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Patient reported activities after shoulder replacement: total and hemiarthroplasty

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Hypothesis/Background: The indication to perform a shoulder arthroplasty is guided in part by a patient's intended level of activity after surgery. What level of activity should be safely recommended, and, presently, patient reported activity level is unknown. The purpose of this study was to define and compare the self-reported activities of patients following shoulder arthroplasty either total (TSA) or hemiarthroplasty (HA).

Methods: Two groups of 75 patients each following TSA or HA were matched by age, sex, operative side, timing from surgery, and state of residence. A mailed questionnaire asked patients to report on their level of pain, motion, strength, and choice of 72 different activities. Reported activities were classified as low demand, intermediate demand, or high demand.

Results: Ninety-nine patients completed the survey, 52 in the TSA group (average age 62 years; 30F:22M), and 47 in the HA group (average age 62 years; 27F:20M). No difference on a pain scale was reported between groups. Better results were reported in the TSA group in forward flexion ($P = .006$), internal rotation ($P = .04$), and strength ($P = .04$). The most commonly reported activities in each category were: low demand (eg, cooking), medium demand (eg, gardening), and high demand (eg, snow shoveling). For each activity there was no significant difference between groups.

Discussion/Conclusion: Conventional thinking that HA provides for more activity is not supported by patient-reported activities when compared with TSA. Patients following TSA reported better motion and strength and were equally as active as the HA group.

Level of evidence: Level III, Retrospective Case Control Study.

Keywords: Total shoulder arthroplasty; hemiarthroplasty

The main goals of shoulder replacement surgery are to reduce pain, restore function, and improve quality of life. A key component to improved quality of life involves resuming participation in activities that were not possible or accomplished only with difficulty prior to shoulder replacement surgery. Advances in shoulder arthroplasty

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have improved clinical outcome; in turn, increasing a patient's expectation to return to a pre-morbid level of activity. Recent interest in athletic activity following joint replacement has focused on activities following hip and knee arthroplasty.[2,3,5,9,11] The answer to the clinical question of what level of daily or athletic activity is expected or should safely be recommended following shoulder arthroplasty, remains unclear. Healy et al surveyed 35 members of the American Shoulder and Elbow Surgeons and collected respondents' opinions on the levels of athletic activity that should be allowed after shoulder replacement.[8] The authors determined that only 4 activities from a list of 42 were not recommended, including football, hockey, gymnastics, and rock climbing. The final recommendation from this survey suggested avoidance of high-impact activities, recognizing that the patient ultimately makes the final decision on their activity level. Schmidt-Wiethoff et al, in studying physical activity after shoulder arthroplasty, commented that there was not a generalizeable estimation for the ability to be active, especially in sports following shoulder arthroplasty.[16] Sports participation after shoulder arthroplasty was more fully assessed, and in this review of 75 patients, 77-92% returned to the most common sports: swimming, tennis, or golf.[15] In a study of younger (less than age 55), active patients having cementless humeral resurfacing arthroplasty, 30 of 36 patients returned to their desired level of activity.[1] Similarly, in another study, 23 of 24 patients having shoulder arthroplasty were able to return to golf.[10]

The choice of total shoulder arthroplasty versus hemiarthroplasty also remains controversial. This choice is guided primary by the presence or absence of glenoid arthrosis, but also in part by the patient's age and intended level of activity. The literature supports the preferential use of total shoulder arthroplasty over hemiarthroplasty for predictable pain relief.[4,6,7,14] Comparing quality of life outcome of total shoulder arthroplasty and hemiarthroplasty in osteoarthritis, at 2 years there was no demonstrated significant difference in a randomized group of 42 patients; however, there was a trend of better function and quality of life in the total shoulder arthroplasty group.[14] In contrast, the use of hemiarthroplasty has the advantage of being a technically easier and faster operation to perform, without the concern of glenoid component wear or loosening, and has thus been recommended by some,[12,13] including for younger or more active patients.[1]

Currently, it is unclear what activities patients actually do following shoulder replacement. We speculated patient-reported activity following either total shoulder arthroplasty or hemiarthroplasty may be similar or hemiarthroplasty patients may, in fact, be more active. We, therefore, designed a survey questionnaire asking patients about their clinical situation and what things they do. The purpose of this study was to define and compare the self-reported activities of patients following shoulder arthroplasty either total or hemiarthroplasty.

