How Are We Measuring Patient Satisfaction After Anterior Cruciate Ligament Reconstruction?

Cynthia A. Kahlenberg,* MD, Benedict U. Nwachukwu,*‡ MD, MBA, Richard A. Ferraro,† BA, William W. Schairer,* MD, Michael E. Steinhaus,* MD, and Answorth A. Allen,* MD

Investigation performed at the Hospital for Special Surgery, New York, New York, USA

Background: Reconstruction of the anterior cruciate ligament (ACL) is one of the most common orthopaedic operations in the United States. The long-term impact of ACL reconstruction is controversial, however, as longer term data have failed to demonstrate that ACL reconstruction helps alter the natural history of early onset osteoarthritis that occurs after ACL injury. There is significant interest in evaluating the value of ACL reconstruction surgeries.

Purpose: To examine the quality of patient satisfaction reporting after ACL reconstruction surgery.

Study Design: Systematic review; Level of evidence, 4.

Methods: A systematic review of the MEDLINE database was performed using the PubMed interface. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines as well as the PRISMA checklist were employed. The initial search yielded 267 studies. The inclusion criteria were: English language, US patient population, clinical outcome study of ACL reconstruction surgery, and reporting of patient satisfaction included in the study. Study quality was assessed using the Newcastle-Ottawa scale.

Results: A total of 22 studies met the inclusion criteria. These studies comprised a total of 1984 patients with a mean age of 31.9 years at the time of surgery and a mean follow-up period of 59.3 months. The majority of studies were evidence level 4 (n = 18; 81.8%), had a mean Newcastle-Ottawa scale score of 5.5, and were published before 2006 (n = 17; 77.3%); 5 studies (22.7%) failed to clearly describe their method for determining patient satisfaction. The most commonly used method for assessing satisfaction was a 0 to 10 satisfaction scale (n = 11; 50.0%). Among studies using a 0 to 10 scale, mean satisfaction ranged from 7.4 to 10.0. Patient-reported outcome and objective functional measures for ACL stability and knee function were positively correlated with patient satisfaction. Degenerative knee change was negatively correlated with satisfaction.

Conclusion: The level of evidence for studies reporting patient satisfaction is low, and the methodologies for reporting patient satisfaction are variable. Additionally, within the past decade there has been a significant decline in the inclusion of this outcome measure within published ACL studies. As sports surgeons are increasingly called on to demonstrate the value of operative procedures, attention should be paid to understanding and reporting patient satisfaction.

Keywords: knee ligaments; ACL; clinical assessment/grading scales; satisfaction

Reconstruction of the anterior cruciate ligament (ACL) is one of the most common orthopaedic operations in the United States, with an estimated over 175,000 procedures performed each year.[11,32] ACL reconstruction procedures are performed on an elective basis with goals that include restoration of knee stability and return to prior sporting function, such as cutting or pivoting activities needed for football, soccer, skiing, and other sports.[1,32,37] In the United States alone, the cost of surgical treatment of ACL rupture is estimated at $2 billion annually[32]; as such, there is significant interest in evaluating the value of ACL reconstruction surgeries.

Value in health care is defined from the patient's perspective[26]; thus, an important component for determining the value of an orthopaedic intervention is measuring and reporting the patient's satisfaction from the procedure.[12] In the changing health care climate, there is increasing burden on surgeons to demonstrate the value of their operations.[13,27] Value assessment and patient-oriented outcomes

‡Address correspondence to Benedict U. Nwachukwu, MD, MBA, Hospital for Special Surgery, 535 East 70th Street, New York, NY 10021, USA (email: nwachukwub@hss.edu).

*Hospital for Special Surgery, New York, New York, USA.

†Weill Cornell Medical College, New York, New York, USA.

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have traditionally focused on functional patient-reported outcome measures; however, as health service research has evolved, the need to measure patient satisfaction is recognized. While patient-reported outcome measures evaluate the disease-specific or health-related quality of life outcome of care, satisfaction assessment involves a multidimensional construct that attempts to gauge whether the achieved outcome is valuable ("satisfactory") to the patient. Specifically, for ACL reconstruction, patient satisfaction is a key component for demonstrating the value of operative intervention. There is a role to report both functional and satisfaction measures given the complexity of the latter, and at times, patient satisfaction may not be clearly associated with patient-reported outcome or clinician-derived outcome measures.[12]

The purpose of this review was to examine the quality of patient satisfaction reporting after ACL reconstruction surgery. We hypothesized that the quality of patient satisfaction reporting in the literature would be poor, with no uniform method of reporting patient satisfaction after ACL reconstruction.

