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Evaluation of satisfaction and durability after hemiarthroplasty and total shoulder arthroplasty in a cohort of patients aged 50 years or younger: an analysis of discordance of patient satisfaction and implant survival

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Background: Shoulder arthroplasty in individuals aged 50 years or younger reportedly leads to worse outcomes than in older patients. Current methods of determining survivorship may be inadequate and may not reflect actual patient definitions of satisfaction. The purpose of this study is to evaluate and contrast the survival of patient satisfaction and implant survival in the youngest reported patients undergoing either a primary hemiarthroplasty (HA) or total shoulder arthroplasty (TSA) using a third-generation stemmed prosthesis.

Methods: Outcomes in 71 patients aged 50 years or younger who were treated with primary HA or TSA were evaluated for patient satisfaction and implant survival rates. Patient satisfaction survival was based on yes or no answers to 2 binary questions regarding willingness to undergo surgery again and whether surgery improved the patient's shoulder.

Results: The Kaplan-Meier patient satisfaction survival rates at 5 years were 71.6% (95% confidence interval [CI], 46%-87%) for HAs and 95% (95% CI, 81%-99%) for TSAs. Multivariable regression analysis implicated postoperative pain as the primary causative factor for failure of patient satisfaction in all patients. In contrast, the implant survival rates at 5 years were 89% (95% CI, 69%-96%) for HAs and 95% (CI, 85%-100%) for TSAs.

Conclusions: Patients aged 50 years or younger who undergo shoulder arthroplasty have declining rates of self-reported satisfaction despite high implant survival rates, and this finding highlights the discordance between patient satisfaction and implant survival. Primary TSA outperforms HA in both implant survival

This study received institutional review board approval from the Partners Human Research Committee (protocol No. 2012-P-000631/1, BWH).

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and patient satisfaction survival rates at short-term follow-up. Future studies and registries must incorporate measurements of patient satisfaction and not just revision rates to truly interpret outcomes.
Level of evidence: Level III, Retrospective Cohort Design, Treatment Study.

Keywords: Shoulder arthroplasty; young patients; patient satisfaction; implant survival

Shoulder arthroplasty is an effective method of treatment for symptomatic shoulder arthritis particularly in older patients. Arbitrary definitions of ''young'' patients include cohorts of varying ages, with 55 years used as a benchmark in several studies.[18] Very little has been published regarding younger cohorts of patients. Younger patients, or those defined as younger than 50 years of age, have more complex and multifactorial forms of arthritis with etiologies such as congenital deformities, trauma, inflammatory conditions, and iatrogenic causes such as prior surgery, as well as intra-articular infusion pain pump use.[34] Furthermore, younger patients engage in more demanding activity after shoulder arthroplasty and have greater expectations and demands.[16,46] Although total shoulder arthroplasty (TSA) is recognized as the most reliable and cost-effective treatment for symptomatic arthritis in older patients, there are concerns about its durability in younger patients.[4,5,7,23] Besides glenohumeral fusion and arthroscopic debridement, the arthroplasty choices include humeral resurfacing procedures, partial or total, as well as stemmed humeral replacement with or without glenoid resurfacing.[6] Glenoid resurfacing options consist of so-called biologic resurfacing with soft-tissue interpositional grafts and prosthetic resurfacing with a polyethylene component. Humeral arthroplasty combined with glenoid debridement or reaming without resurfacing has also been proposed as a treatment alternative.[14,24]

There is limited literature documenting the midterm to long-term outcomes of arthroplasty approaches in patients aged 50 years or younger. As a result, there is a lack of strong evidence available to guide best practices for treatment. One study from the Mayo Clinic has specifically evaluated patients under 50 years of age receiving a hemiarthroplasty (HA) or TSA.[2,38,39] This study reported HA survival rates of 82% and 75% at 10 years and 20 years, respectively, whereas the TSA survival rates were 97% and 84%, respectively. More concerning, however, were the high numbers of ''unsatisfactory'' outcomes for HAs, at 60%, and TSAs, at 48%, using the Neer rating.

