

Functional Assessment

Functional assessment of arthroscopic repair of recurrent anterior shoulder dislocation was done using the UCLA (University of California at Los Angeles), ASES (American Shoulder and Elbow Surgeons) shoulder score and the Rowe score.

Follow Up

The patients were asked to follow-up at 4 weeks, 12 weeks and 24 weeks and one-year post surgery. At every follow-up visit a thorough clinical, radiological and functional examination for every patient as mentioned above and the observations were noted down. During the follow up period, patients were instructed about the exercises of the affected part, which they should do regularly as told to them.

Statistical Analysis

Quantitative data was presented with the help of Mean and Standard deviation. Comparison among the study groups was done with the help of unpaired t test as per results of normality test. Qualitative data was presented with the help of frequency and percentage table. Association among the study groups was assessed with the help of Fisher test, student 't' test and Chi-Square test. 'p' value less than 0.05 was taken as significant. Results were graphically represented where deemed necessary. Appropriate statistical software, including but not restricted to MS Excel, SPSS ver. 20 was used for statistical analysis. Graphical representation was done in MS Excel 2010.

Results

Majority of the patients (23.3%) were in the age group of 21-30 years followed by 20% in the age groups of 31-40 years and 41-50 years, 13.3% in the age group of 51-60 years, 10% patients in the age group of 61-70 years, 6.7% in the age group of 18-20 years and 3.3% in the age groups of 71-80 years and 81-85 years. The mean age of the patients was 42.17 ± 16.88 years. There was male preponderance (73.3%) in the study while female patients constituted 26.7% of the

study group. 11 (36.7%) patients had their right shoulder involved while 19 (63.3%) patients had their left shoulder involved. 14 (46.7%) patients had dislocated 2-4 times preoperatively while 10 (33.3%) and 6 (20%) patients had their 5-9 events and >10 events of pre-operative dislocations. The pre-operative range of motion (ROM) of flexion, abduction, internal rotation and external rotation was 159.13 ± 4.61 , 156.80 ± 6.24 , 64.80 ± 4.94 and 56.47 ± 9.37 respectively.

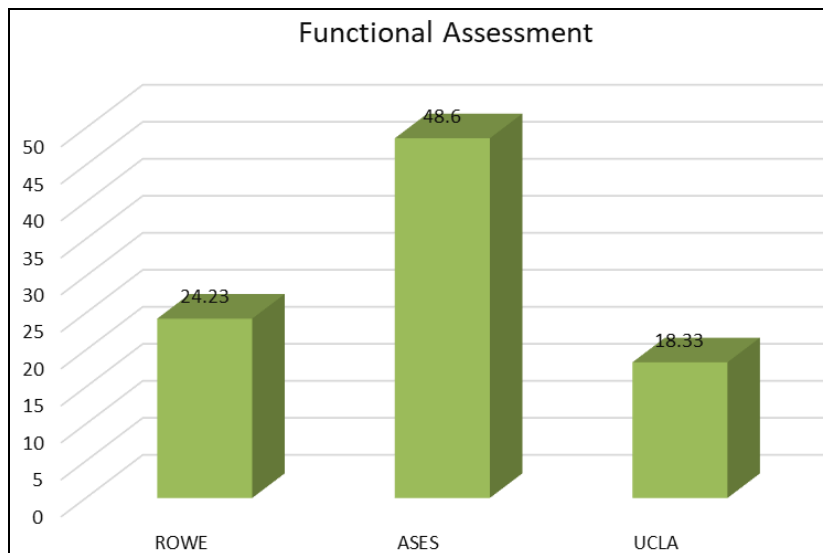


Fig 1: Distribution of patients according to Functional Assessment Scale

Figure 1 shows that the pre-operative ROWE Scale was 24.23 ± 4.20 while the mean American Shoulder and Elbow Surgeons (ASES) and mean University of California at Los

Angeles (UCLA) score was 48.60 ± 5.54 and 18.33 ± 2.76 respectively.

