Preoperative Patient Expectations of Total Shoulder Arthroplasty

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Background: Very little data exist regarding patients' preoperative expectations of the outcome of total shoulder arthroplasty. We hypothesized that younger patients and patients with worse function and worse general health would have greater expectations of total shoulder arthroplasty.

Methods: Ninety-eight patients who underwent unilateral primary total shoulder arthroplasty at one institution were studied prospectively. The preoperative evaluation included the American Shoulder and Elbow Surgeons (ASES) score, Shoulder Activity Scale, Short Form-36 (SF-36), and visual analog scale scores for shoulder pain, fatigue, and general health. Expectations were evaluated with use of the Hospital for Special Surgery's Shoulder Surgery Expectations Survey.

Results: Relief of daytime pain, relief of nighttime pain, and improvement of shoulder range of motion were very important to 86%, 82%, and 84% of the patients, respectively. Expectations were not associated with education, history of previous joint replacement, or comorbidities. Greater expectations were associated with younger age, worse general health on the visual analog scale, and worse ASES scores ($p < 0.05$ for all), with correlation coefficients ranging from 0.25 to 0.28. Multivariate analysis showed that younger age was the only independent predictor of greater expectations ($p < 0.05$).

Conclusions: Younger patients had greater expectations of total shoulder arthroplasty, which may have implications for outcome and implant longevity.

There is increasing evidence that patients' expectations for the outcome of a treatment can be quantified and that expectations have a measurable association with the outcome of treatment[1-6]. Greater expectations are associated with better outcomes[1-6], but unfulfilled expectations are associated with lower patient satisfaction[3-5]. Patients' preoperative expectations of orthopaedic surgical procedures have been examined and shown to vary by diagnosis, age, sex, education, level of function, and general health status[7-9]. A recent study has also demonstrated international variability in patients' expectations for total knee arthroplasty[10].

However, few studies have assessed patients' expectations of total shoulder arthroplasty[7]. The typical indication for primary total shoulder arthroplasty is symptomatic glenohumeral arthritis, and over 35,000 total shoulder arthroplasty procedures are performed annually in both the United States and the United Kingdom[11]. The annual number of shoulder arthroplasties is expected to rise over the next twenty years, with younger patients projected to account for an increasing proportion of this demand[12]. Patients with glenohumeral arthritis were included in the development of the Hospital for Special Surgery's Shoulder Surgery Expectations Survey, which is a validated and reproducible patient-reported instrument for assessing the expectations of patients undergoing shoulder surgery[7]. The final version of the survey was administered to a pilot population that included ten patients with glenohumeral arthritis[7]; however, the preoperative expectations of a larger population undergoing total shoulder arthroplasty have not been previously investigated.

The goal of the study was to assess the factors associated with patients' preoperative expectations of total shoulder arthroplasty. The results of this study can provide a framework to help guide preoperative counseling. On the basis of the existing literature[7-9], we hypothesized that younger patients and patients with worse function and worse general health would have greater expectations of total shoulder arthroplasty.

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Materials and Methods

We prospectively studied patients who underwent unilateral primary total shoulder arthroplasty for the treatment of glenohumeral osteoarthritis at one tertiary-care teaching institution between May 2007 and May 2008. The study was approved by the hospital's institutional review board.

Patients' preoperative expectations were assessed with use of the Hospital for Special Surgery's Shoulder Surgery Expectations Survey[7]. Patients rated the importance of seventeen separate expectations of treatment of the shoulder (Table I). There were five possible responses for each expectation question: "very important," "somewhat important," "a little important," "I do not expect this," and "this does not apply to me." For the purposes of this study, higher levels of importance were defined as "greater expectations." This was an observational study, and no attempt was made to influence patients' expectations aside from the routine preoperative informed consent discussion of the indications, risks, benefits, and alternatives that occurred prior to patient completion of the survey.

