

Research Article

Correlation Between Clinical , MRI and MRA Diagnosis of Anterior Instability of Shoulder Joint

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ABSTRACT

Background: Anterior shoulder instability is caused by defect in soft tissue and bony structure around shoulder joint. Thorough history and physical examinations are mandatory for clinical diagnosis. For confirmation of instability by direct visualization of structural defect Magnetic resonance imaging (MRI) and Magnetic resonance Arthrogram (MRA) have emerged. Studies on diagnostic evaluation of essential clinical diagnosis for shoulder instability specially in terms of MRI and MRA are lacking .Although it is paramount for deciding course of management.

Aims And Objectives : Correlating and comparing clinical diagnosis of anterior shoulder instability with MRI and MRA diagnosis of the same .

Methodology : 49 patients clinically examined to diagnose anterior shoulder instability by history and physical examination , then 49 underwent MRI and 38 out of 49 underwent MRA to detect structural defect causing shoulder instability . Results were correlated.

Results : Young (< 30 years) ,male with recurrent dislocation resulting from fall commonly have shoulder instability with structural defect . Sensitivity, positive predictive values, accuracy of clinical diagnosis is highest when compared MRI and MRA together as a single modality. Specificity and agreement is highest when compared to MRI (K=0.573)

Conclusion: Clinical diagnosis can be relied for shoulder instability. Clinically positive patients have high chances of truly having instability (for satisfactory PPV values). Because of slight to moderate agreement , MRI and MRA confirmation of clinical diagnosis is advisable before planning for management.

Keywords: Shoulder, Instability, Clinical, Mri, Mra.

INTRODUCTION

Shoulder joint is inherently unstable and accounts for more than 50% of all joint dislocations with anterior instability being commonest (95%). Structures like glenoid labrum, glenohumeral ligaments (specially inferior ligaments), and humeral head act as static and rotator cuffs with other muscles acts as dynamic stabilizers of shoulder joint.[1],[2],[3].Compromise of these stabilizers by trauma, overuse, collision sports ,overhead activities ,impaired muscular function ,bony changes can result instability . Presentations are intermittent pain with activities due to micro instability , subjective instability , popping or giving away sensation , range of motion and functional deficit to single or recurrent frank dislocation , 'dead arm' , varying degree of pain often in the

background of trauma , contact sports , fall, overhead activities[2]. For diagnosis detailed history, and thorough physical examination specially provocative tests like Anterior apprehension with Relocation and Surprise test are widely used to clinically establish anterior shoulder instability .Anterior drawer test though reveals laxity ,but higher laxity increases chance of instability . These are easy to perform, yet informative while examining unstable shoulder .But it may be inaccurate. Hence advanced imaging like MRI ,MRA have emerged which is able to detect Bankart (glenoid labral tear) , Hillsach (compression of postero lateral humeral head) ,and there variants , SLAP (superior labrum anterior posterior) ,ALPSA(Anterior labroligamentous periosteal sleeve avulsion) ,HAGL (humeral avulsion of glenohumeral

ligament) etc. With high accuracy in comparison to the gold standard arthroscopy. But it is invasive, technically demanding and not appropriate for every instability. MRA is regarded as gold standard for determining instability and preoperative evaluation of shoulder injuries .Though arthroscopy is the gold standard for diagnosing shoulder instability .[1],[2],[3],[4],[6],[7]

In PMR , conservative , non-operative treatments are provided to appropriate patients with shoulder instability as supporting evidences are available that non operative management can benefit many patients with low recurrence across population . So correct diagnosis of instability from beginning is paramount for planning course of management. As most researches aim at evaluating radiological diagnosis and interventions for shoulder instability ,this study tends to correlate the primary mode of diagnosis which is clinical diagnosis on the basis of history and physical examination with MRI and MRA.[8],[9],[10]

Aims and Objectives:

1. Calculating Sensitivity , specificity , Positive predictive value (PPV), Negative Predictive Value and positive and negative likelihood ratios of Clinical diagnosis of anterior shoulder instability considering MRI and MRA as gold standard
2. To determine Agreement between Clinical Diagnosis and Radiological diagnosis (using MRI ,MRA) of anterior shoulder instability of by calculating Cohen's kappa

MATERIALS AND METHODS:

Study Design: Institution based, Prospective study for diagnostic evaluation of shoulder joint