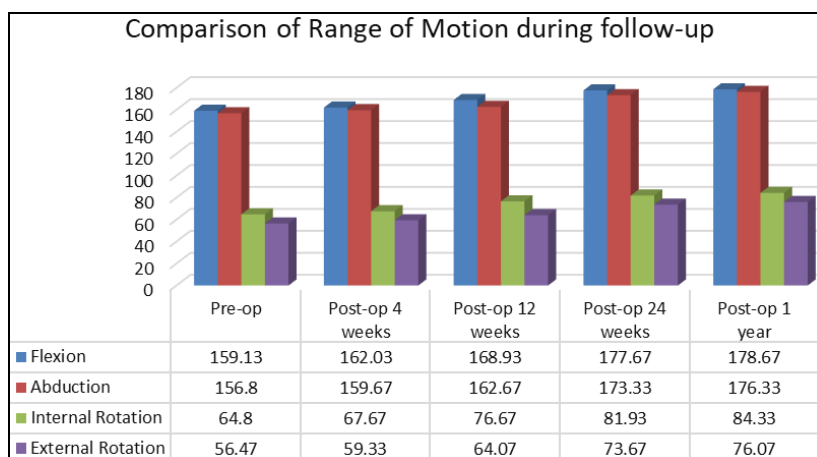


Fig 2: Comparison of Range of Motion during follow-up of patient

Figure 2 shows that during follow-up, there was significant improvement in pre-op ROM of flexion ($p < 0.05$), pre-op

ROM of abduction ($p < 0.05$), pre-op ROM of internal rotation ($p < 0.05$), and pre-op ROM of external rotation ($p < 0.05$).

Table 1: Comparison of ROWE, ASES and UCLA Scale during follow-up of patients

	ROWE Scale		ASES Scale		UCLA Scale	
	Mean	SD	Mean	SD	Mean	SD
Pre-op	24.23	4.20	48.60	5.54	18.33	2.76
Post-op 4 weeks	51.57	4.64	69.60	4.97	26.57	2.69
Post-op 12 weeks	68.67	5.39	81.67	6.87	29.27	2.74
Post-op 24 weeks	84.67	6.99	86.47	5.84	33.33	6.06
Post-op 1 year	92.63	2.99	93.23	4.96	35.10	4.54
P-value	<0.05		<0.05		<0.05	

Table 1 shows that during follow-up it was found that there was significant improvement in pre-op ROWE Scale ($p < 0.05$), pre-op ASES Scale ($p < 0.05$), and pre-op UCLA Scale ($p < 0.05$).

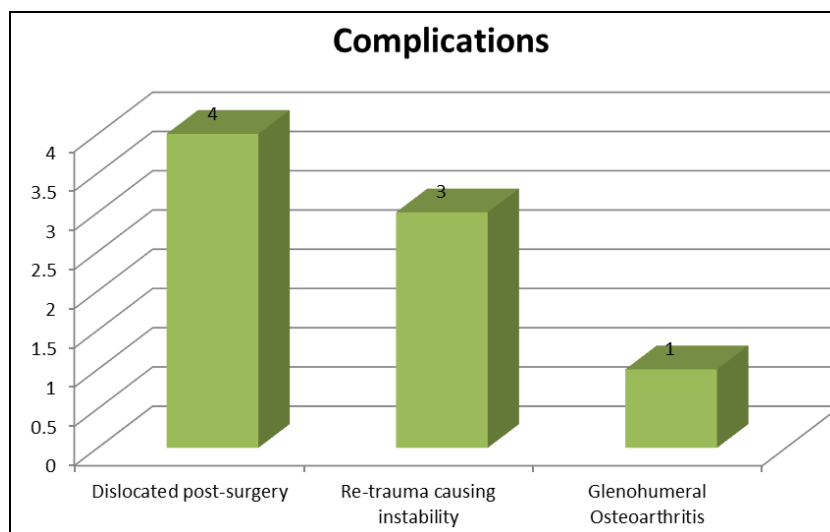


Fig 3: Distribution of patients according to Complications

Figure 3 shows that 4 (13.3%) patients had dislocation post-surgery while 3 (10%) and 1 (3.3%) patient had re-trauma causing instability and glenohumeral osteoarthritis respectively.

Discussion

In the present study, highest numbers of the patients (23.3%) were in the age group of 21-30, with mean age of the total patients 42.17 ± 16.88 years. Also, there was male preponderance (73.3%). This is similar to the studies of Ballal *et al.* (2020) [19] (19 patients (59.4%) were less than 25 years, with mean age of all the patients 24.5 ± 6.9 years, and 90.6% (N=29) male participants), Dussa *et al.* (2016) [20] (29 patients (72.5%) were less than 30 years, with mean age of all the patients 28.96 years, and 85% (N=34) male participants) and Das *et al.* (2020) [21] (83.8% were less than 40 years, with mean age of all the patients 26.16 years, and 89.2% (N=33) male participants).