METHODS

Search Strategy

A systematic review of the MEDLINE database was performed in June 2015 using the PubMed interface. The search terms *ACL + satisfaction* AND *anterior cruciate ligament + satisfaction* in the time period from January 2000 to June 2015 were employed. This search yielded 267 results. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines with a PRISMA checklist were employed.[24] Each of the 267 studies was reviewed for inclusion in this analysis (Figure 1). The inclusion criteria were: English language, US patient population, clinical outcome study of ACL reconstruction surgery, and reporting of patient satisfaction included in the study. Thus, studies in languages other than English or conducted outside of the United States were excluded. Studies were also excluded if they did not include both clinical outcomes and patient satisfaction in their results.

Data Collection and Analysis

The following data points were extracted from each included study: patient demographics, level of evidence, follow-up period, time from injury to surgery, indications for surgery, type of ACL reconstruction performed, patient-reported clinical outcome measures, and objective measures from the postoperative physical examination. Satisfaction information recorded for each study included method of determining satisfaction, time intervals at which satisfaction was measured, and satisfaction scores that were reported. If included in the study, predictors of satisfaction as well as correlations between objective outcomes or patient-reported outcome measures (PROMs) with patient satisfaction were recorded. Quality was evaluated using either the Jadad scale (for randomized controlled trials)[15] or the Newcastle-Ottawa scale (for nonrandomized studies).[38] The Newcastle-Ottawa scale is used to assess the quality of nonrandomized studies in a systematic review and is scored on an ascending scale of quality from 1 to 9, with studies scoring greater than 7 considered higher quality. The Jadad score is used to assess the quality of randomized controlled trials and is scored on a scale of 1 to 5, with studies scoring 3 or greater considered high quality. The heterogeneity of outcome measures reported in the studies precluded a detailed meta-analysis of the extracted data. Instead, each study was analyzed qualitatively, and descriptive statistics were used with means and proportions reported as appropriate.

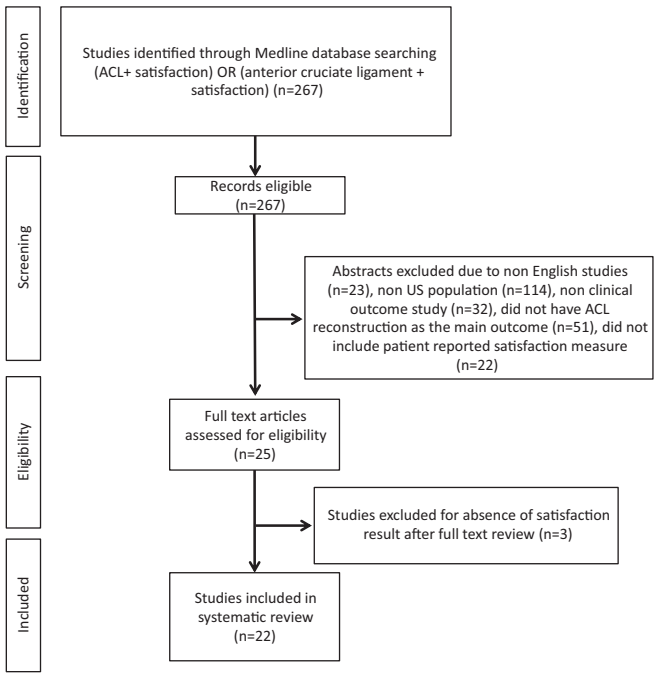

Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow chart illustration of study inclusion and exclusion criteria.

RESULTS

Initial review of the 267 studies found in the MEDLINE database yielded 22 studies that met the inclusion/exclusion criteria (Figure 1).[§] A total of 1984 patients were included, with a mean age of 31.9 years at time of surgery and a mean follow-up period of 59.3 months. The greatest number of articles came from *Arthroscopy* (6 studies), the *American Journal of Sports Medicine* (4 studies), the *Journal of Bone and Joint Surgery* (3 studies), and the *Journal of Knee Surgery* (3 studies). The majority of studies (18/22; 81.8%) were level 4 evidence; 2 studies (9.1%) were level 3, 1 study (4.5%) was level 2, and 1 study (4.5%) was level 1. On evaluation of quality, 1 randomized study was evaluated

[§]References 2, 3, 5, 7-10, 14, 16, 18, 20, 21, 25, 28-31, 33-36, 39.

