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Original Research Article

Arthroscopic evaluation and management of anterior shoulder instability

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ABSTRACT

Aim: Shoulder instability is a common problem that is encountered in young population nowadays due to the increase in the number of road traffic injury cases causing shoulder dislocations. The most common amongst them is anterior shoulder instability which can be diagnosed clinically and radiologically. The aim of the paper is to evaluate the correlation of these clinical and radiological findings to arthroscopic findings and treat these injuries arthroscopically and compare their clinical outcome to open repair of anterior shoulder instability.

Materials and Methods: To assess 20 cases of anterior shoulder instability clinically, radiologically and corelate it with arthroscopic evaluation of the instability and to compare open repair and arthroscopic repair of these injuries.

Results: 20 patients who had anterior shoulder instability and underwent a diagnostic shoulder arthroscopy showed that all 20 of them had Bankart's lesion with 14 of them having an accompanying Hillsach's lesion. Amongst the 14 patients with Hillsach's lesion, 12 of them had a bone loss of less than 10% so were operated for arthroscopic Bankart's repair and the remaining 2 patients had a bone loss of 13% and 15 %. Both these patients underwent an additional Bristow Latarjet capsulolabral repair as the bone loss was less than 25% where using the Tasaki technique the coracoid process was transferred and fixed to the anterior glenoid.

Conclusion: Overall, we have come to a conclusion that "Arthroscopic Evaluation and Management of Anterior Shoulder Instability" is a better method in evaluating the instability as it has a better sensitivity and specificity in identifying the pathology compared to an MRI, gives excellent results when repaired using suture anchors and gives excellent range of motion of the shoulder.

1. Introduction

The shoulder joint or the glenohumeral joint is a ball and socket type of joint which is line by synovial membrane and it connects the axial skeleton to the appendicular skeleton by forming a joint between the glenoid fossa of the scapula and the humeral head.

The term shoulder instability refers to the incidence where the head of the humerus is not anatomically present in the glenoid fossa.[1] The humerus head is kept in the glenoid fossa due to forces that are acted upon by the ligaments and muscles surrounding the shoulder joint. These forces can be disrupted either due to traumatic or atraumatic forces which then places the head under stress and it can be dislocated from the joint due to asymmetrical forces that may be acting on the head.

Atraumatic dislocations are due to repeated overhead use, due to various ligament laxities and due to congenital anomalies of the shoulder, whereas traumatic dislocations are due to sudden forces that cause ligamentous disruptions and can be anteriorly, posteriorly or in any other direction irrespective of the mode of injury to the shoulder.

However, it has been observed that almost 98% of the traumatic dislocations are anterior dislocations.[2]

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Atraumatic shoulder instability is a type of shoulder instability where primarily there is no history of any preceding injury to the shoulder joint.[3]

There are two main types of atraumatic shoulder instability:

1.1. Congenital shoulder instability

This is an acquired condition where there is laxity of the shoulder joint since birth.[4]

1.2. Chronic instability

May be seen after shoulder relocation surgery due to involvement of the glenoid.[5]

There may be repeated trauma to the glenohumeral joint over a period of time as can be seen in athletes due to repeated microtrauma.

The possibility of shoulder dislocation is higher in a young adult[6,7] than in older patients due to the weak rotator cuff muscles and osteoporotic bones in the elderly and that may lead to multiple dislocations in the younger patients due to stretching of the ligaments which may cause functional instability in such patients.

So, whenever a young patient undergoes a shoulder dislocation there is a high chance of a lesion at the anteroinferior glenoid labrum which is known as the Bankart's lesion where patient may present with symptoms consistent with instability where on overhead abduction there is a feeling of giving away of the shoulder joint. On clinical examination these patients show a positive apprehension test and relocation test. These patients are excellent candidates for surgical stabilization of the shoulder.

The aim of our study is to evaluate 20 such patients having anterior shoulder instability and to arthroscopically diagnose and repair the Bankart's lesion and assess for functional improvement in these patients following standard rehabilitation protocols.

2. Materials and Methods

From 2018-2020; 20 patients underwent arthroscopic repair of anterior shoulder instability at Dr. D Y Patil Medical college and Hospital.

Patients with shoulder instability were assessed and our patients were selected on the basis of certain criteria.

2.1. Inclusion criteria

1. Recurrent anterior dislocation of the shoulder joint after an initial trauma.
2. Bankart's lesion that is arthroscopically confirmed.
3. Age group 18-65 years.

2.2. Exclusion criteria

1. Posterior instability.
2. Multidirectional instability.
3. Previous shoulder surgeries.
4. Age > 65 years.
5. Septic and rheumatoid arthritis.

Out of the total 20 patients who presented with shoulder dislocation in our institute 16 were relocated using muscle relaxants and sedation whereas 4 patients were taken to the OT and reduction was done under General anesthesia.

