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ASSESSMENT OF FACTORS ASSOCIATED WITH THE DECISION OF SURGERY FOR GLENOHUMERAL INSTABILITY : A TERTIARY CARE CENTRE STUDY

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ABSTRACT Glenohumeral instability is a heterogeneous shoulder condition, in terms of clinical presentation, structural pathology and management. The factors responsible for eventual surgery in glenohumeral instability need to be addressed. **Objective** of this Observational, Cross-sectional , Comparative study is assessing the factors responsible for eventual surgery in glenohumeral instability in the context of demographics ,frequency, etiology, direction, severity, sports participations . **Method** wise history of demographics , Frequency , Etiology, Direction , Severity of instability , surgical intervention were taken from 96 patients with glenohumeral instability who were physically examined and followed up to 6 months to record the occurrences of surgery. Subsequently 96 patients were divided into two groups , one group needed surgical intervention and the other did not . Data collected were analyzed statistically for significant differences between these two groups with the primary outcome of surgery using Pearson 's chi square tests. **Results** revealed Male and female among 96 qualified patients , out of 200 evaluated patients ,were 81.25% and 18.75% respectively. Surgery was required in 78.57% of 56 younger patients (</= 25 years) which were more common than older patients (>25 years) and 64.29% of 56 sportsperson, which were more than the proportion of non sports person . Instability requiring surgery were commonly traumatic (62.67% of 75 traumatic instability), frequent,>5episodes/ year, (90.00% of 20 frequent instability) sustained by sports related trauma (64.70% of 51 trauma), symptomatic (76.56% of 64 symptomatic instability). So to **Conclude**, Young age (≤ 25 years) , sports activity , traumatic injury, sports related trauma, frequent episodes (>5episodes/ year) and associated symptoms like pain , restricted range of motion ,and functional compromise are the factors resulting in surgery .

KEYWORDS : Instability , Factors , Surgery ,Trauma

INTRODUCTION

Glenohumeral instability, heterogenous in terms of structural pathologies, mechanism of injury, clinical presentation management strategies, is common in young active population , exposure to sporting activity and results in long term health determent, lifestyle modification, missed performances and reduced training in sports personal [3,4,5]. As per literatures the key factors involved in surgical intervention , would be young age , overhead activity , contact sports, active military training , climbing ,presence of generalized laxity etc [15] . Traumatic instability causes significant tissue damage , pain, and apprehension. Conversely, atraumatic instability caused by repetitive injuries presents with symptomatic complaints. The onset of pathology significantly influences management.

Shoulder instability may vary from subtle subluxation which can be reduced spontaneously, to frank dislocation with complete separation of the articular surfaces and requires a specific movement or manual reduction to relocate.

Anterior instability accounts for up to 95% of traumatic instability. Gleno- labral complex and capsule may even be detached from the glenoid rim by trauma , which would eventually require surgical . Posterior instability accounts for less than 5% of traumatic shoulder dislocations but require surgery more frequently than anterior . [12,13,14]

Hence FEDS variables ,frequency ,etiology ,direction , severity along with ,age , sports participation , mechanism of injury , ligamentous laxity , were selected as possible variables to influence the decision of surgery . FEDS classification system was developed by Kuhn ,with substantial to excellent intra observer as well as inter observer agreement, for 4 individual factors . It is also able to identify the natural history of shoulder instability and to inform about treatment options [1,2].