Recently, this same cohort of patients was evaluated at a minimum of 20 years' follow-up, and unsatisfactory Neer outcomes were found in 73.2% of patients receiving an HA and 57.9% of those receiving a TSA.[37] When satisfaction was evaluated in the HA cohort, 66% of patients rated their shoulder as ''much better or better'' than preoperatively. The TSA cohort was relatively small with only 16 patients, of whom 12 reported being ''much better or better.'' It is challenging to reconcile these differences in the Neer ratings and the ''satisfaction'' ratings especially when it is clear that the reoperation cohort of HAs is high. The prosthesis used in this cohort was the Neer prosthesis, an original monoblock design[26] that potentially limits a surgeon's ability to accurately replicate or reconstruct a patient's individual anatomy. Since this study, an evolution in prosthetic design has resulted in modular implants designed to replicate the native humeral geometry.[27,43] Another study evaluated the minimum 10-year follow-up results of cementless resurfacing arthroplasty in 54 shoulders and found that 81.6% of patients were ''satisfied'' despite an 18.5% revision arthroplasty rate.[22]

National registries and large databases report implant survivorship of patients undergoing TSA, but not all registries collect patient-reported outcome scores and they may therefore underestimate the satisfaction of patients regarding their function and pain level.[30,32,33] There have been few peer-reviewed publications from national shoulder arthroplasty registries, and none have specifically looked at a cohort of patients under the age of 50 years.[31-33] The 2014 annual report from the National Joint Replacement Registry in Australia described 5-year cumulative revision rates of 6.7% and 10.6% for stemmed TSA and HA, respectively, for patients under the age of 55 years.[1] The Australian registry does not collect data on functional outcomes and does not present a specific data set on a cohort stratified by age 50 years or younger.

The purpose of this study is to report clinical outcomes (patient satisfaction), durability (freedom from revision), and radiographic outcomes in patients aged 50 years or younger who underwent primary TSA or HA. The prosthesis used was designed to accurately restore 3-dimensional anatomy through modularity of a stem and head system with 3 *df* (neck-shaft angle, humeral offset, and variable version) (Zimmer Anatomic Shoulder Arthroplasty; Zimmer, Warsaw, IN, USA). Our intent was to analyze survivorship based on both patient satisfaction and implant failure. We hypothesized that durability and patient satisfaction would be greater for TSA than for HA and that anatomic reconstruction of the humerus would correlate to both of these variables.

Materials and methods

Patients

Between 2002 and 2011, 30 of 227 primary HAs (11.9%) and 54 of 770 primary TSAs (7.0%) were performed by two surgeons with a modular, anatomic shoulder prosthesis in patients aged 50 years or younger and with a minimum of 2 years' follow-up. All patient clinical and radiographic records were evaluated for diagnoses, complications, failures, and revision surgery. The choice for glenoid component implantation was individualized for each patient based on multiple factors including etiology of arthritis and coexisting anatomic factors, such as the structural condition of the glenoid and decentering of the humeral head, as well as patient activity level. In general, the decision on the type of arthroplasty was made preoperatively regardless of glenoid morphology, and glenoid reconstruction was performed whenever possible. A shared decision-making process with the patients was performed, allowing them to decide which type of arthroplasty they would like to undergo.

The inclusion criteria for this study were as follows: (1) age 50 years or younger at the time of surgery, (2) primary arthroplasty procedure, (3) minimum follow-up duration of 2 years, (4) intact rotator cuff at the time of surgery, and (5) availability to complete an online or telephone evaluation. Overall, 27 of 30 HAs (90%) and 44 of 54 TSAs (81%) were available for follow-up evaluation. The preoperative demographic characteristics for these patients are listed in Table I. Patients who received a TSA were, on average, older and had more prior surgical procedures than those receiving an HA but had a similar average length of follow-up.