Methods

A survey questionnaire was designed to evaluate the current level of daily and athletic activity following shoulder replacement. A previously assessed patient questionnaire, providing high levels of agreement with the surgeon's assessment, included closed ended questions that required a participant to fill in a circle with respect to their operated shoulder.[17] This included a pain scale (1 represented no pain and 10 severe pain), current use of pain medication (none, over the counter, narcotic, or both), a diagrammatic representation of range of motion (forward flexion in degrees, external rotation in degrees, and internal rotation scaled 1-8), and strength on a 10-point scale (where 1 is complete paralysis and 10 is normal strength). Added to the questionnaire were a choice of 72 activities so that the patient could indicate whether or not he or she participated in them over the past year (including activities of daily living, sporting activities, and hobbies), and a question about current occupation (fulltime, part time, disabled, unemployed, retired). One open-ended question at the end of the survey asked a patient to report any activities that they would like to do, but could not due to their shoulder replacement.

The Mayo Clinic Total Joint Registry was used to find patients that met the following inclusion criteria: a shoulder arthroplasty performed prior to 2002 with a 2- to 15-year follow-up, the absence of subsequent revision arthroplasty, patient age 30-65 at the time of surgery, and arthroplasty performed for varying diagnoses. Two-hundred sixty-eight potential patients in the total shoulder arthroplasty group were identified and 122 potential patients in the hemiarthroplasty group were identified from the Registry. A group of 75 patients from the total shoulder arthroplasty group were then matched to a cohort of 75 patients from the hemiarthroplasty group. The matched criteria were prioritized in the following order: sex, age, operative side, timing from surgery, and state of current residence.

The questionnaire was then mailed to the 150 potential participants with a covering letter explaining the purpose of the study, and a consent form to be returned with the completed questionnaire in a pre-stamped, addressed envelope. Recipients were given the option to decline participation in the survey by checking a box at the end of the cover letter and returning it, instead of the completed survey. In order to maximize the response rate, the survey was first sent and then followed by a second mailing to nonresponders 1 month later. Telephone call reminders began 1 month after the second mailing to nonresponders. Telephone calls included 5 call attempts before a person would be considered a noncontact. This would include 2 daytime calls, 2 evening calls, and 1 weekend call. Surveys were then resent to those participants who were contacted on the telephone and had agreed to complete the survey, but who no longer had a copy.

There were 45 Cofield implants (Smith-Nephew, Memphis, TN) and 7 Aequalis implants (Tornier, Minneapolis, MN) in the TSA group. There were 39 Cofield implants, 4 Global implants (DePuy, Warsaw, IN), 3 Biomodular implants (Biomet, Warsaw, IN), and 1 Custom implant from Howmedica (Stryker, Mahway, NJ) in the HA group. All shoulders were supported in a sling or shoulder immobilizer for 5 to 6 weeks postoperatively. During that time only passive range of motion was allowed; thereafter, an active assisted program was started, as was isometric strengthening. Stretching and elastic strap strengthening were added at 10-12 weeks postoperatively.

Following recovery from surgery, patients were advised to avoid more than occasionally heavy lifting (greater than 50 pounds) and to avoid activities with repetitive forceful impact. This advice was similar for both the hemiarthroplasty and total shoulder arthroplasty groups.

