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Psychosocial Factors Play a Greater Role in Preoperative Symptoms for Patients with Atraumatic Shoulder Instability: Data from the MOON-Shoulder Instability Group

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Abstract

Background: Previous studies have demonstrated that psychosocial factors and comorbid depression are associated with worse preoperative baseline measures, clinical outcomes, and recovery in patients undergoing shoulder surgery. It is unknown whether this potential link would differ between those with traumatic vs. atraumatic shoulder instability, as symptoms may persist longer in atraumatic instability prior to surgical intervention. The purpose of this study was to determine if psychosocial factors and/or comorbid depression more heavily influence preoperative symptoms for patients with traumatic vs. atraumatic shoulder instability.

Methods: Prospective baseline data from 1552 patients in the Multicenter Orthopaedic Outcomes Network (MOON) Shoulder Instability cohort were analyzed based on mechanism of injury while controlling for age, sex, and direction of instability. Multivariable linear regressions were

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performed to determine whether psychological factors (RAND 36 Mental Component Score (MCS), Depression Diagnosis, PAS-22) were predictive of preoperative American Shoulder and Elbow Surgeons (ASES) and Western Ontario Shoulder Instability Index (WOSI) scores in the atraumatic group. The same model was repeated for the traumatic instability group, and the model fit was compared between groups with $p < 0.05$ considered statistically significant.

Results: Female sex and lower MCS were significantly associated with worse preoperative ASES and WOSI scores for the group with atraumatic instability (ASES $r^2=0.15$, $p<0.001$; WOSI $r^2=0.17$, $p<0.001$). The same model performed significantly worse ($p<0.05$) for both ASES and WOSI scores in the group with traumatic instability (ASES $r^2=0.07$, WOSI $r^2=0.08$).

Conclusions: Worse preoperative psychosocial factors were found to be more strongly associated with shoulder-related pain and function for patients with atraumatic instability. Across multiple orthopedic conditions, depression and emotional wellbeing have been associated with worse preoperative symptoms and inferior postoperative patient-reported outcomes. Despite the stronger and significant association in atraumatic patients, worse psychosocial factors did not have as large of an impact as has been seen in other more chronic conditions such as osteoarthritis or rotator cuff tears. In addition to medically optimizing patients prior to surgery, the current findings identify a subset of shoulder instability patients that may benefit from a behavioral health intervention either prior to surgery or early in the postoperative period to potentially improve postoperative outcomes.

Level of evidence: Level III; Retrospective Cohort Comparison; Prognosis Study

Keywords

MOON Shoulder instability; psychosocial factors; PROs; atraumatic; traumatic

Psychosocial factors and comorbid depression influence preoperative baseline measures, clinical outcomes, and recovery for those undergoing shoulder surgery.[4, 9, 12] Greater levels of psychological distress have been associated with inferior baseline patient self-assessment of shoulder pain and function in patients with full-thickness rotator cuff tears.[12] Additionally, depression and psychological distress have been associated with increased opioid consumption in the early postoperative period[9] as well as a greater prevalence of prolonged opioid use more than 180 days after surgery.[4] Greater levels of depression and lower mental health scores have been associated with shoulder instability in the presence of comorbid back pain.[5] However, because of potential differences in etiology, severity, and chronicity, it is unknown whether the link between psychosocial factors and preoperative pain and symptoms differs between those with traumatic vs. atraumatic instability.

The purpose of this study was to determine if psychosocial factors and/or comorbid depression more heavily influence preoperative symptoms for patients with traumatic vs. atraumatic shoulder instability. Worse baseline mental health has been associated with chronic conditions of the shoulder like osteoarthritis and rotator cuff tears.[12] Given the similar chronic nature of atraumatic shoulder instability, there is reason to believe that patients with this type of instability may present with similar greater levels of psychological distress compared to patients who have a less chronic condition like traumatic instability. We hypothesized that greater associations would be found between psychosocial factors and

comorbid depression and preoperative shoulder-related pain and symptoms for patients with atraumatic instability than patients with traumatic instability when controlling age, sex, and direction of instability.