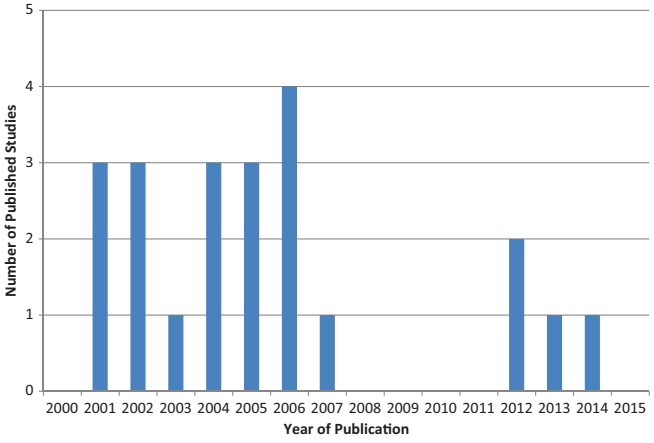

Figure 2. Number of included studies per year.

using the Jadad score and had a score of 2. The remaining studies were evaluated using the Newcastle-Ottawa scale and had a mean score of 5.5. Fifteen studies (71.4%) had a score ≥6, and 5 studies (23.8%) had a score ≥7. The majority of studies (17/22; 77.3%) were published between 2001 and 2006 (Figure 2).

Seventeen studies (77.3%) described a clear methodology for assessing patient satisfaction related to ACL surgery (Table 1). The most common method utilized for assessing patient satisfaction was a 0 to 10 scale, referred to in many studies as a visual analog scale (VAS); this was used in 11 (50.0%) studies. Four studies (18.2%) used an ordinal scale to evaluate patient satisfaction and 2 studies (9.1%) used a binary (yes/no) scale. Four studies (18.2%) also asked patients whether they would undergo the surgery again, given the same circumstances. Twelve studies (54.5%) reported a percentage of satisfied patients, and among those studies, the percent satisfied ranged from 67% to 100%; 9 (75.0%) reported >80% satisfaction. Among those that reported satisfaction on a 0- to 10-point scale, the range of mean scores was 7.4 to 10.0.

All included studies evaluated patient satisfaction at final follow-up. Two studies (9.1%) measured patient satisfaction preoperatively and compared it with postoperative satisfaction.[25,34] Satisfaction was found to increase postoperatively in both studies. Preoperative patient expectations were not evaluated in any of the studies. One study differentiated between satisfaction with process of care versus satisfaction with outcome of care by asking patients to evaluate separately, on a 1-to-10 scale, their satisfaction with care delivery and satisfaction with outcome.[20] Two of the studies specifically measured the satisfaction related to cosmesis.[28,29]

Review of the 22 included studies revealed several factors that were predictive of or associated with patient satisfaction after ACL surgery. Four studies reported a significant positive correlation between patient reported outcome measures (eg, Tegner score, Lysholm score, and International Knee Documentation Committee [IKDC] score) and patient satisfaction.[20,31,34,36] Two studies reported a significant correlation between objective functional measurements and patient satisfaction.[20,21] One study found that a higher grade postoperative pivot shift was associated with lower patient satisfaction after ACL reconstruction.[21] The second found that patient satisfaction was significantly lower in patients with postoperative flexion contracture, laxity on manual maximum test measured with KT-1000 arthrometer, higher pivot shift grade, effusion, and tenderness of the medial joint line and patella.[20] In the same study, the authors also reported extensively on the association between specific concomitant procedures performed and patient satisfaction. They found that patients had significantly lower satisfaction if there was no plica excision performed and if they had osteophytes or a lateral meniscal remnant or degenerative tear noted on diagnostic arthroscopy.[20]

TABLE 1
Quality and Characteristics of Satisfaction Reporting Among Included Studies (N = 22)[a]

	n (%)
Methodology for assessing satisfaction described	17 (77.3)
Method for assessing satisfaction	
VAS (0-10 scale: 10 = satisfied, 0 = dissatisfied)	11 (50.0)
Binary scale (satisfied: yes/no)	2 (9.1)
Ordinal scale (eg, very satisfied, satisfied, neutral, dissatisfied)	4 (18.2)
Willingness to undergo surgery again	4 (18.4)
Not clearly defined	5 (22.7)
Type of satisfaction reported	
Outcome of ACL reconstruction	20 (90.9)
Cosmesis of scar	2 (9.2)
Process of care	1 (4.6)
Satisfaction measured at multiple time intervals	2 (9.2)
Preoperative satisfaction measured	2 (9.2)
Preoperative expectations measured	0 (0.0)

[a]ACL, anterior cruciate ligament; VAS, visual analog scale.

DISCUSSION

Patient satisfaction is a particularly relevant outcome measure after ACL surgery. It remains controversial whether ACL reconstruction alters long-term outcome.[6] Therefore, one of the primary goals for ACL surgery is to restore patients to their prior level of function to allow a return to their preinjury level of activity.[1,32,37] Given these aims of the procedure, measuring patient satisfaction is paramount to understanding the outcome of the intervention. Our systematic review confirmed our hypothesis: The quality of evidence for studies reporting patient satisfaction is moderate and the methodologies for reporting patient satisfaction are variable. The most common technique used to measure patient satisfaction is a 0 to 10 scale, commonly referred to as a VAS score. Additionally, while a significant number of studies reported patient satisfaction before 2006, there has been a decline in the reporting of this outcome measure within the past decade. As sports surgeons are increasingly called on to demonstrate the value of operative procedures, attention should be paid to understanding and reporting patient satisfaction.