The prospective preoperative evaluation also included the American Shoulder and Elbow Surgeons (ASES) shoulder score, the Shoulder Activity Scale (SAS), the Short Form-36 (SF-36), and three 100-mm visual analog scale (VAS) measures. The ASES shoulder score is a well-characterized measure of shoulder function; possible scores range from 0 to 100, with 100 representing the optimal score[13]. The SAS is a validated measure of the frequency with which a patient performs activities involving the shoulder; possible scores range from 0 to 16, with greater numbers reflecting a greater activity level[14]. The SF-36 is a validated and commonly used measure of general health status with eight subscales; possible scores on each subscale range from 0 to 100, with 100 representing the optimal score[15]. The VAS shoulder pain score assessed shoulder pain over the prior week and was anchored with "no pain" at 0 mm and "pain is as bad as it could be" at 100 mm. The VAS fatigue score was used to assess unusual fatigue or tiredness over the prior week and was anchored with "fatigue is not a problem" and "fatigue is a major problem." The VAS general health score was used to assess how the patient was doing overall with respect to illness and health conditions and was anchored with "very well" and "very poorly." The patient response marked on each 100-mm-long VAS line was recorded to the nearest millimeter.

Patient comorbidities were self-assessed by the patient with use of standard binary (yes/no) questions regarding twelve medical problems including depression[16,17]. Patients who indicated that they had a particular medical problem were considered to have that comorbidity.

Statistical Analysis

An analysis of each item and an analysis of the cumulative score were performed. In the item-specific analyses, the responses for each individual expectation question were grouped into three categories to facilitate analysis: "very important" represented the highest level of expectations, "somewhat important" or "a little important" represented the middle level of expectations, and "I do not expect this" or "this does not apply to me" represented the lowest level of expectations for each question. Patients who left a question blank were not included in the analysis for that question. Associations between the three categories of responses on each expectation question and categorical variables (sex, college degree, surgeon, history of depression, history of previous joint replacement, and history of previous contralateral total shoulder arthroplasty) were analyzed with use of the Fisher exact test. Associations involving continuous variables (age, total number of comorbidities, VAS scores, ASES score, SAS score, and SF-36 subscale scores) were analyzed with use of the Kruskal-Wallis test, which is analogous to analysis of variance (ANOVA) but is more appropriate for data that are not normally distributed. The Kruskal-Wallis test utilizes the

TABLE I Responses on the Hospital for Special Surgery's Shoulder Surgery Expectations Survey

	Response *(no. of patients)*				
"How Important Are These Expectations in the Treatment of Your Shoulder?"	Very Important	Somewhat Important	A Little Important	I Do Not Expect This	This Does Not Apply to Me
Relieve daytime pain	84	4	0	0	4
Relieve nighttime pain	80	7	1	0	3
Improve shoulder range of motion	82	8	0	0	2
Stop shoulder from dislocating	34	3	3	2	47
Stop shoulder from clicking	47	12	8	2	22
Improve ability to carry objects over 10 lbs [4.5 kg]	60	26	3	2	3
Improve ability to reach above shoulder level	70	20	3	0	1
Improve ability to reach sideways	68	20	0	0	7
Improve self-care	77	3	0	0	13
Be employed for monetary reimbursement	16	6	3	12	54
Improve psychological well-being	44	16	10	4	19
Improve ability to interact with others	43	26	6	4	13
Improve ability to perform daily activities	62	24	2	0	5
Improve ability to drive or put on a seatbelt	56	17	3	0	16
Improve ability to exercise or participate in sports	51	22	8	3	8
Improve ability to participate in recreational activities	52	25	6	2	8
For shoulder to be back to the way it was before this problem started	66	15	2	9	2

median rather than the mean for analysis. Consequently, both the mean and the median are presented in the text.

For the analysis of the cumulative score, the total number of expectation questions marked "very important" was recorded for each patient. Associations with the total number of expectations were analyzed with use of the Wilcoxon rank-sum test for categorical variables and the Pearson correlation for continuous variables. A multivariate model was then utilized to determine the independent predictors of the total number of expectations marked "very important." The model included age, sex, possession of a college degree, VAS general health, the SF-36 role emotional subscale, and the ASES score; these variables were selected on the basis of the strength of the univariate associations and clinical relevance. A p value of <0.05 was considered significant.

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Results

Two hundred and eighteen patients were treated with total shoulder arthroplasty during the study period. Of these eligible patients, 116 consented to participate and ninety-eight completed the preoperative questionnaire. Twenty different surgeons contributed patients to the study; however, three surgeons contributed fifty-eight (59%) of the patients. The mean age (and standard deviation) was 67.6 ± 10.6 years (range, thirty to eighty-six years) and the median age was 69.5 years. Fifty-seven (58%) of the patients were women and forty-one (42%) were men. Sixty-five (66%) had graduated from college. The mean number of comorbidities was 2.4 ± 1.4 (range, 0 to 7) and the median was 2. Twenty-one patients reported having depression. Forty-three patients reported a history of at least one previous joint arthroplasty (hip, knee, or shoulder) and sixteen of those patients had a history of a previous contralateral total shoulder arthroplasty.