AIMS AND OBJECTIVES

To assess the factors which may predict the requirement of surgical intervention for glenohumeral instability in the context of FEDS Classification system (frequency ,etiology ,direction ,severity) along with demographics , sports involvement. This study tends to observe statistically whether the measured parameters have any significant differences between surgically treated and nonsurgically (conservatively) treated patients

METHODS AND MATERIALS

Participants :

In this OPD based study ,average 2 patients with suspected shoulder instability were found out of 10 to 12 patients with shoulder symptoms attending each of 2 OPD s per week .Over 12 months duration 96 patients of both sexes ranging from 14 years to 56 years were selected by clinical evaluation , after screening 200 patients for obvious sign and symptoms of instability ,apprehension with provocative test positive, surgically corrected , manually reduced and self reduced instability and radiological evidence with history of shoulder instability. Patients , without at least one episode and history of frequency , etiology, direction and severity of instability [1,2,3] , with long bone fracture around shoulder girdle , scapular dyskinesia , central or peripheral nervous system pathology were excluded .Patients were followed up to 6 months .

Study Definition:

Four parts of the FEDS system have the following definitions. “Frequency” is defined as the number of instability episodes in preceding year. There are 3 possibilities: solitary (1 episode), occasional (2-5 times/year), and frequent (>5 times/year). “Etiology” is related to history of trauma. If the first episode of instability caused by injury, it was considered to be traumatic as opposed to atraumatic. “Direction” is related to the primary direction of instability and can be anterior, posterior, or inferior. Provocative testing in the clinic can be used to determine the direction that most closely replicates the patient's symptoms. Finally, “severity” is either a dislocation or a subluxation. If the patient needed assistance at any time to reduce the shoulder, this was considered a dislocation. Self-directed reduction maneuvers were considered subluxations [1,2,3].

Study Design:

In this observational study ,after obtaining institutional ethical committee clearances and written informed consents from each

participants ,96 participants were questioned about demographics like, age of first instability , occupation , sports involvement ,instability characteristics like mechanism of injury , affection of dominant shoulder , symptoms of generalized joint laxity , pain , compromised shoulder function ,requirement of surgical interventions and frequency ,etiology , directions and severity of glenohumeral instability ,depicted in study definition[1,2,12] .Physical examination and Provocative tests were performed to confirm the presence of instability and primary direction of instability where necessary. Signs of liamentous laxity was not graded instead were categorized as present or absent based on clinical evaluation[3] . Patients were followed up to six months to keep record if any surgical intervention was needed for shoulder instability .Management of instability were entirely done by respective doctors ,blind of the study details . Subsequently , Patients were divided into two groups depending on the occurrence of surgery from the beginning of instability till the end of 6 months follow up . Surgically treated patients were included in one group and non surgically using pharmacology , physical rehabilitation , manual reduction , treated patients were incorporated in another group . All data points were considered as possible associated factors and were compared between these two groups to find if significant differences exist with occurrence of surgery as the primary outcome[3,4,5] .

Calculation

Data were collected from history and physical examination and were analyzed by Microsoft Excel . Different Statistical tools and techniques like means , standard deviation **,**chi square test, 95 % Confidence interval (C.I.) ,Odds ratio etc. were used to analyze data which were expressed numerically as well as in percentages. To test the significance of difference of considered variables between two groups ,Pearson's chi square Statistics were used . Statistical significance tests were conducted at 5 % level of significance.

RESULTS

Total 96 (48%) patients selected from 200 screened patients with suspected shoulder instability comprised of 78 (81.25%) male and 18 (18.75%) female . No statistically significant difference was observed between proportions of male (56.41% of 78) and female (44.44% of 18 female), undergone surgery .(P > 0.05)

Average age of study population at first instability was 26.8 years (Range 14 to 56 years). Mean age ± S.D was 23 .7 ±7.48 years in surgical group and 30.4 ±9.20 years in non surgical group . Patients with ≤ 25 years of age ,required surgery was 78.57% of 56 total </=25 years and 20.00 % of 40 patients of >25 years .Rest of both age group were treated nonsurgically. This difference was observed to be statistically significant (P< 0.05) , In 96 patients , 58.33% or 56 were involved in contact and physically demanding sports and 41.67% had no sports associations . Surgery was required in 64.29% of 56 sports person and 40.00% of 40 non sports person. This difference was observed to be statistically significant (p<0.05).

