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The duration of symptoms does not correlate with rotator cuff tear severity or other patient-related features: a cross-sectional study of patients with atraumatic, full-thickness rotator cuff tears

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Hypothesis: The purpose of this cross-sectional study is to determine whether the duration of symptoms influences the features seen in patients with atraumatic, full-thickness rotator cuff tears. Our hypothesis is that an increasing duration of symptoms will correlate with more advanced findings of rotator cuff tear severity on magnetic resonance imaging, worse shoulder outcome scores, more pain, decreased range of motion, and less strength.

Institutional review board approval was obtained at Vanderbilt University (No. 060109), University of Colorado (No. 06-0421), University of Iowa (No. 200605752), The Ohio State University (No. 200605752), Washington University in St. Louis (No. 06-0634), Hospital for Special Surgery (No. 27008), University of California, San Francisco (No. H48075-29336-05), Orthopaedic Institute (Avery IRB No. 2006.049), and Knoxville Orthopaedic Institute (Brany IRB No. 07-08-88-122).

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Methods: We enrolled 450 patients with full-thickness rotator cuff tears in a prospective cohort study to assess the effectiveness of nonoperative treatment and factors predictive of success. The duration of patient symptoms was divided into 4 groups: 3 months or less, 4 to 6 months, 7 to 12 months, and greater than 12 months. Data collected at patient entry into the study included (1) demographic data, (2) history and physical examination data, (3) radiographic imaging data, and (4) validated patient-reported measures of shoulder status. Statistical analysis included a univariate analysis with the Kruskal-Wallis test and Pearson test to identify statistically significant differences in these features for different durations of symptoms.
Results: A longer duration of symptoms does not correlate with more severe rotator cuff disease. The duration of symptoms was not related to weakness, limited range of motion, tear size, fatty atrophy, or validated patient-reported outcome measures.
Conclusions: There is only a weak relationship between the duration of symptoms and features associated with rotator cuff disease.
Level of evidence: Level III, Cross-Sectional Study, Epidemiology Study.

Keywords: Rotator cuff tear; duration of symptoms; cross-sectional study

The patient presenting with a full-thickness rotator cuff tear can have a variety of complaints including pain, weakness, functional loss, and decreased range of motion.[14] The prevalence of asymptomatic rotator cuff tears is high, particularly with increasing age.[24,36] The factors provoking symptoms in patients with rotator cuff tears remain unknown.[35]

Currently, the duration of shoulder symptoms is used as an indication for the surgical treatment of full-thickness rotator cuff tears.[10,21,34] In the setting of a known acute, traumatic, full-thickness rotator cuff tear, repair within 3 weeks of injury has been suggested as optimal.[2] Repair of full-thickness rotator cuff tears beyond 1 year of symptoms appears to have poorer results, and patients who undergo repair within 3 to 4 months of the onset of symptoms can expect a good result[10,21,34]; however, this relationship between the duration of symptoms and poorer outcomes after surgery has not been shown consistently.[5,14,26,34]

Anatomically, an increased duration of a full-thickness rotator cuff tear may contribute to increased tear size or fatty atrophy of the rotator cuff muscle.[12,30,36] However, it is not clear how these anatomic features are related to the development of symptoms.

The purpose of this cross-sectional study is to test the hypothesis that an increasing duration of symptoms in patients with atraumatic, full-thickness rotator cuff tears will correlate with more advanced findings of rotator cuff tear severity on magnetic resonance imaging (MRI), worse shoulder outcome scores, more pain, decreased range of motion, and less strength on initial presentation.

Materials and methods

Study design

Our research group is a collaborative effort composed of 16 surgeons and research personnel representing private and academic practices from across the United States. This group met repeatedly over a period of 2 years to develop research questions and align practice behaviors, by conducting systematic reviews of the literature, performing agreement studies, and developing consensus when no data were available.[3,4,16,17,29,34] The first clinical study conducted by the group was a prospective cohort study evaluating physical therapy for patients with atraumatic, full-thickness rotator cuff tears.[18] There were a total of 452 patients enrolled in the study and 30 patients withdrew. However, baseline data were obtained in 11 of the 30 patients who withdrew, leaving a final total of 433 patients for analysis in this study.

Setting and participants

Patients were enrolled in the offices of the surgeons in the involved research group. Patients who presented with symptoms and atraumatic, full-thickness rotator cuff tears aged between 18 and 100 years were invited to participate. Exclusion criteria included a history of acute injury (defined as a traumatic event that precipitated symptoms within 3 months of presentation), prior surgery on the shoulder, pain determined to be related to cervical or other disorders, glenohumeral osteoarthritis or inflammatory arthritis, adhesive capsulitis, fractures of the proximal humerus, known bilateral rotator cuff tears, and a history of dementia.

Variables and data sources

Patients who were enrolled contributed data on demographic characteristics, comorbidities,[27] and historical information regarding the intensity and severity of symptoms on a questionnaire form. In addition, patients completed the following validated measures of patient shoulder status: Short Form 12,[32] American Shoulder and Elbow Surgeons score,[25] Western Ontario Rotator Cuff index,[15] Single Assessment Numeric Evaluation score,[33] and Shoulder Activity Scale.[7] Patients were specifically asked to define the duration of symptoms as follows: 3 months or less, 4 to 6 months, 7 to 12 months, or greater than 1 year.

Physicians performed physical examinations of the patients and recorded information on areas of tenderness, active and passive range of motion measured in 10° increments, and strength measured with the Medical Research Council manual muscle testing[19] (grades 0-5). In addition, physicians reviewed radiographs and MRI scans for each patient and then graded the