Study subjects: Joshi et. al [10] conducted a study to correlate clinical and MRI diagnosis of anterior and posterior shoulder instability with arthroscopy taking 30 patients of shoulder instability .Present study included initially 56 patients from 16 to 54 years of age ,comprising of 42 males and 14 females ,screened from patients with shoulder complains . Study included single or recurrent episodes of frank dislocations or subjective instability like popping or giving away sensation , click or catch with restricted shoulder movement , pain with functional compromise in the background of fall , trauma in direct as well as abducted and externally rotated position ,

overhead activities and contact or collision sports. Hawking's grade 2 (translation of humeral head 1 to 2 cm. over glenoid rim, reducing spontaneously) and grade 3 (humeral head remained dislocated after translating over the glenoid rims (>2 cm.) Laxity revealed by Anterior Drawer Test [19]. Patients having X-ray of dislocated shoulder or of concentric reduction.

Unreduced dislocation , acute pain, guarding (where physical examination not possible) , posterior ,inferior or multidirectional instabilities ,recent fracture around shoulder girdle (identified by X-ray done routinely for each patients) , conditions like adhesive capsulitis , impingement , acromioclavicular joint involvement were excluded .[7],[8],[17],[18]

Study Technique:

Study was done in PMR Department of a tertiary care Medical college in Kolkata, West Bengal, with 56 patients over 18 months. After obtaining Institutional Ethical Committee clearance and informed consent, thorough history of demographic, causative and symptomatic details were taken. Then general survey and relevant examinations of both the shoulders were done (to compare the affected with the normal side) to exclude posterior ,inferior and multidirectional instabilities and other musculoskeletal condition. Anterior Drawer Test was performed as per description of Gerber and Granz and grading of humeral head translation was done by Hawkin;s and Bokor classification to include Grade 2 and Grade 3 laxity[11],[12],[14].

It is followed by provocative tests for anterior instability of shoulder - Anterior apprehension with Job's Relocation and Surprise test. Anterior apprehension test was done following description of Rowe and zarin's. Reproducing apprehension was criterion for positive test [8],[11]. It was immediately followed by Relocation test, done as described by Jobe et al. Shoulder remained placed in 90 degree abduction and elbow in 90 degree flexion then external rotation done until patient reports apprehension with or without pain , posteriorly directed force is applied on the anterior aspect of shoulder If patient confirmed relief of apprehension , Relocation test was considered positive .[6],[8],[11],[19],[20]

At the maximally abducted and externally rotated position of Relocation test, sudden release of posteriorly directed stabilizing force was done to look if apprehension was

reproduced. If any of these 3 tests came positive , shoulder instability was considered positive clinically .Apprehension was taken as the criterion for the test being positive .[8],[20],[24].

Then all 56 patients were sent to radiology for MR investigation .Patients selections from 56 patients and reporting of findings was done by Department of Radiology themselves .Considering contraindications like allergy , implant , severe kidney disease , technical feasibility , patients refusal , 49 patients eventually underwent 1.5 Tesla MRI of affected shoulder and out of those 49 patients , 38 underwent MRA by following departmental protocols and ethics .An experienced radiologist blinded of the result of clinical diagnosis , reported presence of pathology in glenoid labrum (e.g. Bankart, SLAP), glenohumeral ligaments (tear or laxity) , rotator cuff and rotator interval tear and humeral head (e.g Hill sach"s, Bony Bankart) ; contributory to anterior shoulder instability . Shoulder with gleno humeral –ligamentous ,musculocutaneous defects known identified by MRI or MRA or both were considered radiologically positive .Then clinically and radiologically positive cases were compared and correlated .[6],[7],[13],[17]

Statistical Calculation:

49 patients undergoing clinical and both or either of MRI and MRA were taken for final calculations .Epidemiologic datas were expressed as mean ,standard deviation , percentages etc . Diagnostic

Parameters Are Calculated As Following:

1. Sensitivity= True positive (TP)/ [true positive (TP) +False negative (FN)] $\times 100$
2. Specificity= True Negative (TN)/ [True negative (TN) + False positive (FP)] $\times 100$
3. Positive predictive value (PPV)= True Positive (TP) / [(True positive (TP) +False Positive (FP)] $\times 100$
4. Negative predictive value (NPV)= True negative(TN) / [(True negative(TN)+ False negative(FN)] $\times 100$ Positive likelihood ratio= sensitivity / (1-specificity) Negative likelihood ratio= (1-sensitivity) / specificity
5. Accuracy= True Positive(TP) + True negative(TN) /[(True positive(TP)+ False positive(FP) + False negative (FN) + True negative(TN)] $\times 100$ Agreement between clinical modality and MRI and MRA were determined separately by calculating cohen's kappa for each .(considering >.8