Non sports related instability was found in 40 (41.67% of 96) patients which comprised of 9, (9.37%) patients involved in weight lifting of whom, 6 (66.66%) required surgery , 9 (9.37%) manual labour with 4 (44.44%) treated surgically , 7 (7.29%) defense employees with 2 (28.57%) surgically intervened , 5 (5.21%) driver with 2 (40%) needed surgery , 4 (4.17 %) office worker of whom 1(25%) needed surgery and 6 (6.26%) house wives with 1 (16.66%) treated surgically . No statistically significant differences were observed among the proportion patients involved in different activities ,requiring surgery (p>0.05).

Dominant and non dominant shoulder out of total 96 instability were affected in 62 (64.58 %) and 34 ,(35.42%) patients respectively . Dominant shoulder affection requiring surgery was 54.84% of 62 dominant shoulder and 52.94% of 34 non dominant shoulder was treated non surgically. This difference was observed statistically insignificant (p>0.05).

Generalized ligamentous laxity (clinically) was found in 28 ,that is 29.16% of total 96 patients and 57.14% of 28 patients needed surgical treatment and 52.94 % of 68 patients without ligamentous laxity needed surgery . This difference was not statistically significant (p>0.05).

Out of a total of 96 instability ,number and % of patients with and without symptoms were 64, (66.66%) and 32 (33.34%) respectively. Surgery was required in 76.56% of 64 symptomatic and 9.37% of 32 asymptomatic instability ,This difference observed was statistically significant (p<0.05)

Among 55 patients with known injury mechanism , 18 (32.72 %) fell on outstretched hand, 55.55% of whom needed surgery . Overhead activity initiated 13 (23.64% of 55) instability, of whom 38.46% were treated surgically . Weight lifting caused instability in 11 (20% of 55) of whom 45.45% had surgery .Out of 13 (23.63% of 55) patients with direct trauma, 53.84% were intervened surgically. No statistically significant differences (p>0.05) was observed among mechanisms.

Out of 96 patients , 38 (39.58%) had solitary , 38 (39.58%) occasional and 20 (20.84%) had frequent instability . Surgical treatment was needed in 26.32% of 38 solitary ,63.15 % of 38 occasional and 90% of 20 frequent instability. Conservative treatment were provided in 73.68% solitary, 36.85% occasional and 10% frequent instability The proportion of patient with frequent instability treated surgically (90%) and solitary instability ,treated nonsurgically were higher than other instabilities treated surgically and non surgically respectively. These differences were statistically significant (p<0.05)

Among 96 instabilities ,75 (78.13%) was traumatic and 21 (21.78%) non traumatic . Surgery were done in in 62.67% of 75 traumatic and 23.81% of of 21 nontraumatic patients **.** Rest 76.19% nontraumatic and 37.33 % traumatic instability were treated non surgically .This diffe**re**nce observed was statistically significant.(p <0.05)

Sports related trauma was found in 51 ,68% of 75 traumatic instability , of which 64.70% were treated surgically, and 35.30% non surgically . Among 24 non sports related trauma ,37.50% were treated surgically and 62.50% non surgically. Statistically significant difference was observed between the proportion of sports and non sports persons requiring surgery (p<0.05)

Among 96 patients ,75 (78.13%) anterior , 16 (16.66%) posterior and 5 (5.20%) inferior instability were found. Surgical were required in 53.34 % of 75 anterior , 68.80 % of 16 posterior and 20% of 5 inferior instability . No statistically significant differences were observed in the proportion of directions of instability requiring surgery ,(p> 0.05)

Dislocation and subluxation were found in 42 (43.75 %) and 54 (56.25 %) patients respectively .The surgical group comprised of 54.76 % of 42 dislocation and 53.70 % of 54 subluxation. No statistically significant differences observed between dislocation and subluxation treated surgically a (P > 0.05).