Methods:

Study Design

The Multicenter Orthopaedic Outcomes Network (MOON) Shoulder Instability study is an institutional review board (IRB) approved prospective cohort of patients enrolled and undergoing operative treatment for shoulder instability by 26 sports medicine or shoulder fellowship-trained surgeons. This multicenter study involved 9 private and academic groups across the United States. Kraeutler et al has previously described the epidemiology of the cohort.[10] Baseline demographic characteristics, physical examination data, patient-reported outcome (PRO) scores, and preoperative imaging were collected. Operative findings and procedures performed were recorded by MOON surgeons after surgery.[11] Data were recorded using Teleform (OpenText, Waterloo, ON, Canada) or REDCap (REDCap, Nashville, TN, USA).[7]

Participants

The cohort included 1552 patients with complete preoperative data, and patients were categorized based on self-reports of whether the mechanism of shoulder instability was traumatic (n=1266) or atraumatic (n=286).[11] In the MOON preoperative form, patients specifically answered the following question: “Did you have an injury that started your shoulder problem?” A “yes” answer would categorize the patient into the traumatic subset and a “no” answer would categorize the patient into the atraumatic subset.[11] In the traumatic subset, the first dislocation was the direct result of the physical injury. Patients of the traumatic instability subset were still categorized in the same traumatic subset even if this injury resulted in multiple later dislocations.

Data collection

PROs were collected and included the American Shoulder and Elbow Surgeons (ASES) score, Western Ontario Shoulder Instability Index (WOSI), the Mental Component Score (MCS) of the RAND 36 Item Short Form Health Survey SF-36, the Personality Assessment Screener (PAS-22), or a self-reported diagnosis of depression. Age, sex, and direction of instability were also recorded. A primary direction was established for each patient as anterior, posterior, or inferior.

Statistical analysis

Multivariable linear regressions (forward variable selection $p<0.05$) were performed to determine whether psychological factors (MCS, Depression Diagnosis, PAS-22) were predictive of preop ASES and WOSI score in the atraumatic group, controlling for age, sex, the direction of instability (anterior, posterior, or multidirectional), and diagnosis of Ehlers Danlos Syndrome. To account for multiple comparisons, an alpha level of $p < 0.0042$ was considered statistically significant (0.05 divided by 12 demographic and patient-reported outcome variables). The same model was repeated for the traumatic instability group, and

the model fit was compared between groups using the methods described by Cohen, Cohen, and West with $p < 0.05$ considered statistically significant.[3] A significant finding would be indicative of the model fitting significantly better in one patient group than the other.

Results:

Demographic characteristics and history

1552 patients had complete preoperative data and were categorized based on self-reports of whether the mechanism of shoulder instability was traumatic (n=1266) or atraumatic (n=286). The patients with atraumatic shoulder instability tended to be older, more often female, with an increased prevalence of self-reported depression (Table I). The atraumatic group had significantly fewer dislocations but reported symptoms for a significantly longer period of time prior to surgical stabilization. These patients also had a significantly greater prevalence of posterior or inferior instability and significantly worse PAS22 and ASES scores. WOSI (p=0.10) and MCS scores (p = 0.005) were not statistically significantly different between groups.

Multivariable regressions of patient-reported outcomes

After controlling for age, sex, the direction of instability, and Ehlers Danlos Syndrome diagnosis, female sex and lower MCS were significantly associated with worse preoperative ASES and WOSI scores for the group with atraumatic instability (ASES r^2=0.15, p<0.001; WOSI r^2=0.17 p<0.001; Table II). The model performed significantly worse for both ASES and WOSI scores in the group with traumatic instability (ASES r^2=0.07, WOSI r^2=0.08; Table III). The difference between the model fit in the atraumatic and the traumatic groups was statistically significant (p<0.05 for both ASES and WOSI), indicating that this model based on preoperative psychosocial scores was stronger in the atraumatic population.