=almost perfect , >.6=substantial , >.4=moderate , >.2=fair, 0-.2=slight , <0= poor)

RESULTS : Majority of patients diagnosed with shoulder instability by either of modalities were young [mean age : Clinically(+) : 26.5 years (s.d= 6.8) ; MRI (+) :27.01years (s.d=7.1) ; MRA: 25.4years (s.d= 5.2)]years , with male dominance ,most commonly presented with recurrent dislocation (42.85% in clinically positive , 62.5% MRI positive ,58.06 % in MRA positive). Commonest mode of injury was fall. Maximum number of instability can be detected when MRI and MRA were used together (86.74%) where , structural lesion detected by both or any of two was considered positive. Anterior Drawer Test done for evaluating laxity of shoulder , have 45% to 56 % sensitivity , 42 % to 82% specificity with slight to fair agreement with MRI and MRA in diagnosis of shoulder instability .

Diagnostic evaluation of clinical modality when compared with MRI , MRA as well as MRI and MRA together (defect detected by any of it is considered positive) revealed as Sensitivity - 78.12% vs 77.42% vs. 81.82 % ,specificity - 82.35% vs 42.86 % vs. 80.00 % Positive predictive value -92.85% vs 85.71 % vs. 94.43% ; Negetive predictive value -82.35%vs 30.00 % vs.40.00 % , Accuracy -79.59% vs 71.05 % vs. 81.58 % (expressed as MRI vs. MRA vs MRI and MRA) . Clinical diagnosis had moderate agreement with MRI (Cohen's kappa 0.573) and MRI combined with MRA (k=0.434) and only slight agreement (k=0.174) with MRA .Values are tabulated below.

DISCUSSION: Shoulder dislocation accounts for 50% of all dislocations. Anterior dislocations account for 95% whereas posterior and inferior instability account for 2 to 4 % and .5% respectively. [21],[29],[30], [31]So anterior shoulder instability was considered for this study .MOON'S Shoulder [21]instability cohort comprised of 82% males and 18% female with mean age of about 24 years (12 to 63 years) - comparable with this study having 39 (79.59%) male and 10(20.4%) with mean age of 28.5 (S.D : +/- 4.9) . Puri et.al study had a different gender distribution of 70% male, 30% female but average age of 28.13 years is aligned. Young , active ,athletic population are highly succceptible for shoulder instability with incidence of recurrent instability [23] (Moya et al. ,2021) is also

similar with present study , Fall on outstretched hand is the commonest mode of injury .[23],[25],[28][30],

More et.al [20] concluded detailed interview and clinical examination as mandatory to identify instability. Hence clinical diagnosis was done by history and provocative tests of shoulder instability. Srinivas et.al [16] found clinical diagnosis of unstable shoulder had 82% sensitivity, 71% specificity, 67% PPV, 83% NPV and 75% accuracy. Present study showed comparable sensitivity (78% - 81.82 %), negative predictive value (82.35% against MRI) and accuracy (71% - 81.58 %).

Utkarsha et .al[10] found sensitivity ,specificity ,diagnostic accuracy of clinical diagnosis in comparison to arthroscopy as 85% ,100% and 86% respectively and Gupta et. al[15] found clinical diagnosis having 86.20% sensitivity , 96.44% specificity, 86.26% PPV, 96.64% NPV, 94.42 % accuracy compared to arthroscopy. Present study had alignment in sensitivity , (78.12% - 81.82%) specificity (80% to 82%), accuracy (71.05% to 81.58%) . Puri et.al found 85.71 % sensitivity, 100% specificity, 100% PPV, 33.33% NPV taking arthroscopy as gold standard. Present study showed 81.82% sensitivity , up to 82% specificity , around 85 % to 94% PPV ; 30% to 40 % NPV while taking MRA and MRI with MRA respectively as gold standard .[8],[13],[23]

Agreement of clinical diagnosis with radiological was found to be slight to moderate ($k=0.174$ with MRA , 0.434 when both MRI and MRA reports are taken; 0.573 with MRI) corroborating with available studies. It indicates clinical examination should be confirmed by MR investigation. [33]