Table 1: The Results Are Summarized In The Following Table

Variables		Total	Surgery required	Surgery not required	Chi square (χ^2)	P value	Odd ratio (95 % confidence interval)
		Number (%)	Number (%)	Number (%)			
Sex(n =96)	Male female	78 (81.25%) 18(18.75%)	44 (56.41%) 8 (44.44%)	34 (43.59%) 10 (55.56%)	0.843	p>0.05	
Age(yrs) (n =96)	≤ 25 >25	56(58.33%) 40(41.67%)	44(78.57%) 8(20%)	12(21.43%) 32 (80%)	32.243	P<0.05	14.67 (5.37-40.0)
Dominant shoulder affection (n=96)	Yes No	62(64.58) 34(35.42%)	34,(54.84%) 18,(52.94%)	28,(45.16%) 16,(47.05 %)	0.031	P>0.05	
Signs of ligamentous laxity (n=96)	Yes No	28(29.17%) 68(70.83%)	16(57.14%) 36(52.94%)	12(42.86%) 32(47.06%)	0.141	p>0.05	
Profession (n=96)	Sports person Non sports person	56(58.33%) 40(41.67%)	36(64.29%) 16(40.00%)	20(35.71%) 24(60.00%)	5.543	P<0.05	2.70 (1.70- 6.22)

Mechanism of injury (where definite history found) (n =55)	Fall on outstretched hand Over head activity Heavy weight lifting Direct trauma	18(32.72%) 13(23.63%) 11(20.00%) 13(23.63%)	10(55.55%) 5(38.46%) 5(45.45%) 7(53.84%)	8(44.45%) 8(61.54%) 6(54.55%) 6(46.16%)	1.064	p>0.05	
Symptoms associated with instability (n=96)	Present Absent	64(66.66%) 32(33.34%)	49(76.56%) 3(9.37%)	15(23.44%) 29(90.63%)	38.79	P<0.05	31.58 (8.42-118.43)
Frequency (n=96)	Solitary Non solitary (occasional and frequent)	38(39.58%) 58(60.42%)	10(26.32%) 42(72.41%)	28(73.68%) 16(27.58%)	19.652	P<0.05	7.350 (2.91-18.50)
	Occasional Non occasional (solitary and frequent)	38(39.58%) 58(60.42%)	24(63.15%) 28(48.27%)	14,(36.85%) 30(51.73%)	2.048	p>0.05	
	Frequent Non frequent (solitary and occasional)	20(20.84%) 76(79.16%)	18(90.00%) 34(44.74%)	2(10.00%) 42(55.26%)	13.066	P < .05	4.235 (8.74-20.50)
Etiology (n=96)	Traumatic Nontraumatic	75(78.13%) 21(21.87%)	47(62.67%) 5 (23.81%)	28(37.33%) 16(76.19%)	9.977	P<0.05	5.37 (1.77-16.26)
Traumatic instability (if related to sports) (n=75)	Sports related Non sports related	51(68%) 24(32%)	33(64.70%) 9(37.50%)	18(35.30%) 15(62.50%)	4.902	P<0.05	3.055 (1.11-8.35)
Directions (n=96)	Anterior Other (posterior and inferior)	75 (78.13%) 21 (21.87%)	40(53.40%) 12(57.14%)	35(46.60%) 9(42.86%)	0.095	p> 0.05	
	Posterior Others (anterior and inferior)	16 (16.66%) 80 (83.34%)	11(68.70%) 41(51.25%)	5(31.30%) 39(48.75%)	1.164	p>0.05	
	Inferior Others (anterior and posterior)	5(5.20%) 91(94.80%)	1(20.00%) 51(56.04%)	4(80.00%) 40(43.96%)	2.480	p>0.05	
Severity (n=96)	Dislocation Subluxation	42(43.75%) 54(56.25%)	23(54.76%) 29(53.70%)	19(45.24% 25(46.30%)	0.017	p>0.05	

Solitary , occasional ,frequent instability in surgical group were 26.31% , 63.15% and 90% respectively where as in non surgical group the same were 73.68%, 36.89% and 10% respectively . The application of chi square were done by forming 2x2 contingency table considering the variables (1) Solitary, non solitary (2) occasional ,non occasional and (3) frequent , non frequent .