Clinical evaluation

Patients were contacted for evaluation via an e-mail link to an online follow-up questionnaire or by telephone. Patients were queried for Simple Shoulder Test, American Shoulder and Elbow Surgeons (ASES), and visual analog scale (VAS) scores,[36] as well as the preoperative and postoperative Subjective Shoulder Value (SSV).[13] In addition, patients were asked the following two specific binary questions: (1) "Taking your whole experience into consideration, would you have your operation again?" (2) "In your estimation: Did the operation make your shoulder better or worse?" We defined patient satisfaction failure to have occurred if the patient answered either question with a negative response. In addition, patients were queried if they underwent a revision surgical procedure or any other additional operation on their shoulder at another institution.

Radiographic evaluation

Preoperative and postoperative plain radiographs, as well as a preoperative computed tomography (CT) scan, were obtained in all patients to evaluate glenoid morphology and version. Annual surveillance radiographs with anteroposterior (AP) (Grashey) and axillary views were obtained. The preoperative radiographs and the last clinically available postoperative radiographic data were evaluated and graded by consensus decision between 2 fellowship-trained orthopedic surgeons. Several radiographic criteria were used for evaluation including glenoid version and morphology (Walch classification),[40] head-to-tuberosity distance, humeral head offset and subluxation, humeral head–to–shaft angulation (postoperative radiographs), proximal humeral migration, humeral head–glenoid alignment, glenoid erosion, and prosthetic glenoid radiolucency.

Glenoid version was measured on both the preoperative and postoperative radiographs from either a midaxial CT image or axillary radiograph according to a technique similar to the method of Friedman et al.[10] The humeral head–to–tuberosity distance, humeral head offset, and humeral head–to–shaft angulation were measured on AP radiographs according to the methods described by Pearl and Kurutz.[27] Humeral head subluxation was evaluated with either the midaxial CT image or axillary view using the method described by Gerber et al.[12] Humeral head–to–glenoid alignment in the superoinferior plane was evaluated with either a true AP radiograph (Grashey view) or coronal CT image. The technique for measurement of humeral head–to–glenoid alignment in the superoinferior plane used a best-fit circle centered over the humeral head to the center of the glenoid as described by Ho et al.[17] Superior migration was recorded as a positive number and inferior migration was recorded as a negative number using the method described and validated by Yamaguchi et al.[19,44] Furthermore, postoperative glenoid component lucency was classified into 5 different grades according to the criteria of Lazarus et al.[21] Glenoid component loosening was also grouped as none, mild, moderate, or severe.

Operative techniques and implants

All procedures were performed according to a previously described technique.[8] The same dissection and approach to the humerus were used for all patients regardless of the management of the glenoid. The manner in which the glenoid was addressed depended on the particular presentation and needs of the patient. Patients with glenoid dysplasia or significant retroversion were treated by various methods to correct the deformity. Methods of treatment included osteoplasty either through eccentric reaming alone in an attempt to correct version or by performing autograft bone grafting of the glenoid with or without prosthetic glenoid replacement. Additional glenoid treatments for patients with glenoid osteoarthritis included resurfacing with Achilles tendon or meniscal allografts. Patients with rheumatoid arthritis, avascular necrosis, or a proximal humeral fracture were treated with HA without resurfacing of the glenoid.

Statistical methods

Descriptive group data and univariate data are presented as the mean and standard error of the mean or the median and range of values for continuous variables, whereas categorical values are presented as numbers with percentages. The Pearson test was used for correlation analyses, and comparisons between 2 groups were made using the unpaired t test with Welch correction (for data with continuous variables) or Fisher exact test (for categorical data). Multivariable logistic regression analysis was performed to analyze differences in outcome scores between HA and TSA and individual models for B- and C-type glenoids, as well as revision surgery. Kaplan-Meier survival curves were calculated for outcome failure based on revision surgery for conversion to TSA, resection arthroplasty, or patient satisfaction failure. Patient

Table I Patient characteristics, diagnoses, and previous surgical procedures

	HA	TSA	*P* value
No. of shoulder replacements	27	44	
Mean age (range), y	38 (19-50)	44 (29-50)	.004
M/F sex, n	13/14	31/13	
Mean duration of follow-up (range), y	5.2 (2.3-13.3)	4.9 (2.3-11.1)	.064
Diagnosis, n			
OA	14	33	
RA	7	7	
AVN	5	4	
Trauma	1	0	
No. of patients with previous surgical procedures	8	24	
Mean No. of previous surgical procedures (range)	0.69 (0-4)	1.48 (0-8)	.002

AVN, avascular necrosis; *F*, female; *HA*, hemiarthroplasty; *M*, male; *OA*, osteoarthritis; *RA*, rheumatoid arthritis; *TSA*, total shoulder arthroplasty.