The preoperative scores for the cohort are shown in Table II, and the low ASES scores, high levels of pain on the VAS, and low SF-36 scores are consistent with symptomatic glenohumeral arthritis.

The frequencies of patients' expectations for each question are shown in Table I. Relief of daytime pain, relief of nighttime pain, and improvement in shoulder range of motion were very important to 86%, 82%, and 84% of the patients, respectively. In the item-specific analysis, being employed for monetary reimbursement was very important to the least number of patients, with younger patients reporting that this was more important than older patients did ($p < 0.05$). Younger patients also had greater expectations for relief of nighttime pain ($p < 0.05$), for an improved ability to interact with others ($p < 0.05$), and for an improved ability to exercise or participate in sports ($p < 0.05$). It was more important to women than men to stop the shoulder from dislocating ($p < 0.05$), improve psychological well-being ($p < 0.05$), and improve the ability to drive or put on a seatbelt ($p < 0.05$). We did not observe an association between expectations and possession of a college education, a history of previous joint replacement, a history of previous contralateral total shoulder arthroplasty, the total number of comorbidities, a history of depression, or the surgeon.

We did not observe any associations between eleven of the seventeen expectation questions and the VAS, ASES, SAS, or SF-36 scores. These eleven questions involved relief of daytime pain, relief of nighttime pain, shoulder range of motion, shoulder clicking, carrying >10 lbs (4.5 kg), reaching to shoulder level, reaching sideways, being employed, ability to drive or put on a seatbelt, participating in recreational activities, and the shoulder being "back the way it was" before onset of the problem.

TABLE II Preoperative Scores

Measure*	Mean	Std. Dev.	Median	Minimum	Maximum
ASES shoulder score†	34.6	17.8	34.8	0	71.3
Shoulder Activity Scale†	5.4	4.0	5.0	0	16
VAS shoulder pain‡	68.8	21.3	73.0	5	100
VAS fatigue‡	45.7	15.0	35	0	100
VAS general health‡	5.3	6.8	4.7	0	53
SF-36†					
Physical function	54.5	25.5	60.0	0	95
Role physical	45.9	29.1	43.8	0	100
Bodily pain	31.3	19.1	31.0	0	100
General health	68.4	19.9	72.0	0	100
Vitality	54.3	20.7	56.3	0	100
Social function	68.6	29.7	75.0	0	100
Role emotional	74.5	28.6	83.3	0	100
Mental health	72.9	19.3	75.0	0	100

*ASES = American Shoulder and Elbow Surgeons, VAS = visual analog scale, and SF-36 = Short Form-36. †A higher score represents a better result. ‡A higher score represents a worse result.