Discussion:

This study found that in patients with shoulder instability, differences exist in the degree to which preoperative psychosocial factors are associated with shoulder-related pain and symptoms due to varying mechanisms of injury. In patients whose mechanism of shoulder injury was atraumatic, female sex and lower Mental Component Scores were associated with significantly worse preoperative ASES and WOSI scores. In this atraumatic patient subset, there was a significant association between mental health and both preoperative pain and functional limitation. The results supported our hypothesis that psychosocial factors and comorbid depression were more associated of shoulder-related pain and symptoms for patients with atraumatic instability than patients with traumatic instability, when controlling for age, sex, and direction of instability.

Psychosocial factors have previously correlated with symptoms in those with rotator cuff tears. In multivariate models analyzing rotator cuff tear patients, Wylie *et al* described that the SF-36 MCS had a significant association with the VAS (Visual Analogue Scale) for shoulder pain, the VAS score for shoulder function, the SST (Simple Shoulder Test) score, and the ASES score.[15] In these models assessing the effects of the age, sex, BMI, number of medical comorbidities, smoking, SF-36 MCS, and tear size, the SF-36 MCS

was the only significant predictor that led to a clinically significant difference in the shoulder scores tested.[15] Cho *et al* further supported this association labeling the HADS depression score as a statistically significant predictor of both ASES and Korean Shoulder Scale (KSS) scores.[2] The chronicity of rotator cuff tears may be prone to impact a person's emotional wellbeing. While the degree of chronicity of rotator cuff tears and instability may differ, there is a spectrum of chronicity based on the mechanism of the instability. Weekes *et al* reported an association between major depressive disorder and WOSI scores, further supporting our findings that mental health was linked with WOSI scores as well as ASES scores. In a patient population undergoing arthroscopic shoulder stabilization, WOSI scores were significantly worse for the group with preoperative major depressive disorder compared to the group without major depressive disorder.[14] Similar to patients with rotator cuff tears, patients with atraumatic instability experience an extended duration of symptoms as the condition follows a more chronic course. With chronicity of rotator cuff pathology being linked to the impact of emotional wellbeing, the current results suggest that chronic atraumatic shoulder instability may be linked in a similar manner.

In the current study, atraumatic instability presents as a more chronic form of instability when compared to traumatic instability, thus atraumatic instability may impact emotional wellbeing to a greater extent. Prior studies have also shown that psychological factors and symptoms of depression are predictive of other atraumatic upper extremity conditions. *Vranceanu et al* found that the patients, receiving a diagnosis from a hand specialist that differed from the diagnosis of the referring Primary Care Physician, were the same patients experiencing greater symptoms of depression and catastrophic thinking. This suggests that prolonged time to accurate diagnosis and treatment increases susceptibility to worse psychosocial scores and increased catastrophization. Atraumatic pain was associated more with the somatization of psychological distress and this diffuse, vague presentation often led to a delay in the accuracy of the diagnosis and treatment for the patient.[13] In patients with nonspecific neck pain, emotional wellbeing measured by the MCS scores of the 12-Item Short Form Survey (SF-12), has also been shown to be significantly predictive of neck pain disability and patient satisfaction with treatment.[8] When comparing predictive factors for lower limb pain in traumatic and non-traumatic injuries, depressive feelings and headaches were positively associated to the non-traumatic lower limb pain with no association to the traumatic pain.[6] These findings further support the link between psychosocial factors and symptoms for those with chronic atraumatic orthopedic conditions.

Limitations of the study include analyzing a cohort with a large majority of patients with traumatic shoulder instability (82%) compared to a smaller number of patients with atraumatic shoulder instability, although this represents the typical population of shoulder instability. The groups were determined by a patient's self-reporting of their onset of instability. While there are inherent limitations of using patients' self-reports, this definition has been previously used by Magnuson et al[11] and there were significant differences in demographics, preoperative patient-reported outcomes, psychosocial factors, the duration of symptoms, and the number of dislocations. As such, the self-reported definition of traumatic vs. atraumatic instability does appear to be discriminant. As we only assessed psychosocial and shoulder-related factors at one preoperative time point, we could not determine whether psychosocial factors increased shoulder pain and symptoms over time prior to surgery, or

whether chronic painful instability affected emotional wellbeing. The selection of patients for the study was also limited to operative intervention. Strengths of this study include a large cohort size and enrollment from 9 geographically diverse private and academic groups across the United States.

