J Shoulder Elbow Surg (2016) ■■, ■■–■■

ELSEVIER

Journal of Shoulder and Elbow Surgery

www.elsevier.com/locate/ymse

ORIGINAL ARTICLE

What factors are predictors of emotional health in patients with full-thickness rotator cuff tears?

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Background: The importance of emotional and psychological factors in treatment of patients with rotator cuff disease has been recently emphasized. Our goal was to establish factors most predictive of poor emotional health in patients with full-thickness rotator cuff tears (FTRCTs).

Methods: In 2007, we began to prospectively collect data on patients with symptomatic, atraumatic FTRCTs. All patients completed a questionnaire collecting data on demographics, symptom characteristics, comorbidities, willingness to undergo surgery, and patient-related outcomes (12-Item Short Form Health Survey, American Shoulder and Elbow Surgeons score, Western Ontario Rotator Cuff Index [WORC], Single Assessment Numeric Evaluation score, Shoulder Activity Scale). Physicians recorded physical examination and imaging data. To evaluate the predictors of lower WORC emotion scores, a linear multiple regression model was fit.

Results: Baseline data for 452 patients were used for analysis. In patients with symptomatic FTRCTs, the factors most predictive of worse WORC emotion scores were higher levels of pain (interquartile range odds ratio, −18.9; 95% confidence interval, −20.2 to −11.6; $P < .0001$) and lower Single Assessment Numeric Evaluation scores (rating of percentage normal that patients perceive their shoulder to be; interquartile range odds ratio, 6.2; 95% confidence interval, 2.5-9.95; $P = .0012$). Higher education ($P = .006$) and unemployment status ($P = .0025$) were associated with higher WORC emotion scores.

Conclusions: Education level, employment status, pain levels, and patient perception of percentage of shoulder normalcy were most predictive of emotional health in patients with FTRCTs. Structural data, such as

This study was approved by Institutional Review Boards at the University of Colorado (CRV009-1), Hospital for Special Surgery (2013-123-CR2), University of Iowa (200605752), Brany (07-08-88-122), Avera (2006.049), The Ohio State University (2006H0154), University of California–San Francisco (10-00940), Vanderbilt University (060109), and Washington University in St. Louis (201103049).

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1058-2746/$ - see front matter
http://dx.doi.org/10.1016/j.jse.2016.04.007

tendon tear size, were not. Those with poor emotional health may perceive their shoulder to be worse than others and experience more pain. This may allow us to better optimize patient outcomes with nonoperative and operative treatment of rotator cuff tears.

Level of evidence: Level III; Cross-Sectional Study; Epidemiology Study

Keywords: Rotator cuff; full-thickness tears; emotional health; SF-12; ASES; WORC; SANE; Shoulder Activity Scale

Emotional health has been increasingly recognized to correlate with pain, function, and recovery from orthopedic injuries and operations. This effect has been demonstrated in joint replacement and spine disease as well as in a number of upper extremity disease states.[1,2,4,9,11,12,18-22,25,29,30] In some cases, behavioral health interventions are even being offered in conjunction with treatment of the orthopedic condition or as a precondition for surgical treatment.[2,7] In the shoulder, numerous studies have documented the profound impact of biopsychosocial stressors, coping mechanisms, and pain catastrophizing on perception of shoulder pain and disability.[3,6,7,10,11,17,23,24] Emerging data have indicated that biopsychosocial factors may have a dramatic effect on postoperative recovery and final clinical outcomes after surgical repair of rotator cuff tears.[13,26] To date, there have been no large studies to document predictors of poor emotional health in patients with full-thickness rotator cuff tears (FTRCTs).

Our multicenter group is a geographically diverse group of shoulder surgeons who have studied the responsiveness of FTRCTs to therapy as well as analyzed factors associated with successful and unsuccessful nonoperative management. Previous data from this group have demonstrated that up to 80% of patients with atraumatic FTRCTs can be treated effectively nonoperatively. In addition, tear chronicity, size of tear, retraction of tendon, and atrophy did not have any effect of responsiveness to physical therapy.[5,16,28] Greater pain was documented in patients with more comorbidities, lower education level, and nonwhite race, but it was not correlated with size of tear or structural factors.

The goal of this study was to assess which patient-related factors correlated with emotional health, as measured by the Western Ontario Rotator Cuff Index (WORC) emotion score, of patients with atraumatic FTRCTs. The WORC emotion score is the emotional domain of the WORC score, a validated outcome tool for rotator cuff disease.

Materials and methods

In 2007, our team of fellowship-trained orthopedic surgeons and research personnel from across the country began to prospectively collect data on patients with magnetic resonance imaging–documented, symptomatic, atraumatic FTRCTs. All patients completed a questionnaire collecting data on demographics, symptom characteristics, comorbidities, willingness to undergo surgery, and patient-related outcomes (12-Item Short Form Health Survey, American Shoulder and Elbow Surgeons score, WORC score, Single Assessment Numeric Evaluation [SANE] score, Shoulder Activity Scale). Physicians recorded physical examination and imaging data. Further details on data collection, patient details, and protocols can be found in previous articles using this cohort of patients.[5,8,16,28]

The WORC score is a validated outcome score that assesses functional outcomes in rotator cuff disease patients with 5 domains: pain and physical symptoms, sports and recreation, work function, social function, and emotional function.[15] This survey was collected on 452 patients in this cohort at the initiation of treatment. The impact of the following patient-specific parameters on WORC emotion score was analyzed: visual analog scale for pain scores, SANE scores, education level, employment status, activity level, age, sex, comorbidities, body mass index, hand dominance, duration of symptoms, number of tendons torn, atrophy of the supraspinatus, and patient expectations.

Statistics

With open-source R statistical software,[27] a linear multiple regression model was fit using the previously listed parameters to determine predictors of poor emotional health (WORC emotion). Interquartile range (IQR) odds ratios (ORs) are given for continuous variables.

Results

In patients with symptomatic, atraumatic FTRCTs, worse WORC emotion scores were associated with higher pain levels (IQROR, −18.9; 95% confidence interval [CI], −20.2 to −11.6; $P < .0001$) and lower SANE scores (IQROR, 6.2; 95% CI, 2.5-9.95; $P = .0012$; Table I). Better WORC emotion scores were associated with higher levels of education and employment status (Table II). More specifically, compared with those with a high-school education or less, a college degree (OR, 9.9; 95% CI, 2.6-17.3; $P = .006$) or a graduate degree (OR, 12.2; 95% CI, 5.1-19.2; $P = .006$) correlated with a better WORC emotion score. Those who were working full-time or were retired had higher WORC emotion scores than

Table I Factors associated with worse WORC emotion score

Factor	IQROR	95% CI	*P* value
High pain level	−18.9	−20.2 to −11.6	<.0001
Lower SANE score	6.2	2.5-9.95	.012

WORC, Western Ontario Rotator Cuff Index; *IQROR,* interquartile range odds ratio; *CI,* confidence interval; *SANE,* Single Assessment Numeric Evaluation.
WORC emotion scores were significantly lower in patients with higher pain scores as well as lower SANE scores.