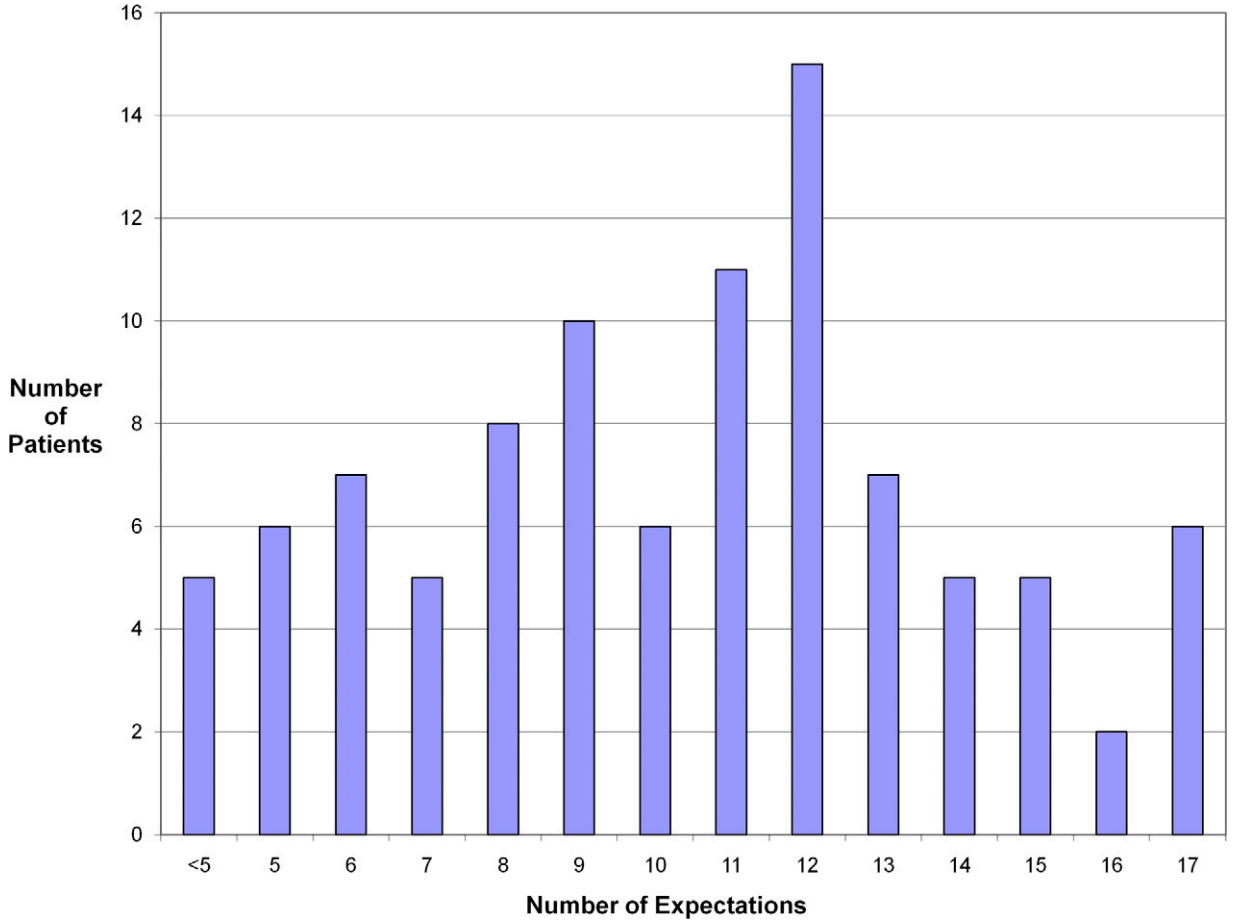

Fig. 1

Histogram of the total number of expectations marked as ''very important'' by the patient.

The following associations were found for the remaining six questions. Patients with greater expectations of an improved ability to exercise or participate in sports had less shoulder pain on the VAS scale ($p < 0.05$), which suggests that patients with less pain may be focused on more demanding functional goals regardless of age or activity level. Patients with greater expectations of an improved ability to interact with others had worse VAS general health scores ($p < 0.05$) and lower SF-36 social function scores ($p < 0.05$). Greater expectations of an improved ability to perform daily activities were associated with lower SF-36 physical function scores ($p < 0.05$). Greater expectations of improved self-care were associated with worse ASES shoulder scores ($p < 0.05$). Greater expectations of improved psychological well-being were associated with worse VAS fatigue scores ($p < 0.05$), worse VAS general health scores ($p < 0.05$), and worse scores on all SF-36 subscales except general health ($p < 0.05$). Greater expectations for stopping the shoulder from dislocating were associated with worse VAS general health scores ($p < 0.05$), lower SAS scores ($p < 0.05$), and worse SF-36 physical function ($p < 0.05$), bodily pain ($p < 0.05$), and role emotional scores ($p < 0.05$).

The mean number of "very important" expectations (Fig. 1) was 10.1 ± 4.0, with a median of 11 and a range of 0 to 17. A greater total number of expectations was associated with younger age ($p < 0.05$), worse VAS general health scores ($p < 0.05$), and worse ASES scores ($p < 0.05$). The correlation coefficients for these associations ranged from 0.25 to 0.28, indicating a weak linear association. Patients with lower SF-36 role emotional scores also had a greater number of "very important" expectations, but this did not reach significance (correlation coefficient = 0.20, $p = 0.057$).

The multivariate analysis showed that younger age was the only independent predictor of a greater number of "very important" expectations ($p < 0.05$). The multivariate regression coefficient was –0.08, which means that every 12.5-year increase in age was associated with one less expectation.