Table II Clinical results comparing HA and TSA

	HA	TSA	*P* value
Preoperative SSV, mean (SD)	24.4 (17.8)	25.6 (21.2)	.8155
Postoperative SSV, mean (SD)	66.3 (26.3)	78.7 (21.09)	.0341*
Postoperative pain score, mean (SD)	2.69 (3.0)	1.69 (2.4)	.1322
Postoperative SST score, mean (SD)	69.24 (27.0)	81.7 (25.1)	.0588
Postoperative ASES score, mean (SD)	68.4 (27.5)	78.1 (22.2)	.1164
No. of patients with reoperation (%)	4 (14)	5 (11)	
No. of patients with failed outcome (%)†	6 (22)	3 (7)	

ASES, American Shoulder and Elbow Surgeons; *HA*, hemiarthroplasty; *SST*, Simple Shoulder Test; *SSV*, Subjective Shoulder Value; *TSA*, total shoulder arthroplasty.

* Statistically significant.

† Defined as satisfaction failure with a negative response to either of the binary questions.

satisfaction was graded in a binary fashion as failed (ie, the patient gave a negative response to either of the 2 specific questions regarding patient perception) or intact. To account for the outcome scores of the HA patients in whom failure occurred and revision to a TSA was required, the average outcome scores of those patients in whom the HA "failed" but who did not undergo revision surgery were calculated into an average "failure score." This failure score was assigned to those HAs in the overall calculation of mean outcome scores for HAs. An α level of .05 was used for the determination of statistical significance. All statistical analyses were performed using SAS software, version 9.3 (SAS Institute, Cary, NC, USA).

Results

Clinical outcomes

Direct comparison between HA patients and TSA patients showed that the preoperative mean SSV was no different between the 2 groups; however, the postoperative mean SSV was clinically and statistically significantly different (Table II). Although there was a trend toward better outcomes for TSA in terms of the other measured outcome scores (VAS, Simple Shoulder Test, ASES), these values did not reach statistical significance. The HA cohort was a heterogeneous group because 4 patients received meniscal allograft resurfacing procedures, 4 underwent eccentric reaming for version correction, and 2 underwent autograft bone grafting without glenoid prosthesis placement for version correction. In the TSA cohort, 8 patients underwent version correction with eccentric reaming and placement of a glenoid component. No patients in the TSA cohort available for follow-up underwent autograft bone grafting of the glenoid with placement of a glenoid prosthesis.

Overall, 22% of all HAs had clinical failure whereas only 7% of TSAs had clinical failure. A reoperation (not revision arthroplasty) did not always equate to clinical failure because with a correctable problem, such as stiffness requiring an arthroscopic capsular release or revision repair of a displaced lesser tuberosity osteotomy, patient satisfaction ultimately resulted. Meanwhile, a lack of reoperation or complications did not protect against patient satisfaction failure (Table II).

The Kaplan-Meier 5-year implant survival rate was 89% (95% confidence interval [CI], 69%-96%) for HAs and 95% (95% CI, 85%-100%) for TSAs (Fig. 1). The patient

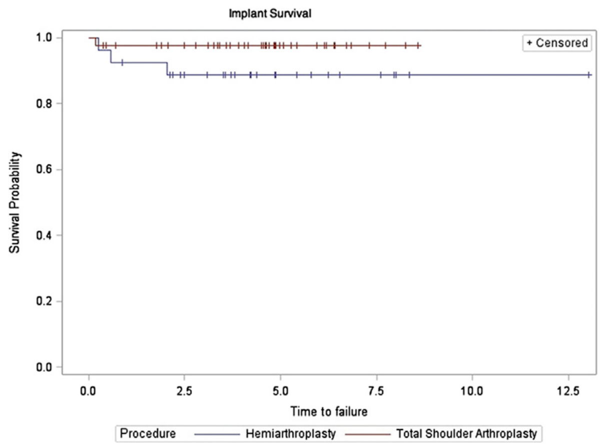

Figure 1 Kaplan-Meier implant survival estimates for hemiarthroplasty and total shoulder arthroplasty.