Anterior Drawer test tends to explore degree of laxity with sensitivity and specificity of 53% and 85% for instability .(Faber et.al) [11].Present study revealed 56.25% sensitivity and 82.35% specificity to detect instability when grade 2 and 3 are considered though it is not a provocative test . Anterior apprehension test , provoking humeral head to go over anterior edge of glenoid labrum has a sensitivity and specificity of 41.7% - 72%) and 95.7% -100% respectively (Hedgedus EJ et al,) [8] and Relocation test has a sensitivity and specificity of 81% and 92% respectively (Faber et al and Jobe et. al) [11],[19]. Sensitivity and specificity of Surprise Test is 63.89% and 98.91% respectively (Ian K et.al) [24] .These 3 provocative tests were considered to identify anterior instability .

Though present study cannot be directly compared with available studies because it compared clinical diagnosis with MRI and MRA not with arthroscopy .Most of the studies focus on comparing clinical diagnosis , MRI , MRA detection of structural pathology causing instability , with arthroscopic findings .MRI in particular is a valuable diagnostic tool with 86% -91% sensitivity for detecting capsular , ligamentous pathology (Seeger et .al)[18] . Gupta et.al [15] revealed 91.30% sensitivity and 85.71 % specificity, 90.0% accuracy of MRI for anterior instability. MRA is considered superior with 86 % to 91% sensitivity and 89% to 93% specificity for labral and capsular , ligamentous lesion compared to conventional MRI .[17],[22]. Awasthi et.al [7] ascertained MRA as gold standard for doing preoperative evaluation of shoulder instabilities. So MRI and MRA have been chosen as the gold standard for comparison instead of arthroscopy which is more invasive. [3], [7], [17], [18], [22].

Arthroscopy has its own limitations and complications. Each shoulder instability does not need arthroscopy or surgical intervention .Single episode without any risk factors ,microinstability, subluxation can be managed by rehabilitation (Jaggi A et al)[26],[27] Though young patient , initial dislocation , professional athlete , contact sports ,humeral and glenoid critical bone defect, ligamentous laxity often end up with arthroscopic intervention .[29]

History, physical examination can be immediately done in non-acute instability. MRI and MRA are well available to diagnose instability with high sensitivity and specificity. So detecting instability, structural pathology, prognosis and management prediction can be done by clinically and radiologically without essentially undergoing arthroscopy.

While comparing Categorical data (as positive or negative) of two modalities was the aim of the study , it reveals which structural pathology are actually responsible for shoulder instability . It helps to decide if rehabilitation is the mode of treatment or arthroscopy is eventually needed.

CONCLUSION: Clinical diagnosis of anterior shoulder instability by history and physical examination specially the provocative tests has comparable diagnostic parameters in terms of MRI and MRA with available datas with some deviations .Hence they can be used for initial diagnosis ,But MRI or MRA visualization of

causative defect of instability are advisable for confirmation and planning the appropriate management of glenohumeral instability.

Limitation: Patients number was limited, clinical tests were not done under anesthesia, Radiological investigations are prone to technical errors. Comparison was done against MRI and MRA not against Arthroscopy, the gold standard.

REFERENCES:

