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ORIGINAL ARTICLE

Pain catastrophizing behaviors and their relation to poor patient-reported outcomes after scapular muscle reattachment

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Hypothesis: We hypothesized that the patient-reported status following treatment of traumatic scapular muscle detachment would improve from the preoperative status and that higher pain catastrophizing scores would be more common in patients with poor postsurgical outcomes.

Methods: We studied 50 patients who met the diagnostic criteria for scapular muscle detachment and in whom rehabilitation failed. American Shoulder and Elbow Surgeons (ASES) scores were collected preoperatively and postoperatively. Patients completed a 7-point global rating of change scale, the Pain Catastrophizing Scale (PCS), and a 10-point satisfaction scale (0-3, not satisfied [NS]; 4-6, moderately satisfied [MS]; or 7-10, highly satisfied [HS]) focused on current shoulder use. Statistical analyses compared preoperative and postoperative ASES scores, compared the 3 levels of satisfaction and ASES scores, and compared ASES scores in patients with low PCS scores (LPCS) (<20) versus high PCS scores (HPCS) (≥20). Significance was set at $P < .05$.

Results: ASES scores significantly improved following surgery (42 ± 20 preoperatively and 73 ± 21 postoperatively) ($P < .001$), and the global rating of change score was 2 ± 2 . There were 39 LPCS patients (mean PCS, 7 ± 6) and 11 HPCS patients (mean PCS, 34 ± 8). HPCS patients had significantly lower postoperative ASES scores (53 ± 18) than LPCS patients (79 ± 18) ($P < .001$). The MS patients ($n = 11$) had significantly higher ASES scores than the NS patients ($n = 10$) ($P = .003$), while the HS patients ($n = 29$) had significantly greater ASES scores than the other groups ($P \leq .001$). Of the HPCS patients, 90% were in the NS and MS groups compared with 10% in the HS group.

Conclusions: Surgical restoration for scapular muscle detachment can result in meaningful improvement in outcomes. Pain catastrophizing negatively affected the self-reported outcome scores.

Level of evidence: Level II; Retrospective Design; Prognosis Study

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Scapular muscle detachment has been demonstrated to be a clinical entity with distinct and reproducible clinical presentation, physical examination findings, and surgical findings.¹³ The incidence and prevalence of scapular muscle detachment have not been investigated or established, but the

lead author (W.B.K.) has treated more than 300 patients from 28 states and 9 countries over the past 20 years for this problem. Admittedly, the incidence is likely under-reported because of the lack of widespread knowledge of the condition and lack of accurate imaging techniques. The major reason this condition is important is that these patients have high levels of dysfunction including pain, weakness, and an inability to perform many activities of daily living, as well as high levels of frustration because of lack of a diagnosis and consequent ineffective treatment.¹³ As described in our initial study, the etiology is related to an acute tensile injury, a direct blow, or contusion trauma to the medial scapular supporting musculature.¹³ The initial article reported the consistent grouping of clinical findings (scapular dyskinesis, pain along the medial scapular border, a palpable defect or loss of muscle bulk along the medial scapular border, pain and decreased ability to use the arm in overhead or forward flexion positions, muscle spasm headaches, and substantial relief of pain and increased arm function with manual scapular stabilization). The article emphasized that since diagnostic imaging has not been shown to be effective, the diagnosis is made by clinical history and physical findings. It was found that by strictly adhering to a set of well-defined clinical inclusion criteria, the diagnosis of medial scapular muscle detachment could be reliably made, and treatment based on this diagnosis could be instituted. The clinical inclusion criteria allow the clinician to differentiate patients with the medial scapular muscle detachment diagnosis from patients with other shoulder problems.¹³ The article also described the surgical procedure, which involved débridement, mobilization, and reattachment by sutures through paired drill holes of the involved lower trapezius and rhomboid muscles. The initial article describing this condition reported significant medium-term improvement in pain and functional outcomes via the American Shoulder and Elbow Surgeons (ASES) score following treatment of the detachment.

However, other factors relating to individual patients can have a sizable effect on the self-reported measures. For example, pain is the most common patient-reported symptom,³⁵ but the perception of pain is individual and not always directly proportional to the extent of injury.^{10,37} Pain catastrophizing behavior, an alteration in how an individual perceives pain, is associated with an exaggerated negative mental state during actual or anticipated painful experiences and is often associated with poorer postoperative outcomes.^{7,27,30,31} This factor was selected because the clinical condition of many scapular muscle detachment patients, owing to the chronicity of the injury (average, 4.5 years), the lack of information regarding the injury, and the disability of the injury, could lead to difficulties in mentally coping with this problem.¹³

Knowledge of the patient-specific level of pain catastrophizing as it may relate to outcome could be beneficial in interpreting the patient-reported outcome measures and provide information to develop strategies for future treatment and for preoperative patient education. Therefore, the purpose of this study was to assess midterm clinical and func-

tional outcomes, using established patient-reported outcome measures, and to include a patient-specific psychosocial factor of pain catastrophizing behavior to determine its effect on the outcome measures in a cohort of patients treated for scapular muscle detachment. The research hypotheses were that (1) patient-reported status would be improved from the preoperative status, (2) patient-reported outcomes would be equal to or better than the midterm results reported previously, and (3) higher pain catastrophizing scores would be more common in patients with poor postoperative patient-reported outcome measures.

Materials and methods

All patients treated for post-traumatic scapular muscle detachment from 2010 to 2016 were eligible for this study. The clinical inclusion criteria for this cohort were the same as in the initial study.¹³ The inclusion criteria for the clinical diagnosis were tensile injury, localized high-level pain along the medial scapular border, inability to use the arm in forward flexion, and relief by manual scapular repositioning. Data are reported for the patients who completed all parts of the evaluation. Because of the wide geographic distribution of the patients and the length of time since treatment, complete data could be gathered on 50 patients (mean age, 38 ± 13 years; 23 female and 27 male patients) out of the 119 patients treated (42%). Of the 50 patients, 24 were part of the original study¹³ and 26 were new patients who entered the patient registry following reporting of the initial cohort's results.

Surgical procedure

The surgical procedure and postoperative care have previously been described in detail.¹³ Surgical indications were consistently applied for the entire group. They included the presence of all the clinical findings and inclusion criteria, no relief of the symptoms by a directed comprehensive scapula-based rehabilitation program, and consultation with the patient. As described in the initial study, current methods of advanced diagnostic imaging (computed tomography, magnetic resonance imaging, and so on) have not been helpful in demonstrating this chronic condition.¹³ Anecdotal reports about diagnostic ultrasound imaging in 2 patients in this cohort suggest that nonspecific thickening in the rhomboid tissue may be seen. It appears that, to display all the clinical findings of the inclusion criteria, the scapular muscle detachment must include injury to both the lower trapezius and rhomboid muscles, as injury to both muscles was found in every operative case. The same surgical technique was used for every patient in the study. The only difference in the surgical treatment was the number of drill holes and sutures, which was determined by the length of the medial scapular border, since the drill holes were placed at 1-cm intervals as described in the initial study.¹³ All patients were found to have injury to the lower trapezius and rhomboid muscles, and all underwent reattachment by multiple mattress sutures placed through paired drill holes in the scapula. The criteria for completeness of the operation to restore more normal anatomy were reattachment of the entire muscle, no gapping of the bone on probing, secure suture tying, reattachment of the infraspinatus and dorsal fascia, and static restoration of scapular retraction. There were no additional procedures performed on the glenohumeral or acromioclavicular joints. Patients were immobilized for 3-4 weeks in a

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