DISCUSSION

This study investigated the factors potentially responsible for surgery in shoulder instability .Lebus et al has a novel study on same subject where he used FEDS Classification [4, 14,] variables to compare between surgical and non surgical group.

Our study population comprised of 81.25 % male and 18.75% female and mean age +/- standard deviation of first instability in surgical group was 23.7 +/-7.48 years which Lebus et al. reported as 22 + /- 15 years , but had 72% male and 28% female in whole cohort . Average age of surgically treated patients was 25 years and male ,female proportion 82% and 18% respectively in J.A.Magnuson et al. study .Like Lebus et al. significantly higher proportion of surgery was found in younger patients (</=25 years) [3,6] .

Our study population revealed 64.58% affection of dominant shoulder and 29.17% generalized ligamentous laxity clinically . Cameron et al. found statistically significant correlation between ligamentous laxity (BHS >2) and glenohumeral instability.[(19).] Moon shoulder instability study showed 52% affection of dominant shoulder and 13% generalized laxity (BHS > 4). But like Lebus et al. no significant difference found in surgical and non surgical group regarding these characteristics [3,12,14].

Consistent with Lebus et al., significantly higher proportion of sports person and sports related trauma required surgery , in present study . Balg and Boileau who developed Instability severity index score, found younger age , competitive and contact sports activity , hyperlaxity as risk factors for instability after arthroscopic stabilization .According to Shrinivasan et al . [18]overhead activity , contact sports, climbing should be considered for surgical management [13].

No significant differences was found among various direction of instability in occurrence of surgery . Though Lebus .et al found significantly higher proportion of surgery in posterior instability .Same was found by Song et.al in their arthroscopic stabilization patients. This difference may be the result of small sample size of our study [3,17].

Our study found frequent instability as a deciding factor for surgery. Dickens et al considered recurrence in planning of surgery for instability [13]. Kuhn described frequency as an indirect measure of the severity of pathology [1,2] Sofu et al. emphasizes on surgical intervention for recurrent instability.

Surgical intervention (62.6%) was significantly more frequent in traumatic instability than non traumatic , which is consistent with Lebus et.al and Hettrich et al study .Isolated to quadruple intra articular lesion in posttraumatic shoulder instability was described by . Habermeyer *et al*. to aid surgical planning [3,4,16] .

Surgical patients of present study was comprised of 54.76% dislocation and 53.70% subluxation ,with no significant differences .J.A .Magnuson et al. found 54.6% subluxation and 45.6% dislocation , similar with ours .But Owens et al. findings of 15.4% dislocation , 84.6% subluxations which was inconsistent [6,9] .

MOON 's study reported inferior impression of shoulder function preoperatively reflected by mean ASES (72.4) ,WOSI (43.3) etc .In congruence with it ,symptomatic instability was found to have more surgical implication in present study [12].

Factors based on clinical evaluation were analyzed statistically for significance as a predictor of surgery . Demographic factors , FEDS classification variables [1,2], sports participations were critical in deciding surgery for instability [3,6] . A realistic management strategy considering the requirement of surgery for glenohumeral instability can be planned based on this study findings.

Small sample size, limited study duration, not using appropriate statistical means due to resource constraints were limitations of this study.

CONCLUSION

This Study concludes that young ,active patients with </= 25 years , involved in contact or physically demanding sports, traumatically caused , symptomatic ,frequent shoulder instability required surgery in significantly higher proportion .Hence proper history taking considering then mentioned factors along with physical examination helps to plan a comprehensible management strategy in an easier way .It is specifically helpful in predicting if surgery is eventually needed for glenohuneral instability.

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