Post reduction a universal shoulder immobilizer was given and check radiographs were done and patient were advised to follow up after 2 weeks of immobilization for examination.

After 2 weeks of follow up the patients were clinically examined in the OPD and shoulder examination was done where we assessed for:

1. Apprehension test.
2. Relocation test.
3. Release test.

Fig. 1: Apprehension test

Patients were then advised an MRI shoulder in all cases and a CT scan was done if there was a suspected bone loss.

After getting an MRI done the findings were collaborated with radiological findings, and clinical tests and patients were counselled for arthroscopic repair of shoulder instability. A Rowe and Zarin's score were obtained preoperatively for those willing to undergo arthroscopic evaluation.

Fig. 2: Relocation test

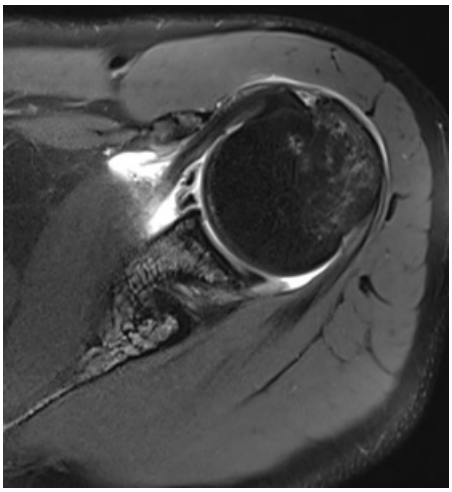

Fig. 3: MRI Section showing a bankarts lesion

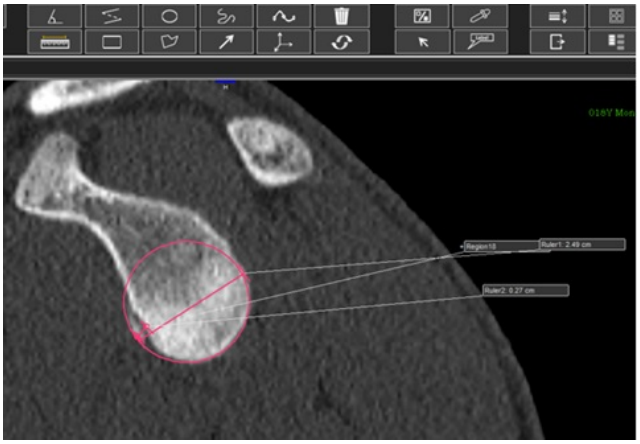

Fig. 4: A CT scan image showing the best circle fit method for calculating bone loss

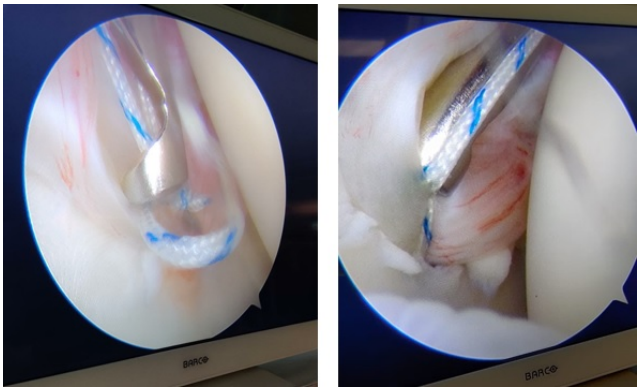

Fig. 5: Arthroscopic bankarts repair

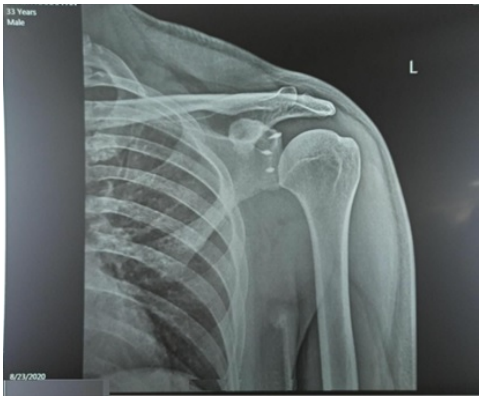

Fig. 6:

All patients were followed up at an interval of 3 weeks for the first 6 months followed by every 3 months for the next 4 follow up and then every six months for a minimum time of 2 years in total.

At each visit of the patient we evaluated the patient by:

1. Evaluating range of motion.
2. Rowe and Zarine score was assessed.
3. Patient wert clinically assessed by doing the drawer test and the apprehension test.
4. A standard shoulder radiograph was taken.
5. Post-operative X-ray After Shoulder Arthroscopy:

3. Result

Table 1: Time interval since onset

Time interval since onset	Number	Percentage
Up to one year	2	10.0
>1 year	18	90.0
Total	20	100

2 patients had a history of dislocation of less than 1 year whereas the rest 18 patients had a history of recurrent

dislocation for more than a year.