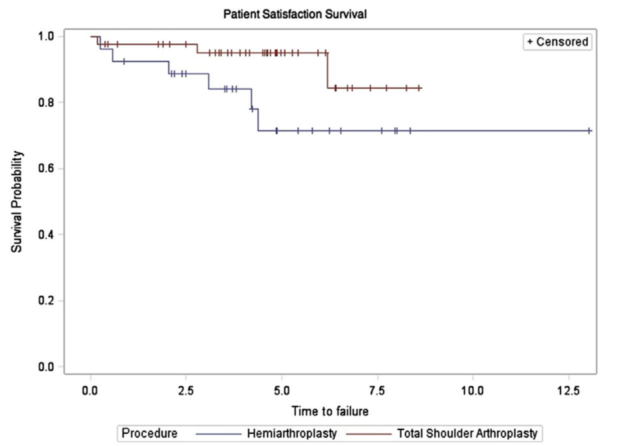

Figure 2 Kaplan-Meier satisfaction survival estimates for hemiarthroplasty and total shoulder arthroplasty.

satisfaction survival rate was 72% (95% CI, 46%-87%) for HAs and 95% (95% CI, 81%-99%) for TSAs at 5 years (Fig. 2). An analysis of specific identified causes of outcome failure is shown in Table III. Frequently, the predominant source of failure was pain, which for most patients was present immediately after surgery and was persistent. A specific cause of the pain, such as a postoperative traumatic event, rotator cuff disorder, or loosening of components on radiographic review, was not always apparent in the clinical record. Univariate and multivariable regression analyses performed for pooled data of all HAs and TSAs indicated that risk factors for worse outcomes in terms of patient satisfaction failure were increased levels of postoperative pain and lower preoperative and postoperative SSV scores (Table IV). Other evaluated measures including glenoid morphology, increasing glenoid component loosening scores, age, sex, and accuracy of replication of the native humeral anatomy, as well as both the history of surgical procedures and an increasing number of prior surgical procedures, were not risk factors for poor outcomes or related to outcome scores.

Complications and revision surgery

Nine revision surgical procedures between both groups occurred in 9 shoulders (13%), of which 3 (11%) were HAs revised to TSAs. Additional reasons for revision included infection, aseptic glenoid loosening, stem loosening, stiffness, and lesser tuberosity nonunion (Table III).

Radiographic outcomes

The mean difference in the humeral head–to–tuberosity height before versus after humeral head reconstruction was 2.7 mm (range, 0-10.8 mm). The mean head-shaft offset difference from preoperatively to postoperatively was 4.8 mm (range, 0-24.7 mm). No definitive conclusions could be made about whether the accuracy of replication made a difference in outcome scores, patient satisfaction, or complications.

The mean postoperative Lazarus radiolucency grade was 1.3 (range, 0-4) at last radiographic follow-up, with no patients requiring revision surgery for a loose glenoid component. Eighty-two percent of patients had grade 0 or 1 postoperative Lazarus radiolucency. Finally, the difference in average proximal humeral migration between preoperative and latest postoperative values was 0.6 mm ($P = .836$) for HAs and 1.2 mm ($P < .005$) for TSAs.