It might be because younger peoples are more active and involved in outdoor and sports activities which makes them more prone to injuries and makes them more vulnerable to accidents and trauma.

Further, in the present study, 11 (36.7%) patients had their right shoulder involved while 19 (63.3%) patients had their left shoulder involved. This is in contrast to the studies of Ballal *et al.* [19] (71.9% right side and 28.1% left side), Dussa *et al.* [20] (75% right side and 25% left side) and Das *et al.* [21] (75.7% right side and 24.3% left side). Higher incidence of right shoulder involvement may be due to right hand dominance.

In the present study, the mean ROWE, ASES and UCLA Scale was 24.23 ± 4.20 , 48.60 ± 5.54 and 18.33 ± 2.76 respectively. Dussa *et al.* [20] descriptive study showed preoperative UCLA shoulder mean score of 9.93 ± 1.711 .

Furthermore, in the present study, there was significant improvement in pre-op ROM of flexion ($p < 0.05$), pre-op ROM of abduction ($p < 0.05$), pre-op ROM of internal rotation ($p < 0.05$), and pre-op ROM of external rotation ($p < 0.05$). These findings were consistent with the studies of Ballal *et al.* [19], Miyamoto *et al.* (2017) [22], Grimberg *et al.* (2016) [23] and Zhu *et al.* (2011) [24].

Ballal *et al.* [19] prospective study reported a significant improvement in range of motion with follow-ups at 1 month, 3 months and 6 months with all patients achieving at least 80 degree of external rotation with arm in abduction by the end of 6 months. Miyamoto *et al.* [22] found postoperatively, the

restricted ROM and muscular weakness alleviated with time, and the clinical scores improved significantly from the preoperative values. No significant difference in postoperative scores was noted among cases managed by different surgeons. At one year after the operation, the ROM of flexion, abduction, external rotation, and internal rotation was significantly lower in the remplissage group. Muscle strength did not differ between the two groups before or after the operation. Grimberg *et al.* [23] study found that patients who underwent remplissage showed an 11.7° restriction of external rotation ROM, which differed significantly from that noted in patients who underwent Bankart repair alone.

Zhu *et al.* [24] reported an average improvement in flexion by 8° and restriction of external rotation by 1.9° , but these differences were not statistically significant.

It was observed in the present study that there was significant improvement in pre-op ROWE Scale ($p < 0.05$). Similar observations were noted in the studies of Miyamoto *et al.* [22], Das *et al.* [21], Ballal *et al.* [19], Miyamoto *et al.* [22] and Lenters *et al.* (2007) [25].

Miyamoto *et al.* [22] study showed ROWE score was significantly lower in the remplissage group both preoperatively and at one year after the operation. Das *et al.* [21] study concluded that a dip in the total ROWE score at 2 weeks was due to the shoulder immobilization post-surgery. Ballal *et al.* [19] found to have a highly significant improvement with follow ups at 1 month, 3 months and 6 months. Miyamoto *et al.* [22] reported preoperative ROWE score was significantly poorer in the remplissage group, reflecting that this group consisted mostly of high-risk patients. The incidence of bony Bankart lesion and glenoid bone defect was also significantly higher in the remplissage group. Lenters *et al.* [25] reported arthroscopic repairs were associated with higher ROWE scores than were open methods. Similarly, analysis of the arthroscopic suture anchor techniques alone showed the ROWE scores to be higher than those associated with open methods. Arthroscopic treatment led to a better functional result according to ROWE score

It was observed in present study that there was significant improvement in pre-op ASES Scale ($p < 0.05$). Similar observations were noted in the study of Ballal *et al.* [19], which found that ASES shoulder score showed a highly significant improvement at post-op follow ups from a mean pre-op ASES score. ASES score showed no significant difference between the 2 groups at all post-op follow-ups.

In the present study, there was significant improvement in

pre-op UCLA Scale ($p < 0.05$). This is similar to the studies of Miyamoto *et al.* [22], Dussa *et al.* [20], Ballal *et al.* [19] and Gartsman *et al.* (2000) [26].