1. Ladd LM, Crews M, Maertz NA .Glenohumeral Joint Instability: A Review of Anatomy, Clinical Presentation, and Imaging .Clin Sports Med.2021;40(4):585-599
2. Lecouvet FE, Simoni P, Koutaïsoff S, Vande Berg BC, Malghem J, Dubuc J-E. Multidetector spiral CT arthrography of the shoulder: Clinical applications and limits, with MR arthrography and arthroscopic correlations. Eur J Radiol. 2008;68(1):120-136. doi: 10.1016/j.ejrad.2008.02.025. [DOI] [PubMed] [Google Scholar]
3. Omoumi P, Rubini A, Dubuc J-E, Vande Berg BC, Lecouvet FE. Diagnostic performance of CT-arthrography and 1.5T MR-arthrography for the assessment of glenohumeral joint cartilage: a comparative study with arthroscopic correlation. Eur Radiol. 2014 doi: 10.1007/s00330-014-3469-2. [DOI] [PubMed] [Google Scholar]
4. Guermazi A, Jomaa N, Hayashi D, Jarraya M, et al. MR arthrography of the shoulder: Optimizing pulse sequence protocols for the evaluation of cartilage and labrum. Eur J Radiol. 2014;83(8):1421-1428. doi: 10.1016/j.ejrad.2014.04.030. [DOI] [PubMed] [Google Scholar]
5. Jarraya M, Roemer FW, Gale HI, Landreau P, D'Hooghe P, Guermazi A. MR-arthrography and CT-arthrography in sports-related glenolabral injuries: A matched descriptive illustration. Insights Imaging. 2016 doi: 10.1007/s13244-015-0462-5. [DOI] [PMC free article] [PubMed] [Google Scholar]
6. Stephen E.; Kaarre, Janina MD; Steuer, Fritz BS, Herman, Zachary J. Anterior Glenohumeral Instability Clinical Anatomy, Clinical Evaluation, Imaging, Nonoperative and Operative Management, and Postoperative Rehabilitation. The Journal of Bone and Joint Surgery .107(2)
7. Aswathi P, Dwivedi A, Choudhary SS .Role of Magnetic Resonance Arthrography (MRA) in the Diagnosis of Shoulder Injuries .Advanced Biomedical Research.2025;14(1):55
8. Hegedus E.J., Goode A., Campbell S., Morin A., Tamaddon M., Moorman C.T., III, Cook C. Physical examination tests of the shoulder: A systematic review with meta-analysis of individual tests. Br. J. Sports Med. 2008;42(2):80-92.
9. Beighton P., Horan F. Orthopaedic aspects of the Ehlers-Danlos syndrome. J. Bone Joint Surg. Br.1969;51(3):444-453
10. Joshi UP, Puri S. Clinical ,MRI and Arthroscopic correlation in anterior and posterior shoulder instability. Int J Res Med Sci .2014 Aug ;2(3):857-860
11. Farber A.J., Castillo R., Clough M., Bahk M., McFarland E.G. Clinical assessment of three common tests for traumatic anterior shoulder instability. J. Bone Joint Surg. Am. 2006;88(7):1467-1474.
12. Gerber C., Ganz R. Clinical assessment of instability of the shoulder. With special reference to anterior and posterior drawer tests. J. Bone Joint Surg. Br. 1984;66(4):551-556
13. Dwivedi A, Sharma R 2, Sharma A 1, Gupta P. Evaluation of Shoulder Injuries: A Comparative Study of Imaging by Magnetic Resonance Imaging (MRI) and Magnetic Resonance Arthrography (MRA) .J Pharm Bioallied Sci.2024 Apr 16;16(Suppl 2):S1494-S1497.
14. Hawkins R.J., Schutte J.P., Janda D.H., Huckell G.H. Translation of the glenohumeral joint with the patient under anesthesia. J. Shoulder Elbow Surg. 1996;5(4):286-292.
15. Gupta A, Agarwal A, Kumar S, Raghuvanshi S, Siddiqui F. Correlation between clinical, MRI and arthroscopic findings in various shoulder joint disorder. International journal of Research in Orthopedic.2025;11(6)
16. Dr.Srinivas Y, Dr.Srikanth G, Dr.Santosh Sekar and Dr.ME Luthar .A Clinical radiological and arthroscopic correlation in various shoulder pathologies :A prospective study . Int.J.Orthop.Sci.2018 ;(3):294-297
17. Sharma Y, Iqbal MS, Sud AD, Sharma P, Magar MT. Accuracy of Magnetic Resonance Imaging of the Shoulder in