Discussion

Outcome studies on arthroplasty often focus on success or failure of an arthroplasty based on the survival of the implant. This benchmark, however, may not accurately reflect the patient's perception of the outcome of his or her arthroplasty. Shoulder arthroplasty in young patients is relatively uncommon, with few studies evaluating long-term functional outcomes or implant survivorship in this unique patient population.[2,5,25,29,37,38] One study evaluated the results of a cohort of patients under the age of 55 years who underwent stemless humeral resurfacing without glenoid arthroplasty. This study consisted of 36 patients with a relatively short-term follow-up of 38 months and showed a decrease in pain VAS score from 7.5 to 1.3 and an improvement in ASES score from 30 to 86. To our knowledge, only 2 other studies, performed on the same cohort of patients, have evaluated outcomes in patients under the age of 50 years undergoing HA or TSA.[38,39] With a minimum of 15 years' follow-up, Sperling et al[38] reported the outcomes and survivorship of 78 Neer HAs and 36 Neer TSAs. All patients had significant long-term relief of pain and improvement in both active abduction and external rotation, although there was not a significant difference

Table III Characteristics of patients with satisfaction failure

Age, y	Diagnosis	Procedure	Complication	Failure mode	Rate of decline	Time to failure, y	Revision
43	OA	HA with meniscal allograft	Unstable Achilles graft	Pain and stiffness	Gradual	7.2	None
39	OA—revision for failed resurfacing	HA	None	Pain	Gradual	2.1	TSA
45	OA	HA	None	Pain	Immediate	0.6	TSA
44	OA	HA	None	Pain	Immediate	0.2	TSA
37	Post-traumatic OA	HA	None	Pain	Gradual	4.1	None
37	OA	HA and glenoid reconstruction	None	Pain	Immediate	3.1	None
48	AVN	TSA	Infection	Infection	Immediate	0.2	Resection arthroplasty
49	OA	TSA	None	Pain	Gradual	6.2	None
48	OA	TSA	None	Pain	Immediate	2.8	None

AVN, avascular necrosis; *HA*, hemiarthroplasty; *OA*, osteoarthritis; *TSA*, total shoulder arthroplasty.

Table IV Predictors of patient satisfaction failure (total shoulder arthroplasty and hemiarthroplasty)

	Unadjusted odds ratio (95% CI)	*P* value
Postoperative SSV (10 points)	0.243 (0.087-0.678)	.0069*
Preoperative SSV (10 points)	2.096 (1.268-3.464)	.0039*
C-type glenoid	1.893 (0.184-19.430)	.5912
B-type glenoid	0.484 (0.054-4.298)	.5145
A-type glenoid	1.275 (0.233-6.964)	.7792
Pain (postoperative)	4.387 (1.409-13.662)	.0107*
Previous surgical procedures	1.085 (0.346-3.403)	.8888

CI, confidence interval; *SSV*, Subjective Shoulder Value.
* Statistically significant.

between the HA and TSA groups with respect to these variables. By use of the modified Neer rating system, unsatisfactory results were seen in 60% of patients in the HA group versus 48% in the TSA group. The reported survival rates for HA were 82% and 75% at 10 years and 20 years, respectively, whereas the survival rates for TSA were 97% and 84%, respectively. Our results were similar, with the overall implant survival rates for both HA and TSA being 90% through 5 years of follow-up; however, the patient satisfaction rates did not seem to correlate with the high implant survivorship rates. This is an important distinction because although patients may not undergo revision surgery, they may have pain and poor function, resulting in lower self-reported satisfaction. In addition, absolute numerical functional outcome scores do not necessarily match patient satisfaction in these challenging types of patients, many of whom have undergone multiple prior surgical procedures.

An age-matched and demographically controlled analysis, however, was not possible because of the numbers available and the fact that the referral nature of the practices of the 2 surgeons results in the treatment of a substantial number of patients who have undergone failed prior surgical procedures. Another factor influencing results is likely a result of treatment bias regarding patients with significant glenoid retroversion or dysplasia. We believe this bias is relatively low, however, because the decision to implant a glenoid was generally made preoperatively. Furthermore it is clear that a similar number of glenoids underwent eccentric reaming or glenoid modification in both groups, indicating that treatment bias, while still present, was minimized. Regardless of the treatment, however, patients with these difficult glenoids were 6 times more likely to have satisfaction failure. Previous studies have highlighted the difficulties of shoulder arthroplasty in this population, and it continues to be a problem.[20,41] Overall, it appears that primary TSA outperforms HA in young patients in terms of implant longevity, patient outcomes, and cost-effectiveness, and this finding is consistent with previous studies evaluating outcomes between TSA and HA in series with patients in older age groups.[3,11,28,37,47]