Miyamoto *et al.* [22] study observed UCLA scale score remained significantly different between the two groups throughout the follow-up period. Dussa *et al.* [20] showed preoperative UCLA shoulder mean score of 9.93 ± 1.711 which significantly improved to 28.15 ± 3.544 . There is statistically significant difference between preoperative and postoperative patients with respect to postoperative UCLA shoulder score. Postoperative recovery and rehabilitation is faster than open surgical techniques. Postoperative range of motion is also not sacrificed for the sake of stability. Patients are able to have a good range of motion functionally, especially external rotation, which allows them to return to their sports or high demand jobs. Ballal *et al.* [19] study reported all patients had similar functional outcome irrespective of the number of suture anchors used indicating that, proper patient selection for the appropriate procedure

and good surgical technique with proper placement of anchors can give satisfactory results.

In our study, 4 (13.3%) patients had dislocation post-surgery while 3 (10%) and 1 (3.3%) patient had re-trauma causing instability and glenohumeral osteoarthritis respectively. Similar observations were noted in the studies of Ballal *et al.* [19], Miyamoto *et al.* [22] and Das *et al.* [21].

Ballal *et al.* [19] study reported none of the patients had any recurrent dislocation or other associated complications, and all patients reported excellent satisfaction following the surgical procedure with an average limitation of 5° external rotation. Miyamoto *et al.* [22] study reported no complications during or after the operation. Over a follow-up of one year, no re-dislocation or resubluxation was noted. Das *et al.* [21] study observed 89.2% patients did not have any complications, whereas 5.4% patients had shoulder stiffness, 2.7% patient complained of mild pain and 2.7% patient had a re-dislocation episode postoperatively.