- Evaluation of Anterior Shoulder Instability. Journal of Marine Medical Society .2019; (1)p15-18,21
18. LL Seeger, RH Gold, LW Bassett. Magnetic resonance imaging of glenohumeral joint disease. BMC Musculoskeletal Disord. 2025 Apr 16; 26:368
 19. 19 Jobe FW, Kvitne RS, Giangarra CE. Shoulder pain in the overhand or throwing athlete: The relationship of anterior instability and rotator cuff impingement. Orthop Rev. 1989; 18:963-975
 20. Valencia Mora M., Ruiz Ibán M.A., Diaz Heredia J., Gutiérrez-Gómez J.C., Diaz R.R., Aramberri M., Cobiella C. Physical Exam and Evaluation of the Unstable Shoulder. Open Orthop. J. 2017; 11
 21. Kraeutler MJ, McCarty EC, Belk JW, Wolf BR, Hettrich CM, Ortiz SF, MOON Shoulder Instability Group. Bravman JT, Baumgarten KM, Bishop JY, Bollier MJ, Brophy RH, Carey JL, Carpenter JE, Cox CL, Feeley BT, Grant JA, Jones GL, Kuhn JE, Kelly JD, Ma CB, Marx RG, Miller BS, Sennett BJ, Smith MV, Wright RW, Zhang AL. Descriptive Epidemiology of the MOON Shoulder Instability Cohort. Am J Sports Med. 2018 Apr; 46(5):1064-1069.
 22. A Mistry¹, AP Tomst¹. Radiological assessment of shoulder instability. Imaging Med. 2011; 3(5)
 23. Moya D, iAydin N, Yamamoto N, Simon JP, Robels PP, Strong GT et al. Current concept in anterior glenohumeral instability : diagnosis and treatment SCIoT. J. 2021; 7:48
 24. Lo IKY, Nonweiler B, Woolfrey M, Litchfield R, Kirkley A. An Evaluation of the Apprehension, Relocation, and Surprise Tests for Anterior Shoulder Instability The American Journal of Sports Medicine, Vol. 32, No. 2, pp. 301-307
 25. 25. Varacallo AM, Musto AM, Mair SD. Anterior Shoulder Instability
 26. Jaggi A, Alexander S. Rehabilitation for shoulder instability-Current Approaches. Open Orthop J. 2017; 11:957-971
 27. Buss DD, Lynch GP, Meyer CP, Huber SM, Freehill MQ. Nonoperative management for in-season athletes with anterior shoulder instability. Am J Sports Med. 2004 Sep; 32(6):1430-3.
 28. McFarland E.G., Torpey B.M., Curl L.A. Evaluation of shoulder laxity. Sports Med. 1996; 22(4):264-272
 29. Di Giacomo G, de Gasperis N, Scarso P. Bipolar bone defect in the shoulder anterior dislocation. Knee Surg Sports Traumatol Arthrosc. 2016 Feb; 24(2):479-88.
 30. Zacchilli MA, Owens BD. Epidemiology of shoulder dislocations presenting to emergency departments in the United States. J Bone Joint Surg Am. 2010 Mar; 92(3):542-9..
 31. Tzannes A, Murrell GA. Clinical examination of the unstable shoulder. Sports Med. 2002; 32(7):447-57.
 32. Leroux T, Wasserstein D, Veillette C, Khoshbin A, Henry P, Chahal J, Austin P, Mahomed N, Ogilvie-Harris D. Epidemiology of primary anterior shoulder dislocation requiring closed reduction in Ontario, Canada. Am J Sports Med. 2014 Feb; 42(2):442-50.
 33. Krikley A, Litchfield R, Thain L, Spouge A. Agreement between magnetic resonance imaging and arthroscopic evaluation of shoulder joint in primary anterior dislocation of the shoulder. Clin J Sport Med. 2003; 13(3):148-151
 34. Owens BD, Duffy ML, Nelson BJ, DeBerardino TM, Taylor DC, Mountcastle SB. The incidence and characteristics of shoulder instability in the United States Military Academy. Am J Sports Med. 2007; 35 (7):1168-1173

Tables: (Original Data Gathered From This Particular Study)

1. Number and Gender Distributions of Patients Distributions (M=Male, F=Female)			
Modality	Total Number	Positive	Negative
Clinical	49 [M=39(79%), F=10, (21%)]	28 (57.14%) [M=24(85.715%), F=4(14.28%)] Mean Age= 26.5 Years	21
Mri	49 [M=39(79%), F=10, (11%)]	32(65.3%) [M= 30(93.75%), F=2	17

		(6.25)] Mean Age= 27.01 Years	
Mra	38[M=32(84.21%),F=6(15.78%)	31(81.57%)[M= 27 (87.09%),F=4(12.90%)] , Mean Age= 25.49 Years	7

2. Causative Events (Etiology) of Shoulder Dislocations

Etiology (For Instability Positive Patients)	Clinically Positive (N=28)	Mri Positive (N=32)	Mrapositive (N=31)
Fall (Outstretched Hand And Directly On Shoulder)	11(39.28%)	13(40.62%)	11(40.74%)
Direct Trauma	8	10	10
Trauma In Abduction And External Rotation	4	3	4
Over Head Activities	2	3	3
Atheletic Activities (Not Specified)	3	3	3