Discussion

The results supported our hypothesis that younger patients have greater expectations for total shoulder arthroplasty. Younger patients had a greater number of expectations as well as greater expectations for relief of nighttime pain, improved ability to interact with others, and improved ability to exercise or participate in sports. Mancuso et al. found that younger patients undergoing any type of shoulder surgery had greater expectations than older patients for improvement in sports[7]. Similarly, studies

of patients undergoing hip or knee arthroplasty have suggested that younger patients have different expectations than older patients do[3,8,9]. However, in contrast to the findings of the present study, younger patients undergoing total hip arthroplasty were found to have fewer expectations than older patients did[8]. The reasons for these divergent findings are unclear, but may be related to differences in the patient populations or to the inherent difference between the Hospital for Special Surgery's "Expectations" surveys, which are tailored to the anatomic region and are therefore not directly comparable. Greater preoperative expectations have been associated with better postoperative outcomes and satisfaction after shoulder surgery[2,5]. However, greater preoperative expectations in younger patients undergoing total shoulder arthroplasty could be a potential concern if they lead to unmet expectations[18] or if they indicate an increased future demand on the shoulder prosthesis that may have implications for implant longevity.

The results of the present study partially supported our hypothesis that patients with worse self-reported function would have greater expectations for total shoulder arthroplasty. We found that patients with worse function had greater expectations for improved self-care and improved daily activities, which suggests that patients with worse function assign greater importance to less demanding activities. This corroborates the findings of Mancuso et al., who found that worse shoulder function as assessed by the L'Insalata Shoulder Rating Questionnaire was associated with more frequent expectations for improvement in the ability to provide self-care in patients undergoing any type of shoulder surgery[7]. We also found that lower ASES scores were associated with a greater number of expectations in the univariate analysis; however, this association was not significant in the multivariate analysis. Patients with worse preoperative self-reported function have been reported to have more unmet expectations after total hip arthroplasty[18]. We did not assess actual shoulder function in the present study, and it is possible that some patients may have perceived themselves as more dysfunctional than they actually were.

The results of the study partially supported our hypothesis that patients with worse general health would have greater expectations for total shoulder arthroplasty. Worse scores on the VAS general health and seven SF-36 subscales were most closely associated with greater expectations for improvement in psychological well-being. This does not seem to be related to a self-reported history of depression or a greater number of medical comorbidities, as we did not find an association between either of these variables and expectations. It is possible that these patients felt a greater need for the improvement because of their worse general health. Other variables that could be considered in future studies include current depressive symptoms, loss of independence, and perceived burden on others, which are psychosocial factors known to be associated with worse general health in other patient groups[19].

A surprising finding of the study was that thirty-four patients reported that it was very important for the surgery to stop the shoulder from dislocating. This contrasts starkly with the study by Mancuso et al., in which none of the patients with glenohumeral arthritis cited this as an expectation[7]. Since instability is not generally a feature of glenohumeral arthritis, stopping the shoulder from dislocating is not an appropriate expectation for the surgery. Our results suggest a potential misunderstanding of the pathology and the planned treatment that could be profound. Alternatively, the patients may have perceived crepitus or mechanical symptoms as a sense of "dislocation." Female patients, patients with a lower SAS score, and patients with worse general health were more likely to indicate that this was important.

This study has several limitations. First, the study population was derived from a tertiary-care center and may not be generalizable to other settings. For example, the proportion of college graduates in the study was 66%, which may not be consistent with other populations of patients undergoing total shoulder arthroplasty. Second, twenty different surgeons contributed patients to the study. While we did not detect a difference in expectations among the patients of different surgeons, an individual surgeon's approach to preoperative counseling could have a substantial effect on a patient's preoperative expectations as well as on the decision to proceed with surgery. Third, the lack of data from eligible patients who did not participate in the study represents a source of potential bias that could have influenced the results. Fourth, the visual analog scales utilized in the study have not been formally validated in the literature. Fifth, although we found significant associations that had potential clinical relevance, the correlation coefficients were small and the actual clinical significance of the associations is unknown. However, our data may underestimate the association between expectations and preoperative status because of the limited range of some of the outcome scores as well as a ceiling effect in which many patients reported the highest possible level of expectation for many of the questions. Finally, other aspects of preoperative patient expectations that were not assessed in this study, such as the amount of improvement expected[20] and the likelihood of improvement[2], may be important. Future studies are required to address these limitations and to further investigate the relationship between expectations and the outcome of total shoulder arthroplasty. ■

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