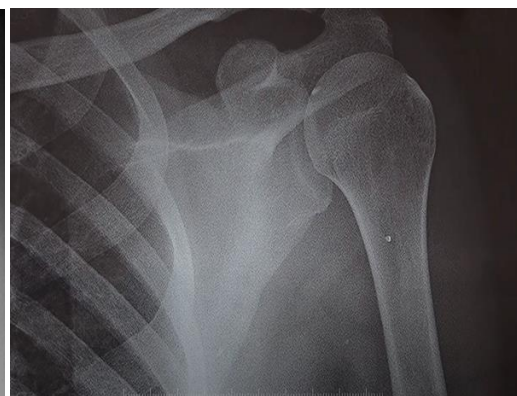
Appendix

Left Side With 5times Dislocation History

Pre Op X-Rays

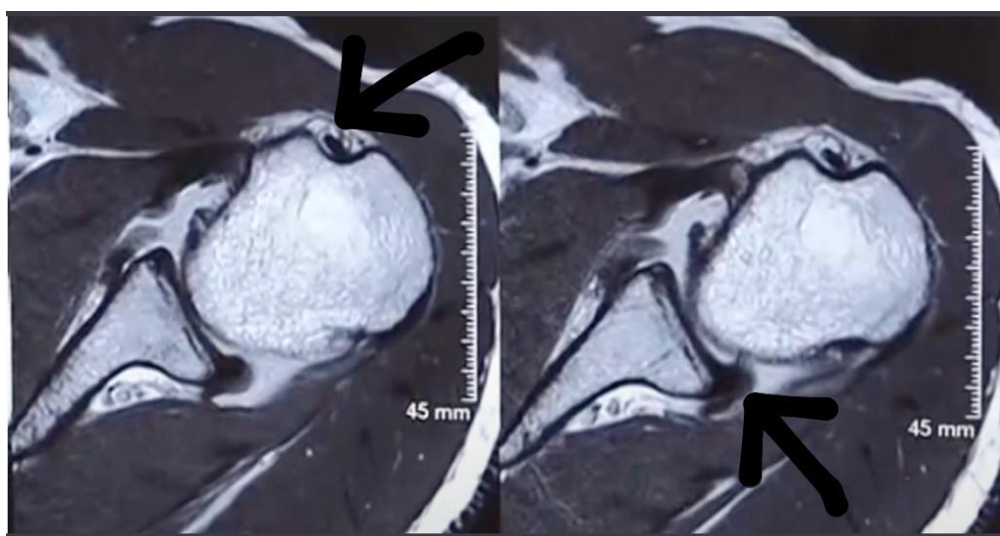


AP view – Dislocated shoulder



AP view – Relocation done

MRI – Axial view: Bankarts and Hill sachs lesion



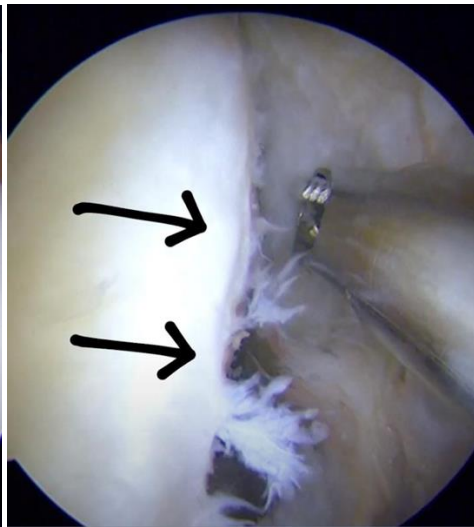
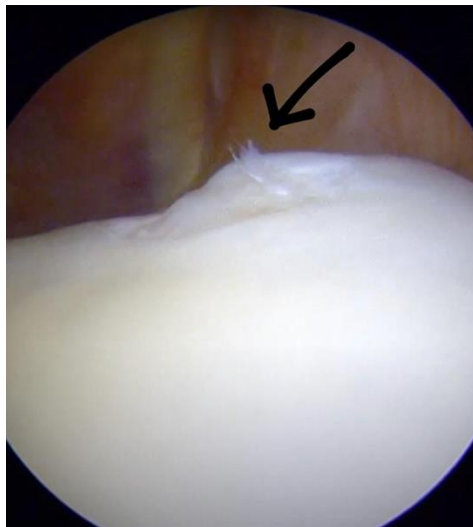
Patient Positioning – Lateral decubitus