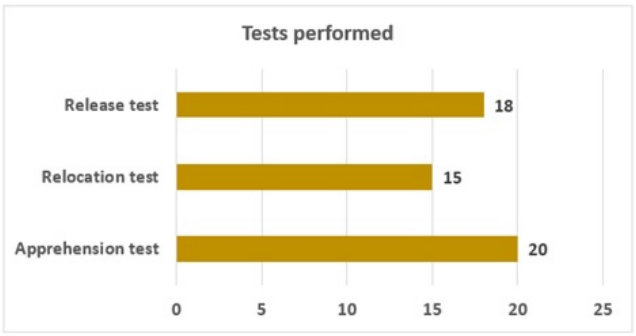

Fig. 7: Clinical evaluation of instability

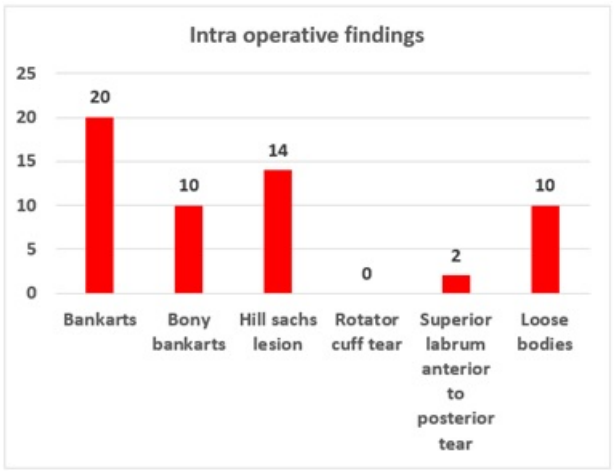

Fig. 8: Intraoperative finding in shoulder instability

In the above table it is seen that out of the 20 patients that were clinically assessed, apprehension test was positive for all 20 patients.

Release test was positive in 18 patients and relocation test was positive in 15 patients.

After assessing the patients clinically a diagnostic arthroscopy of the affected shoulder was done which showed that all 20 patients (100%) had a Bankart's lesion, and 10 of those had an accompanying bony Bankart's lesion (50%). 14 patients (70%) had a Hillsach's lesion, 10 patients had loose bodies and 2 patients had a superior labrum tear.

Table 2: Recurrence of shoulder instability

Recurrence	Number	Percentage
Absent	18	90.0
Present	2	10.0
Total	20	100

There were two patients who had recurrence of shoulder instability post operatively.

Table 3: Comparison of pre op & follow up row zarin scores

Period	Mean	SD	t value	P value
Pre-operative	31.5	11.5	12.8	<0.001
Follow up	86.3	17.5		

*t test

Pre-operative row and zarin score was 31.5 with a standard deviation of 11.5 which improved post-operatively to a mean of 86.3 with a standard deviation of 17.5.

The data follows a normal distribution curve and has a significant difference as paired t test p value is <0.05

Table 4: Table comparingtime since onset with postoperative result

Time of onset	Excellent		Fair		Good		P value
	N	%	N	%	N	%	
Up to one year	2	100.0	-	-	-	-	0.6
More than one year	12	66.7	3	16.7	3	16.7	
Total	14	70.0	3	15.0	3	15.0	

*Chi square test

The above table shows the association of time difference between first incidence and operative intervention which showed that there is no significant difference as the chi square test p value is insignificant.

Out of the 14 patients with Hillsach's lesion, 12 of them had a bone loss of less than 10% so were operated for arthroscopic Bankart's repair and the remaining 2 patients had a bone loss of 13% and 15 %. Both these patients underwent an additional Bristow Latarjet capsulolabral repair as the bone loss was less than 25% where using the Tasaki technique the coracoid process was transferred and fixed to the anterior glenoid.

4. Discussion

Arthroscopic Bankart's repair has many advantages compared to the open technique which includes a minimally invasive surgery with lesser surgical trauma and blood loss compared to an open technique which leads to a faster postoperative recovery and rehabilitation with lesser chances of wound infection.

A study amongst 60 people who had recurrent shoulder instability to assess the return to sports after undergoing an open repair or undergoing an arthroscopic Bankart's repair found that those who underwent arthroscopic Bankart's repair had a better chance to return to sport, had better shoulder range of motion and had better shoulder perception.[8]

With a continuously improving design in suture anchors, arthroscopic repair of the shoulder are becoming more preferred as their superior biomechanical strength has trans passed that of osseous repair[9] and has led to lesser failure

rates due to a higher pullout strength. The use of bio absorbable suture anchors has led to lesser chances of suture migration which might cause impingement of the shoulder joint.