Conclusion:

Psychosocial factors were found to be more associated with worse preoperative shoulder-related pain and symptoms for patients with atraumatic instability compared to traumatic. Across multiple orthopedic conditions, depression and emotional wellbeing have been associated with worse preoperative symptoms and inferior postoperative patient-reported outcomes. Similar to medically optimizing patients prior to surgery, the current findings identify a subset of shoulder instability patients that may need to be psychologically optimized either prior to surgery or early in the postoperative period to potentially improve postoperative outcomes.

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Conflicts of interest:

Cale A. Jacobs reports a grant from Smith and Nephew and personal fees from Flexion Therapeutics, all outside the submitted work.

Scott D. Mair reports receiving consulting fees from Smith and Nephew, outside the submitted work.

Keith M. Baumgarten reports consulting fees form Wright Medical, and personal fees from Arthrex, Micah and Stryker, all outside the submitted work.

Jonathan T. Bravman reports consulting for Smith and Nephew, consulting for DJO, and consulting and receiving royalties from Shukla Medical, all outside the submitted work.

Brian T. Feeley reports NIH grant funding, consulting for Kaliber, is on the Board of Directors for Bioniks, and is an Associate Editor, for Journal of Shoulder and Elbow Surgery and an Editor for Current Reviews in Musculoskeletal Medicine, all outside the submitted work.

John A. Grant reports a grant and personal fees from JRF Ortho, a grant and educational support from Arthrex, a grant from Aesculap Biologics, personal fees from Conmed, consulting fees from Vericel, all outside the submitted work.

Drew A. Lansdown reports educational support from Evolution Surgical/Arthrex, consulting fees from Vericel and Allosource and a research grant form AOSSM, all outside the submitted work.

Robert G. Marx reports personal fees (Deputy Editor) from JBJS, personal fees as an Associate Editor from JBJS Evidence-Based Orthopedics, royalties from books published from Springer and Demos Health and equity compensation for seat on science advisory board from MEND Nutrition Inc., all outside the submitted work.

Adam J. Seidl reports Personal Fees (consulting) form DJO, outside the submitted work.

Matthew V. Smith reports Grant (Collaborator) from National Science Foundation, Personal Fees (Educational Speaker) from Elite Orthopedics (Arthrex), Personal Fees (Consultant) from Flexion Therapeutics and Grant (Site-PI) from PCORI, all outside submitted work.

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Alan L. Zhang reports consulting fees from Stryker and from Depuy-Mitek, all outside the submitted work.