Response data were tabulated for the entire study group, including both numerical data and respondent written comments. The self-reported clinical data were further analyzed after excluding patients with a revision procedure, an acute fracture, neoplasia, or cuff tear arthropathy. A second subanalysis was performed excluding these shoulders and those with rotator cuff tearing. Activities were subjectively categorized by the authors into 3 groups depending on the imposed demand on the shoulder replacement as low, medium, and high demand activities. A low demand activity was defined as an activity that does not impose a repetitive stress on the shoulder, does not involve heavy lifting, and most shoulder movements are below shoulder height. A moderate demand activity was defined as an activity with the potential for repetitive stress, and may involve lifting moderate loads up to 20 lbs and occasional overhead activity. A high demand activity involves activities with repetitive stress, potential for heavy loads (greater than 20 pounds), and regular movements overhead. Patients were, in turn, classified as low, medium, or high demand, dependent on their response to their highest level of activity participation. Similar to the self-reported clinical data, analysis of activity level was performed for the entire study group and the 2 sub groups − first excluding those with diagnoses that might lead to a less robust result, and the second also excluding those with rotator cuff tearing.

Statistical analysis was performed using SAS version 8.2 (SAS institute, Cary, NC) by the Division of Biostatistics. Comparison between group diagnoses, rotator cuff tearing, and activities were made using Fisher's exact test, while the comparison of grouped data into categories of low, medium, and high demand were made using an extension of Fisher's exact test for ordered contingency tables. Comparison between groups for age, pain, range of motion, and timing from surgery were made using a 2-sample t test assuming unequal variances.

Results

A self-reported summary of the clinical data for both the total shoulder arthroplasty and hemiarthroplasty group means is tabulated (Tables I-III). Table I reports data for the entire study group. Table II removes patients with a revision, acute fractures, neoplasia, and cuff tear arthropathy. Table III also excludes those shoulders with rotator cuff tearing. Pain on a 10-point scale was not significantly different between groups. Forward flexion, internal rotation, and strength were all significantly better in the total shoulder arthroplasty group, while external rotation was not. These differences were present in the entire study group and also in the first subanalysis group excluding certain diagnoses. When those with rotator cuff tearing were also excluded, there were no differences between the total shoulder arthroplasty and hemiarthroplasty groups.

Ninety-nine patients responded to the survey: 52 in the total shoulder arthroplasty group (30F:22M, average age 62 yrs) and 47 in the hemiarthroplasty group (27F:20M, average age 62 yrs). The majority response was from the Midwestern States (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, Ohio, Wisconsin, North and South Dakota) in both groups − total shoulder arthroplasty in 48 and hemiarthroplasty in 43. The average age the time of the index surgery was 53 years (range, 31-64) years in the total shoulder arthroplasty group and 53 years (range, 34-65) in the hemiarthroplasty group. The average age at the time of completion of the survey was 62 years in both groups, and there was no significant difference in age between groups ($P = .87$). The average follow-up time from index surgery to completion of the survey was 8.6 years in the total shoulder arthroplasty group and 8.8 years in the hemiarthroplasty group ($P = .63$). There was a similar proportion of females (58%) and males (42%) in both groups $P = 1.0$. In the total shoulder arthroplasty group, the right shoulder was involved in 29 and the left shoulder in 23; in the hemiarthroplasty group, the right shoulder was involved in 25 and the left shoulder in 22. The hemiarthroplasty group had no patients with bilateral shoulder replacements, while in the total shoulder arthroplasty group, there were 6 patients with bilateral total shoulder replacements.

The diagnoses were osteoarthritis (22 primary, 3 secondary) in 25, rheumatoid arthritis in 11, posttraumatic arthritis in 15, and failed HA in 1 shoulder in the TSA group. The diagnoses were osteoarthritis (9 primary, 1 secondary) in 10, rheumatoid arthritis in 12, posttraumatic arthritis in 10, acute fracture in 7, osteonecrosis in 4, neoplasia in 3, and cuff tear arthropathy in 1 shoulder in the HA group. This reflects a somewhat different distribution of diagnostic indications between TSA and HA ($P = .005$). All procedures were performed by or with the direction of the senior surgeon. There were 6 complete thickness rotator cuff tears in the TSA group and 16 in the HA group ($P = .008$).

No patient has undergone revision of their prosthesis. Eleven shoulders having TSA had a complication: an undisplaced glenoid, humeral metaphyseal or humeral diaphyseal fracture that healed in 6, neurapraxia that resolved in 3, rotator cuff tearing with instability in 1, and heterotopic ossification in 1. Seven shoulders having HA had complications: undisplaced humeral fractures that healed in 2, hematoma formation (1 with drainage) in 2, pulmonary embolus in 1, heterotopic ossification in 1, and subacromial impingement in 1.

