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ORIGINAL ARTICLE

Early return to baseline range of motion and strength after anterior shoulder instability surgery: a Multicenter Orthopaedic Outcomes Network (MOON) shoulder group cohort study

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Background: Patients often return to higher-level activities and sports at 4 to 8 months after anterior shoulder stabilization procedures. It is unknown what percentage of patients have regained normal function at this time frame and what factors predict residual deficits, range of motion (ROM), and strength after anterior shoulder instability surgery.

Methods: Ten participating sites throughout the United States enrolled patients in a prospective cohort study including primary, revision, arthroscopic, and open anterior stabilization procedures. Baseline demographic data and patient outcomes questionnaires were collected with initial physical examination, treatment, surgical findings, and surgical repair details. At the 6-month follow-up visit, ROM and strength measurements were collected and compared with preoperative measurements.

Results: There were 348 patients identified who underwent surgical treatment for anterior shoulder instability. Of these, 259 patients (74.0%) returned to baseline, and 89 (26.0%) did not return to baseline shoulder ROM (≥20° loss of ROM) or strength. A higher Beighton score ($P = .01$) and number of dislocations ($P < .01$) were associated with failure to regain baseline ROM and strength at early follow-up. No surgical variables were found to influence return to baseline function, including open vs. arthroscopic surgery, primary vs. revision surgery, and number of suture anchors.

Conclusions: By 4 to 8 months postoperatively, 76% of patients return to baseline ROM, 98% return to baseline strength, and 74% return to both baseline ROM and strength. An increased number of dislocations and generalized joint laxity were associated with failure to return to baseline ROM and strength at early follow-up after anterior shoulder instability surgery.

This study was approved by the University of Iowa Institutional Review Board (Department of Health and Human Services Registration # IRB00000099) and by the Institutional Review Board at each participating institution.

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The factors related to poor outcomes after anterior shoulder instability surgery are of significant interest for surgeons and patients. Shoulder instability patients tend to be young and active, and there is often a desire to return to higher-level activities postoperatively.[4] Patients who have undergone shoulder instability surgery are often released back to sports and higher activity level activities approximately 6 months after surgery. There is a paucity of data on whether these patients have persistent deficits in strength and range of motion (ROM) at this point in their recovery.

Several studies[1,8,21] have suggested that duration of symptoms and number of dislocation events may be related to worse outcomes after surgical stabilization procedures. However, these studies focus on recurrence of instability and longer-term outcomes. Evaluating short-term outcomes after anterior shoulder instability surgery can provide useful information to the surgeon and patient regarding return of shoulder ROM and strength and possible return to sport. The purpose of this study was to examine how frequently surgical anterior shoulder instability patients returned to baseline ROM and strength by an average of 6 months after surgery and to identify factors that may affect return to baseline ROM and strength.

Materials and methods

Study design

The Multicenter Orthopaedic Outcome Network (MOON) Shoulder research collaborative comprises 26 sports medicine or shoulder fellowship-trained surgeons from 10 academic and private groups throughout the United States. This prospective cohort study enrolled patients undergoing surgical treatment for shoulder instability. Extensive baseline demographic data and patient-reported metrics, physician examination data, and detailed surgical data were collected. After surgery on the anterior labrum or capsule, or both, patients followed the standard MOON shoulder postoperative care, sling usage, and rehabilitation protocols at all sites, and outcomes were measured at the 6-month follow-up visit (range, 4-8 months). Participants provided written, informed consent using Institutional Review Board–approved consent forms and procedures.

Participants

Patients were enrolled at 1 of 10 participating institutions. Patients were eligible to enroll if they were between the ages of 12 and 99 years old and had a history and physical examination consistent with anterior shoulder instability. The study included primary and revision surgery as well as open and arthroscopic procedures. Exclusion criteria included patients with concomitant rotator cuff surgery, posterior or multidirectional instability, as identified by history and physical examination, and worker's compensation claims.

Data collection

Extensive baseline data were collected, including demographic characteristics, medical comorbidities, and historical information regarding previous operations or treatments and patient-reported outcome measures. Plain radiographs were obtained for each patient and reviewed at the time of enrollment. If additional imaging was available, such as magnetic resonance imaging (MRI) or computed tomography (CT), these were also reviewed but were not required as part of the standard protocol.

A detailed physical examination on each patient was performed and documented by the operating surgeon. At the baseline and 6-month follow-up visits (range, 4-8 months), participants were evaluated for ROM in forward elevation (FE), abduction (ABD), external rotation (ER) at the side (ERside), ER in 90° of abduction (ERabd), internal rotation at 90° (IR), and strength using a standard 5-point scale with FE, ABD, ERside, lift-off test, and belly press test. All measurements were performed on the surgical extremity and contralateral extremity, and no specific device was used for strength or ROM. The same physician performed a physical examination at both assessments. The comparison of these data points comprises the basis for analysis of short-term outcomes. Postoperatively, patients underwent a standardized protocol that was used at all 10 participating institutions.

Surgical data were collected at the time of the procedure and included basic operative variables, examination under anesthesia, pathology and treatment of the synovium, biceps tendon, capsule/labrum, and articular cartilage, presence or absence of loose bodies, and management of the subacromial space, coracoacromial ligament, bursa, acromion, clavicle, and rotator cuff. Patients with rotator cuff pathology were excluded from analysis.

Definition of outcome

Change between the baseline and 6-month follow-up visit was determined. A return to baseline at short-term follow-up was defined as having ROM within 20° of the baseline surgical extremity value in all planes and a strength measurement equal to or greater than the baseline value. A failure to return to baseline by the patient's 6-month visit was defined as ≥20° loss of ROM compared with baseline in any plane or strength grade less than the baseline value, or both.

Statistical methods

Baseline characteristics are described by outcome groups using mean ± standard deviation for continuous variables and percentage for categoric variables. Group differences in continuous measures were evaluated using *t* tests, and distributions of categoric variables