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References

1. Beks RB, Mellema JJ, Menendez ME, Chen NC, Ring D, Vranceanu AM. Does Mindfulness Correlate With Physical Function and Pain Intensity in Patients With Upper Extremity Illness? Hand (N Y). 2018;13(2):237–43. doi: 10.1177/1558944717697429. [PubMed: 28719992]
2. Cho CH, Seo HJ, Bae KC, Lee KJ, Hwang I, Warner JJ. The impact of depression and anxiety on self-assessed pain, disability, and quality of life in patients scheduled for rotator cuff repair. J Shoulder Elbow Surg. 2013;22(9):1160–6. doi: 10.1016/j.jse.2013.02.006. [PubMed: 23594716]
3. Cohen J, Cohen P, West SG, Aiken LS. Applied multiple regression/correlation analysis for the behavioral sciences, 3rd ed. Applied multiple regression/correlation analysis for the behavioral sciences, 3rd ed. Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers; 2003. ISBN No. 0-8058-2223-2.
4. Cronin KJ, Mair SD, Hawk GS, Thompson KL, Hettrich CM, Jacobs CA. Increased Health Care Costs and Opioid Use in Patients with Anxiety and Depression Undergoing Rotator Cuff Repair. Arthroscopy. 2020;36(10):2655–60. doi: 10.1016/j.arthro.2020.05.038. [PubMed: 32497659]
5. Cronin KJ, Wolf BR, Magnuson JA, Jacobs CA, Ortiz S, Bishop JY, et al. The Prevalence and Clinical Implications of Comorbid Back Pain in Shoulder Instability: A Multicenter Orthopaedic Outcomes Network (MOON) Shoulder Instability Cohort Study. Orthop J Sports Med. 2020;8(2):2325967119894738. doi: 10.1177/2325967119894738.
6. El-Metwally A, Salminen JJ, Auvinen A, Kautiainen H, Mikkelsson M. Risk factors for traumatic and non-traumatic lower limb pain among preadolescents: a population-based study of Finnish schoolchildren. BMC Musculoskelet Disord. 2006;7:3. doi: 10.1186/1471-2474-7-3. [PubMed: 16420704]
7. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)--a metadata-driven methodology and workflow process for providing translational research informatics support. J Biomed Inform. 2009;42(2):377–81. doi: 10.1016/j.jbi.2008.08.010. [PubMed: 18929686]
8. Hill JC, Lewis M, Sim J, Hay EM, Dziedzic K. Predictors of poor outcome in patients with neck pain treated by physical therapy. Clin J Pain. 2007;23(8):683–90. doi: 10.1097/AJP.0b013e3181468e67. [PubMed: 17885347]
9. Klein JS, Davis DE, Wells ZS, Kane LT, Sholder D, Namdari S, et al. The Distress and Risk Assessment Method predicts postoperative narcotic use in patients undergoing rotator cuff repair. J Shoulder Elbow Surg. 2019;28(6s):S146–s53. doi: 10.1016/j.jse.2019.04.012. [PubMed: 31196509]
10. Kraeutler MJ, McCarty EC, Belk JW, Wolf BR, Hettrich CM, Ortiz SF, et al. Descriptive Epidemiology of the MOON Shoulder Instability Cohort. Am J Sports Med. 2018;46(5):1064–9. doi: 10.1177/0363546518755752. [PubMed: 29505730]
11. Magnuson JA, Wolf BR, Cronin KJ, Jacobs CA, Ortiz SF, Bishop JY, et al. Sex-related differences in patients undergoing surgery for shoulder instability: a Multicenter Orthopaedic Outcomes Network (MOON) Shoulder Instability cohort study. J Shoulder Elbow Surg. 2019;28(6):1013–21. doi: 10.1016/j.jse.2019.02.020. [PubMed: 31003889]

12. Potter MQ, Wylie JD, Greis PE, Burks RT, Tashjian RZ. Psychological distress negatively affects self-assessment of shoulder function in patients with rotator cuff tears. Clin Orthop Relat Res. 2014;472(12):3926–32. doi: 10.1007/s11999-014-3833-1. [PubMed: 25080266]

13. Vranceanu AM, Ring D. Psychological factors predict unexpected diagnoses. Hand (N Y). 2012;7(2):172–6. doi: 10.1007/s11552-012-9403-7. [PubMed: 23730236]

14. Weekes DG, Campbell RE, Shi WJ, Giunta N, Freedman KB, Pepe MD, et al. Prevalence of Clinical Depression Among Patients After Shoulder Stabilization: A Prospective Study. J Bone Joint Surg Am. 2019;101(18):1628–35. doi: 10.2106/jbjs.18.01460. [PubMed: 31567799]

15. Wylie JD, Suter T, Potter MQ, Granger EK, Tashjian RZ. Mental Health Has a Stronger Association with Patient-Reported Shoulder Pain and Function Than Tear Size in Patients with Full-Thickness Rotator Cuff Tears. J Bone Joint Surg Am. 2016;98(4):251–6. doi: 10.2106/jbjs.O.00444. [PubMed: 26888672]

Table I:

Study Demographics

Patient Reported Outcomes in MOON Shoulder Instability Prospective Cohort-Cohort data was collected at 9 private and academic groups across the United States. The categorization of atraumatic versus traumatic shoulder instability, the depression diagnosis, the duration of symptoms, and the number of dislocations was based on patient self-reports. The mean Mental Component Score (MCS) of the RAND 36 Item Short Form Health Survey SF-36, the Personality Assessment Screener (PAS-22), the American Shoulder and Elbow Surgeons (ASES) score, and Western Ontario Shoulder Instability Index (WOSI) were calculated for both mechanism of shoulder instability.