While doing an arthroscopic repair of a Bankart's lesion it is observed that at least 3 suture anchors are needed to maintain stability and lesser number of anchors have led to a higher failure rates[10] whereas in our study patients with even 2 suture anchors had excellent postoperative outcome.

Theoretically there is a greater chance of failure of arthroscopic repair with capsular laxity of the shoulder but a study by Mayer S W[11] found that capsular plication at the time of shoulder instability along with a Bankart's repair gives excellent results in terms of range of motion of the patient.

Almost 90% of our patients were younger than 30 years and were male patients which is consistent with the finding of Pope EJ et al.,[12]

In our study the primary cause of dislocation was a history of road traffic accident which was followed by patients involved in sports activity which required overhead throwing leading to repeated trauma which first manifested as pain and a sense of instability followed by dislocation in the event of a traumatic event which is consistent with a study of Carew-McColl.[13]

Out of the total 20 patients who were part of the study, all 20 patients had a positive Apprehension test (100%), 18 had a positive Release test (90%) and 15 patients had a positive Relocation test (75%), which is almost similar in findings based on the study of van Kampen et al.,[14] who had a sensitivity of 90-98% for all the three tests whereas in our study we found that the Relocation test had a slightly lower sensitivity.

On the basis of radiological investigations we found that MRI suggestive of anterior shoulder instability in 13 out of the 20 patients (65%) which is comparative to most of the studies but is lower than the study of Sharma Y et al.,[15] who showed a diagnostic accuracy of almost 90% in their study of shoulder instability and its causes. This can be attributed to the quality of the MRI machine where the results vary due to the significant difference in their magnetic strength.

After doing a diagnostic arthroscopy we found that all 20 patients (100%) had a Bankart's lesion and 14 patients had an accompanying Hillsach's lesion (70%) which is consistent with most of the studies for anterior shoulder instability where Bankart's lesion is defined as an essential lesion where there is an avulsion of the anterior capsulolabral complex present in the inferior part of glenoid labrum, 10 patients (50%) had a Bony Bankart's lesion which is invariably associated with recurrent shoulder instability. All these findings were consistent with Yiannakopoulos et al.,[16] who did a comparative study between acute and chronic shoulder dislocation diagnostic arthroscopy findings which showed that recurrent shoulder dislocation had a higher chance (90%) of Bankart's and Hillsach's lesion than acute dislocation.

None of our patients developed any intraoperative complications which is one of the advantages of undergoing shoulder arthroscopy, although there have been incidences of neurovascular injury during a shoulder arthroscopy.

We also did not have any suture pullout, though there are studies which have documented suture pullout as a complication. This could be due to the use of all suture anchors in our study which have a higher pullout strength as shown by a study by Ntalos D et al.,[17]

Post operatively there was an increase in the mean Row and Zarin score from 31.5 to 86.3 for the entire study group with 70% of the patients having excellent function of the affected shoulder, 15% of them had a good outcome, and the remaining 15% had a fair shoulder score on the Row and Zarin scoring system. Most of the patients returned to their work without any complication or without any limitation of function except 2 patients who had recurrence of the instability, which can be attributed to early enthusiastic return to heavy weight training and return to playing volleyball which required overhead full range of motion, this can be compared to open shoulder repair of shoulder instability which showed a similar result as shown in a study by Cohen et al.,[18] comparing open reduction with arthroscopic repair which showed a 90-95% success with open reduction.

5. Conclusion

After evaluating the relevant data of the study we found that anterior shoulder instability is a problem which is predominantly present in the younger population which is less than 30 years of age, the primary cause of which is a road traffic accident followed by overhead throwing sports activities where after the primary dislocation occurs; there is a feeling of the shoulder giving away in one particular position causing discomfort to the patient.

The most common cause of an anterior shoulder instability is a Bankart's lesion which is the essential lesion of this condition, which can be diagnosed by doing an Apprehension test, Relocation test and a Release test which give us a fair idea about the instability.

MRI is gold standard in diagnosing these pathologies of the shoulder and aids in planning the fixation, the amount of bone loss can be quantified by doing a CT scan of the shoulder and depending on the bone loss we can plan additional procedures.

There is a good Range of motion that can be achieved post repair aided with supervised physiotherapy.

All our patients had good range of motion post-surgery and could return to their normal daily activity without any instability. The recurrence rate of our study was 10% which is acceptable in comparison with open repair of shoulder instability.

Overall, we have come to a conclusion that "Arthroscopic Evaluation and Management of Anterior Shoulder Instability" is a better method in evaluating the instability as it has a better sensitivity and specificity in identifying the pathology compared to an MRI, gives excellent results when repaired using suture anchors and gives excellent range of motion of the shoulder.

6. Source of Funding

None.

7. Conflict of Interest

None.

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