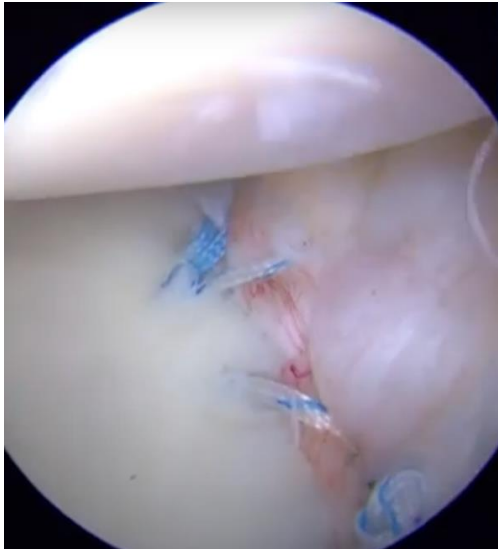
Surface markings for Portal Placement



Intra-operative arthroscopic images

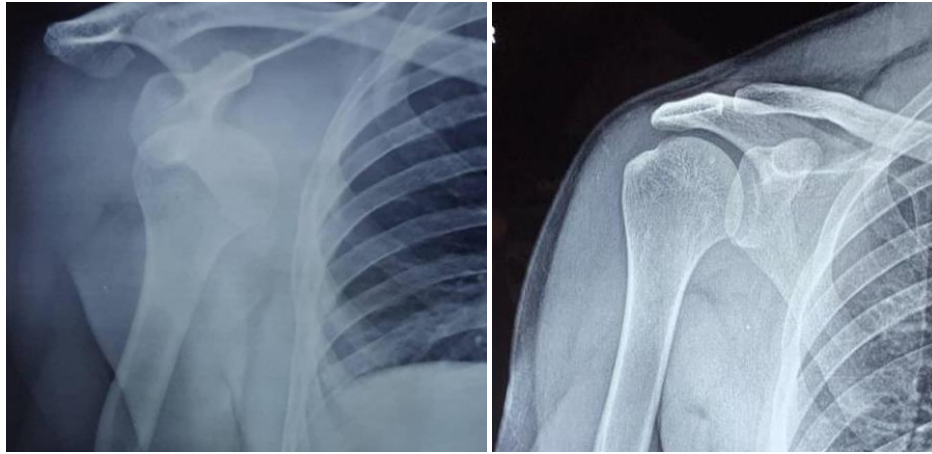


Glenoid labral tear



Post Labral repair with suture anchors

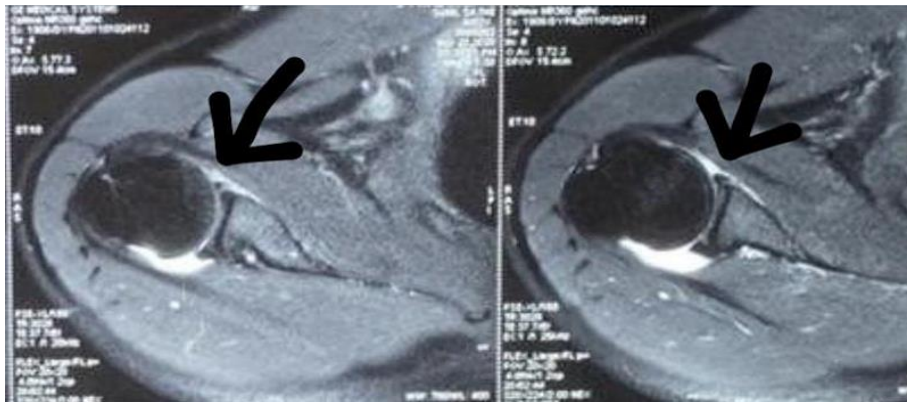
Case 2
Right Side With 4 Times Dislocation History
Pre op X-rays



AP view – Dislocated shoulder

AP view – Relocation done

MRI – Axial and Sagittal views

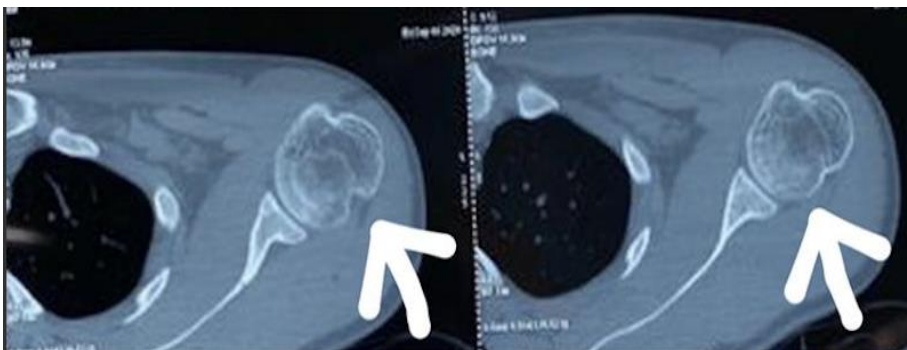


Loss of head contour



Antero inferior capulo-labral involvement

CT – Axial and Sagittal view





Postero-lateral bony defect

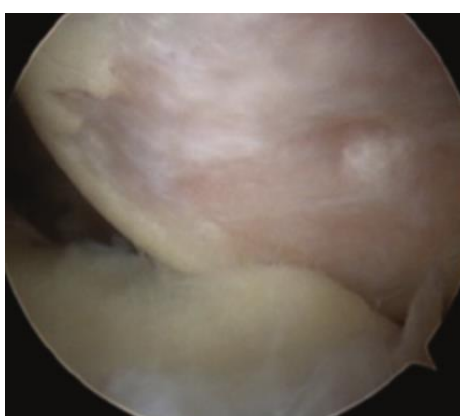
Patient positioning and Surface markings for portal placement



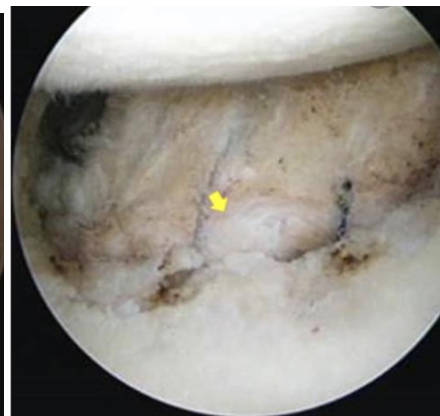
Intra-operative arthroscopic images



Labral tear shown by marker



Hillsachs lesion



Labral repair

Conclusion

Arthroscopic repair in cases of recurrent anterior shoulder instability is a reliable surgical procedure with respect to shoulder function and motion as it offers good clinical outcome, excellent post-operative shoulder range of motion with improved function. This surgical procedure has better patient compliance and minimum surgical complications in properly selected patients.

Arthroscopic repair for anterior shoulder instability is a useful and successful procedure. Patient identification and selection remains the key in determining the success of the repair. Meticulous surgical technique and correct positioning play a crucial role in determining the final functional outcome,

thereby reducing the economic burden on the patient.

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