	Atraumatic	Traumatic	P-value
Number of Patients	286	1266	-
Age, mean +/− SD, yr	26.05 +/− 9.85	24.47 +/− 8.79	0.013
BMI, mean +/− SD	25.97 +/− 4.80	25.59 +/− 4.46	0.20
Sex (Female/Male, (% Female))	73/213 (25.5%)	240/1026 (19.0%)	0.01
Self-reported Depression Diagnosis	43 (15.0%)	122 (9.6%)	0.007
Ehlers Danlos Syndrome	9 (3.1%)	8 (0.6%)	0.001
Duration of Symptoms			< 0.001
≤ 1 year	107 (37.2%)	643 (50.8%)	
> 1 year	179 (62.6%)	623 (49.2%)	
Number of Dislocations*			< 0.001
0	101 (35.3%)	228 (18.0%)	
1	35 (12.2%)	286 (22.6%)	
2–5	81 (28.3%)	449 (35.5%)	
> 5	69 (24.1%)	302 (23.9%)	
Direction of Instability			< 0.001
Anterior	170 (59.4%)	1021 (80.6%)	
Posterior	113 (39.5%)	238 (18.8%)	
Inferior	3 (1.0%)	7 (0.6%)	
Superior	0 (0%)	0 (0%)	
Mental Component Score (MCS)	48.7 +/− 10.7	50.6 +/− 10.3	0.005
PAS22 Score	15.4 +/− 7.3	14.1 +/− 6.9	0.004
ASES Score	61.5 +/− 20.0	66.1 +/− 20.6	< 0.001
WOSI Score	1264.0 +/− 398.5	1221.1 +/− 398.9	0.10

Table II:

ASES Regression

Multivariable linear regression assessing the role of psychosocial factors on preoperative ASES scores for those with either atraumatic or traumatic instability.*

Group	Predictor Variables	Final β Coefficient (95%CI)	p-value
Atraumatic (n = 286)	Age	0.05 (−0.18 to 0.27)	0.67
	Sex	−7.23 (−12.28 to −2.18)	0.005
	Direction of Instability	−1.85 (−6.09 to 2.39)	0.39
	Ehlers Danlos	5.12 (−7.53 to 17.77)	0.43
	MCS	0.67 (0.47 to 0.88)	< 0.001
Traumatic (n = 1266)	Age	−0.04 (−0.16 to 0.09)	0.56
	Sex	−7.42 (−10.23 to −4.61)	< 0.001
	Direction of Instability	−6.28 (−8.95 to −3.62)	< 0.001
	Ehlers Danlos	−7.80 (−21.72 to 6.11)	0.27
	MCS	0.35 (0.24 to 0.45)	< 0.001

*R^2 for each model. Atraumatic: R^2=0.15; Traumatic: R^2=0.07.

Table III:

WOSI Regression

Multivariable linear regression assessing the role of psychosocial factors on preoperative WOSI scores for those with either atraumatic or traumatic instability.*

Group	Predictor Variables	Final β Coefficient (95%CI)	p-value
Atraumatic (n = 286)	Age	1.60 (−2.81 to 6.01)	0.48
	Sex	164.96 (65.51 to 264.40)	0.001
	Direction of Instability	−36.22 (−119.74 to 47.31)	0.39
	Ehlers Danlos	−27.75 (−276.95 to 221.46)	0.83
	MCS	−13.42 (−17.43 to −9.41)	< 0.001
Traumatic (n = 1266)	Age	3.47 (1.04 to 5.89)	0.005
	Sex	109.02 (54.68 to 163.35)	< 0.001
	Direction of Instability	53.31 (1.79 to 104.84)	0.04
	Ehlers Danlos	138.80 (−130.12 to 407.72)	0.31
	MCS	−8.76 (−10.84 to −6.68)	< 0.001

*R^2 for each model. Atraumatic: R^2=0.17; Traumatic: R^2=0.08.