3. Pattern of Clinical Presentations

Chief Complains	Clinically Positive = 28	Mri Positive=32	Mra Positive=31
Recurrent Dislocation	12(42.85%)	20(62.5%)	18(58.06%)
Single Dislocation	9(32.14%)	9(28.1%)	10(32.22%)
Episodes Of Subjective Instability	5 (17.85%)	3 (9.37%)	1(3.2%)
Pain(Vas >6) & Disrupted Shoulder Rom	2 (7.14%)	1(3.12%)	2(6.45%)

4. Results of Laxity (Grade 2, Grade 3) and Provocative Tests

TOTAL (N=49)	CLINICALLY (+)=28	MRI(+):(N=32)	MRA(+):(N=31)
ANTERIOR DRAWER TEST	21	21	18
ANTERIOR APPREHENSION TEST	28	25	24
JOB'S RELOCATION	26	24	23
SURPRISE /RELEASE TEST	26	24	24

5. Correlation of Anterior Drawer Test Revealing Grade 2 and Grade 3 Laxity (Ligamentous Laxity Accounting Shoulder Instability) with Mri Diagnosis

Test (Anterior Drawer)(Grade 2,Grade-3)	Mri(+)	Mri(-)	Total
+	18(Tp)	3(Fp)	21
-	14(Fp)	14(Tn)	28
	32	17	49(N)

SENSITIVITY = 56.25 %, SPECIFICITY= 82.35% ,PPV=85.71%, NPV=50%, LR (+) =3.19,L.R(-)=.53
 ACCURACY= 65.31%[95% CI] ; Cohens kappa =.335 (fair agreement) ,S. E of Kappa=0.119, 95% C.I= 0.102 to 0.568(C.I= Confidence interval)

6. Correlation of Anterior Drawer Test (Revealing Grade 2 and Grade 3 Laxity) with MRA Diagnosis

Anterior Drawer Test(Grade 2,Grade 3)	Mra+	Mra-	Total
+	14	4	18
-	17	3	20
	31	7	38

SENSITIVITY= 45.16%, SPECIFICITY=42.86%,+LR=.79,-LR=1.28,PPV=77.78%, NPV=15.00%,ACCURACY=44.74%, [95% CI] Cohen's kappa= 0.070,(SE of kappa =0.122,95% C.I=0.309-0.170)

7. Correlation between Clinical Diagnosis and Mri of 49 Patients [Prevalance =65.31%]

Test	Mri(+)	Mri (-)	Total (N)
Clinical (+)	25 (Tp)	3(Fp)	28
Clinical(-)	7 (Fn)	14 (Tn)	21
	32(65.3%)	17	49

8. Correlation of between Clinical Diagnosis and Mra of 38 Patients [Prevalance =81.58%]

Test	Mra (+)	Mra(-)	Total
Clinical(+)	24 (T.P)	4(F.P)	28
Clinical(-)	7(F.N)	3(T.N)	10
	31 (81.57%)	7	38

9. Correlation Between Mri and Mra As Single Radiological Modality (Structural Defect Detected by Any of Mri Or Mra Is Considered Radiologically Positive) with Clinical Diagnosis, [Prevalance=86.84%]

Test	(Mra+Mri) Positive	(Mra+Mri)Negative	Total
Clinical(+)	27(T.P)	1 (F.P)	28
Clinical(-)	6(F.N)	4(T.N)	10
	33(86.74%)	5	38

10. Correlation of Clinical Diagnosis in Respect to Mri and Mra To Detect Shoulder Instability

	SENSITIVITY	SPECIFICITY	PPV	NPV	+LR	-LR	ACCURACY	COHEN'S KAPPA
MRI	78.125%	82.35%	89.29 %	66.67 %	4.43	0.27	79.59%	K=0.573(S E Of Kappa 0.118 95% CI=0.341 To 0.804)
MRA	77.42%	42.86 %	85.71 %	30.00 %	1.35	0.53	71.05 %	K=0.174 (SE Of Kappa 0.174) (95% CI=0.166 To 0.434)
MRI +MRA	81.82%	80.00%	96.43 %	40.00 %	4.09	0.23	81.58%	K=0.434 (S.E=0.169, 95% CI=0.102 To 0.766)

[ABBREVIATIONS : TP =True positive, TN =True negative, FP=False positive , FN =False negative ,
PPV=Positive predictive value , NPV= Negative predictive value , LR = Likelihood ratio ,SE= Standard
error , CI= Confidence interval]