Several studies in our review showed a correlation between functional/patient-reported outcome measures and patient satisfaction scores. Interestingly, 2 studies demonstrated an association between physical examination findings and patient satisfaction.[20,21] Both studies showed that a higher grade of postoperative pivot shift was associated with lower postoperative satisfaction. This finding is likely associated with a subjective sense of patient instability postoperatively. Surgeons examining patients postoperatively can use this association to tailor rehabilitation programs and counsel patients to modify expectations and potentially improve satisfaction. One of the studies also showed that postoperative degree of laxity measured on KT-1000, presence of flexion contracture, and medial joint line and patellar tenderness were all predictive of worse patient satisfaction after ACL surgery.[20] These latter findings highlight functional and subjective findings that may adversely impact patient satisfaction beyond the primary ACL reconstruction. A careful preoperative history and physical examination can identify such issues that are present preoperatively so that patient expectations can be appropriately managed. The same study also found that evidence of degenerative joint disease on arthroscopic examination was associated with lower satisfaction postoperatively. This finding is particularly relevant for preoperative counseling of patients with degenerative joint disease who are planning to undergo ACL reconstruction. There is significant opportunity to further study physical examination and functional parameters that influence patient satisfaction with ACL reconstruction.

Our review noted that the majority of studies reporting satisfaction after ACL surgery were performed over a decade ago, with only 4 studies published in the past 5 years meeting inclusion criteria. This trend is likely explained by an increased attention to patient-reported outcomes and similar functional outcome measures that matter to patients after ACL surgery. As such, there has been a proliferation of numerous outcome measures with the ACL reconstruction literature.[22] We hypothesize that with increased attention to disease-specific outcome measures, there has been a relative inattention to patient-reported satisfaction measures. Recent commentary by leaders in the field emphasized the need for increased satisfaction reporting for orthopaedic procedures.[12] In the changing healthcare climate, there is increasing burden on surgeons to demonstrate the value of elective surgeries. Especially for high-volume elective procedures such as ACL reconstruction, it is important for surgeons to evaluate and maximize patient satisfaction after surgery. Further work needs to be done to define the best method for measuring and reporting patient satisfaction after ACL surgery. We believe that there is a role for the routine reporting of patient satisfaction along with patient-reported outcome measures such as the Tegner or IKDC. Attention should be paid to collecting these satisfaction measures in an impartial way that avoids potential bias engendered by the physician-patient relationship.

No studies in our review included measurement of preoperative expectations. Preoperative expectation has been shown to have a strong impact on postoperative patient satisfaction in other areas of orthopaedic surgery.[23] Data from the Multicenter Orthopaedic Outcomes Network (MOON) group have shown that a significant number of athletes undergoing ACL reconstruction do not have a sustained return to sport.[4] An important factor in patient satisfaction may be appropriate management of expectations, especially regarding return to play.

The studies included in this review most commonly measured patient satisfaction using a 0 to 10 VAS-type score. It is unclear whether this tool is robust enough to capture all facets of patient satisfaction relating to ACL surgery. Subspecialty organizations need to develop a standardized tool for improved measurement of satisfaction. The tool could be part of a current patient-reported outcome measure or could be separate and tailored to ACL reconstruction. Either way, a new satisfaction tool should include return to play as a component, as this is a likely a strong contributing factor to satisfaction and warrants further study.

This review has certain limitations. First, only studies performed in the United States were included. Advances in ACL reconstruction surgery have been made all over the world, and it is possible that we could have missed articles from outside the United States that reported on satisfaction. However, previous studies have shown that cultural differences as well as differences in health care systems may influence patient preferences and satisfaction after procedures.[17,19] Therefore, to minimize confounding variables and patient heterogeneity, we limited the inclusion criteria to only US studies. Second, there is a wide range of methods for performing ACL reconstruction, and many of the studies included in this review used different reconstruction techniques, further contributing to the heterogeneity of the study data. Additionally, given the time frame for patient surgeries included as part of this review, some of the described techniques are no longer employed in modern ACL reconstruction surgery.

CONCLUSION

The quality of evidence for studies reporting patient satisfaction is moderate, and the methodologies for reporting patient satisfaction are variable. Additionally, within the past decade there has been a significant decline in the inclusion of this outcome measure within published ACL studies. Continued attention should be paid to the reporting of patient satisfaction after ACL reconstruction and toward determining a consensus on the method for reporting this measure.

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