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Clinical measurements versus patient-reported outcomes: analysis of the American Shoulder and Elbow Surgeons physician assessment in patients undergoing reverse total shoulder arthroplasty

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Background: The American Shoulder and Elbow Surgeons (ASES) score is composed of a patient-reported portion and a physician assessment. Although the patient-reported score is frequently used to assess postoperative outcomes after shoulder arthroplasty, no previous studies have used the physician-assessment component. This study evaluated the relationship of the ASES physician-assessment measurements with patient-reported shoulder and general health outcomes.

Methods: A retrospective review of a prospectively collected multicenter database was used to analyze patients who underwent primary reverse total shoulder arthroplasty (RTSA) from 2012 to 2015 with a minimum 2-year follow-up. ASES physician-assessment and patient-reported components and 12-Item Short Form Health Survey (SF-12) general health questionnaires were obtained preoperatively and 2 years postoperatively. The relationship between ASES physician measurements with ASES patient-reported outcome (PRO) scores and SF-12 Physical and Mental domain scores was assessed with Pearson correlation coefficients.

Results: Included were 74 patients (32 men; mean age, 69.2 years; body mass index, 29.4 kg/m^2). Preoperative physician measurements and PRO scores were not significantly correlated. Postoperatively, only the ASES physician-measured active ($R = 0.54$, $P < .01$) and passive forward flexion ($R = 0.53$, $P < .01$) demonstrated moderate correlation with ASES patient scores. The remaining clinical measurements had no significant correlations with ASES patient or SF-12 scores. During the 2-year period, only improvements in active forward flexion correlated with improvements in ASES patient scores ($R = 0.36$, $P < .01$).

Conclusions: Little correlation exists between clinical measurements from the ASES physician component and PROs, including the ASES patient-reported and SF-12 general health surveys, in RTSA patients. Improvement in active forward flexion is the only clinical measurement correlated with PRO improvement at 2 years.

Shoulder arthroplasty, including reverse total shoulder arthroplasty (RTSA), has become increasingly used in the United States.[2,5,16] Patients experience improved function and outcomes after RTSA for conditions such as cuff tear arthropathy and glenohumeral arthritis in the setting of rotator cuff pathology.[3,6,15] The improvement in patient satisfaction has been correlated with functional recovery and resumption of regular activities.[1,4,20,22,23] To better measure and assess such patient outcomes after surgery, patient-reported outcomes (PROs) scores have become increasingly used in total joint arthroplasty and shoulder surgery.[8,9,12,23]

The American Shoulder and Elbow Surgeons (ASES) is one of the most commonly used PROs.[8] The ASES was introduced in 1996 and consists of 2 components: the patient-reported questionnaire and a physician assessment.[12] The ASES can be used without a licensing fee. The ASES score has been validated for its reliability and responsiveness[19]; however, the score is only tabulated with the patient-reported subjective visual analog scale for pain and 10 functional questions.[7,10] The physician assessment, which is the portion the physician completes, rather than the patient, focuses on functional parameters such as range of motion, strength testing, and instability. This physician component of the ASES assessment has

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not been previously reported by any studies as an outcome measure in shoulder arthroplasty or undergone any validation.

As technical advancement has raised patient expectations for functional recovery, it has become increasingly important for physicians to counsel patients on the likely functional recovery and its relationship with postoperative subjective recovery and quality of life. Despite numerous previous articles evaluating PRO measurements after RTSA, no previous analysis has been conducted of the physician portion of the ASES score or of the correlation of these measurements with PROs.[9] The purpose of study was to examine the ASES physician-assessed functional measurements after RTSA and determine whether measurements correlate with patient subjective outcomes and general overall health. We hypothesized that improvements in ASES physician-assessed measurements would correlate with improved subjective scores and general overall health.

Materials and methods

Study design

Data for this study were obtained from a prospectively collected multicenter RTSA database by 5 different surgeons from 3 separate institutions. The study included 74 patients who were able to complete at least 2 years of follow-up. All patients provided consent before participation in the study.

The database includes demographic information (age, sex, body mass index) and PRO scores. Preoperative and 2-year postoperative ASES physician- and patient-reported scores, along with the 12-Item Short Form Health Survey (SF-12) Physical Component Summary (PCS) and Mental Component Summary (MCS) scores, were recorded from patients who underwent primary RTSA with the Zimmer Trabecular Metal Reverse Shoulder System (Zimmer Inc., Warsaw, IN, USA) between 2012 and 2015. Only patients with a minimum 2-year follow-up were included.