On the basis of the results of this study, it is important to understand that implant survival is not an accurate indicator of the success of shoulder arthroplasty in this patient cohort. Although standardized outcome instruments are important in identifying trends as well as outcomes, a better and perhaps more straightforward way to distill the success or failure of a treatment may be to simply ask patients if they believe the operation decreased their pain or improved their function and if the operation was worth undertaking in the first place. As this study has shown, patient satisfaction is not necessarily correlated with implant survival with the end point measured by revision surgery. Furthermore, absolute scores from standardized outcome scoring measurements may not completely portray the satisfaction or happiness of a complex set of patients. Thus a patient's own perception of the outcome is an essential component of the success or value of surgery.

As patients and consumers request more clarity on what kind of results they can expect from a shoulder arthroplasty, we believe that using simple binary outcome questions, such as whether patients are better or worse or would undergo surgery again, would be helpful for future patients to decide whether surgery is right for them. Language, ethnicity, and socioeconomic and educational factors can complicate and challenge obtaining traditional patient-reported outcome measures. Furthermore, the cost and burden of obtaining scores are challenges, so using simplified questions may be beneficial. We do believe that traditional outcome scores (VAS, ASES, SSV, and so on) remain vitally important and should also be used to evaluate outcomes, particularly nuanced findings that simple binary questions do not answer.

Radiographic analysis indicates that a third-generation humeral implant that provides the ability to make changes in multiple planes results in an accurate replication of the native humeral anatomy. This improved accuracy may have an improved benefit over both historical and recent designs in decreasing rotator cuff complications as evidenced by the low reported rate of specific rotator cuff problems and reduced rate of proximal humeral migration.[43,45] No definitive conclusions can be made, however, regarding the influence on outcome from the accuracy of humeral anatomy replication in part because of lack of statistical power, a control group, and complete radiographic follow-up. The Mayo Clinic studies evaluating outcomes in young patients only looked at periprosthetic lucency, "glenohumeral subluxation," and glenoid erosion or wear in their cohort of patients undergoing TSA or HA.[38,39] Newer, modular designs that offer a wider range of eccentric and offset heads and stems, allowing for improved intraoperative adaptation and control, are associated with high short-term implant survival rates, but the accuracy of replication of anatomy has not specifically been analyzed.[35] The only other studies previously performed that evaluated the accuracy of the humeral anatomy were cadaveric studies and showed that motion is adversely affected by component malpositioning.[9,15,42] Our study did not specifically measure range of motion, so no conclusions can be drawn in that regard. To our knowledge, no other published studies have ever tried to directly reconcile restoration of anatomy with actual outcomes.

In addition to the previously mentioned limitations of this study, additional confounding elements are its retrospective design, mixed diagnosis patterns, and intermediate follow-up. The incidence of arthroplasty in young patients is relatively uncommon even at tertiary referral centers and speaks to the need for larger multicenter trials and even large joint registries. In addition, the inability to have all patients return for a specific clinical examination and radiologic evaluation limited the ability to study other relevant factors that may have contributed to success or failure, such as wear, loosening, range of motion, rotator cuff integrity, and other functional parameters.

Conclusion

The use of shoulder arthroplasty in patients aged 50 years or younger remains a challenge in this complex and demanding population. Although the data from this study indicate that both pain and function are improved with shoulder arthroplasty, patient satisfaction may not be durable over the intermediate to long term and does not correlate with the high implant survivorship rates. Primary TSA results in markedly better outcomes and patient satisfaction than revision TSA at short-term follow-up. Future studies and registries need to include an evaluation of patient satisfaction because implant survival alone does not correlate with clinical outcomes.

Disclaimer

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