Outcome measures

The SF-12 evaluates overall general health and includes a Physical (PCS) and Mental Component Summary (MCS). The PCS and MCS scores are both calculated using a 12-question survey, with each score ranging from 0 (lowest health level) to 100 (highest level of health), as previously described.[21]

The ASES tool includes a patient-reported score with visual analog scale for pain and functional subscales ranging from 0 (worse pain and function loss) to 50 (no pain and excellent function). Both scores are summed for a maximum score of 100, as described previously.[12] A change in the ASES patient-reported score of 12 to 17 points is considered the minimal clinically important difference.[19]

The physician-assessment section of the ASES includes 3 functional sections (range of motion, strength testing, and instability grading) and 1 subjective section.[12] Passive and active range of motion (total combined glenohumeral and scapulothoracic) are assessed using a goniometer for forward flexion, external rotation (at side and 90° abduction), internal rotation (highest segment of spinal anatomy), and cross-body adduction (distance of antecubital fossa from the opposite acromion). Strength is tested and measured according to the Medical Research Council grade of 0 to 5, with 0 as no contraction, 1 as flicker, 2 as movement with gravity eliminated, 3 as movement against gravity, 4 as movement against some resistance, and 5 as normal power. Instability is graded as anterior, inferior, and posterior translation on a 0 to 3 scale, with 0 if absent, 1 if mild (0-1 cm), 2 if moderate (1- to 2-cm translation or to glenoid rim), and 3 if severe (>2-cm translation or over the glenoid rim). The physician is also asked to note whether the translation maneuvers reproduce the symptoms and whether the patient has voluntary instability, a positive result on the relocation test, or generalized ligamentous laxity.

The subjective section asks the physician to note signs, including supraspinatus or greater tuberosity tenderness, acromioclavicular joint tenderness, and biceps tendon tenderness or rupture, impingement, scars, atrophy, or deformity. This study did not include the ASES physician-reported measurements of tenderness and instability due to their subjective nature.

Surgical procedure

All surgical procedures were performed with Zimmer Reverse implants. Surgical indications were cuff tear arthropathy or glenohumeral arthritis with irreparable rotator cuff tears. Patients underwent a deltopectoralis approach. No patients required bone grafting. The subscapularis was not repaired. Patients were kept in a shoulder immobilizer for 6 weeks postoperatively and then began physical therapy. Dislocations occurred in 3 patients that required revisions.

Statistical analysis

Pearson correlation coefficients were made from each ASES physician measurement with the ASES patient score, and the SF-12 PCS and MCS scores, preoperatively and 2 years postoperatively. In addition, a Pearson correlation was performed to assess the change in ASES physician measurements with the change in ASES patient scores, SF-12 MCS, and SF-12 PCS during the 2-year course of the study.

Results

The study included 74 patients (43% male, 57% female) who completed a minimum 2-year follow-up. The cohort was an average age of 69.2 years (range, 54-88 years), and the mean body mass index was 29.4 kg/m^2 (range, 19.9-37.3 kg/m^2). Average PRO scores (ASES patient, SF-12) and ASES physician measurements preoperatively and 2 years after the operation are provided in Table I.

Table I
Preoperative findings versus postoperative findings

Assessments	Preoperative	Postoperative
	Mean (range)	Mean (range)
SF-12		
Physical (PCS)	33 (9.4-49.1)	45 (21.4-58.8)
Mental (MCS)	50 (18-71.1)	54 (33.4-66.5)
ASES patient	32 (24.8-86.5)	79 (27.3-100)
ASES physician (sections)		
Range of motion		
Forward flexion		
Active	74 (0-165)	141 (80-175)
Passive	108 (0-180)	149 (90-180)
External rotation		
Active	19 (0-75)	34 (0-90)
Passive	31 (0-90)	42 (0-90)
90° active	27 (0-90)	66 (10-90)
90° passive	37 (0-100)	74 (5-100)
Internal rotation		
Active	T10 (T2-L3)	T10 (T3-S1)
Passive	T10 (T4-L3)	T9 (T1-L5)
Strength		
Forward flexion	3 (0-5)	4 (0-5)
Abduction	3 (0-5)	4 (0-5)
External rotation	3 (0-5)	4 (0-5)
Internal rotation at side	3 (0-5)	4 (0-5)

SF-12, 12-Item Short Form Health Survey; *MCS*, Mental Component Summary; *PCS*, Physical Component Summary; *ASES*, American Shoulder and Elbow Surgeons.

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