Table IV summarizes and compares patient reported activities in the total shoulder arthroplasty and hemiarthroplasty groups. The activities have been grouped as low, medium, and high demand. There was no significant difference between groups when comparing an individual activity. The top 3 commonly reported activities in each category include: low demand (cooking, baking, and driving), medium demand (gardening, leaf raking, and lawn mowing), and high demand (snow shoveling, wheelbarrow use, and shoveling dirt). The most commonly reported sporting activities in each category included: low demand (stationary biking, treadmill, and horseshoes), medium

Table I Self-reported clinical data comparing the means for the total shoulder arthroplasty and hemiarthroplasty groups

	Total shoulder arthroplasty (mean)	Hemiarthroplasty (mean)	*P* value*
No. of shoulders	52	47	
Pain (1—10 scale)	3.7	3.9	.77
Forward flexion (degrees)	143	120	.006
External rotation (degrees)	51	46	.27
Internal rotation (1—8 scale)	3.6	3.0	.04
Strength (1—10 scale)	6.2	5.4	.04

* Comparison using a 2-sample *t* test assuming unequal variances.

Table II Self-reported clinical data comparing the means for the total shoulder arthroplasty and hemiarthroplasty groups (after removing patients with a revision, acute fractures, neoplasia, and cuff tear arthropathy)

	Total shoulder arthroplasty (mean)	Hemiarthroplasty (mean)	*P* value*
No. of shoulders	51	36	
Pain (1—10 scale)	3.8	3.5	.67
Forward flexion (degrees)	144	128	.06
External rotation (degrees)	51	48	.48
Internal rotation (1—8 scale)	3.7	3.0	.05
Strength (1—10 scale)	6.2	5.4	.06

* Comparison using a 2-sample *t* test assuming unequal variances.

demand (fishing, dancing, swimming), and high demand (road biking, free weights, hunting/shooting). The total shoulder arthroplasty group reported on average 9.6 activities per person, while the hemiarthroplasty group reported on average 8.5 activities per person. Tables V-VII summarize the distribution of patients' overall activity level classified as low, medium, or high demand. There was no significant difference in the distribution between groups across all categories, be it low, medium, or high demand ($P = .18$). This continued to be true for the 2 subgroup analyses — first excluding the diagnoses of revision, acute fractures, neoplasia, and cuff tear arthropathy, and then also excluding those with rotator cuff tearing. Overall, the total shoulder arthroplasty group did trend toward a higher proportion of respondents in the medium to high demand activity category (89%) compared with the hemiarthroplasty group (77%); but this trend was not significant. This trend continued in the 2 subgroup analyses.

Table III Self-reported clinical data comparing the means for the total shoulder arthroplasty and hemiarthroplasty groups (after removing patients with a revision, acute fractures, neoplasia, cuff tear arthropathy, and rotator cuff tears)

	Total shoulder arthroplasty (mean)	Hemiarthroplasty (mean)	*P* value*
No. of shoulders	45	24	
Pain (1—10 scale)	3.7	3.1	.30
Forward flexion (degrees)	144	140	.69
External rotation (degrees)	50	49	.95
Internal rotation (1—8 scale)	3.6	3.4	.63
Strength (1—10 scale)	6.2	5.9	.46

* Comparison using a 2-sample *t* test assuming unequal variances.

In the total shoulder arthroplasty group, 15 respondents were working either full or part time (29%), 21 had retired (40%), and 16 were on disability or unemployed (30%). In the hemiarthroplasty group, 14 were working either full of part time (30%), 19 had retired (40%), and 12 were on disability or unemployed (25%). In the total shoulder arthroplasty group, 1 respondent described his work as heavy labor, 3 light labor, 10 manager or professional, and 12 homemaker. In the hemiarthroplasty group, of those that were working, 3 described their work as light labor, 8 as manager or professional, and 11 as a homemaker.

The final question of the survey was open ended, asking what activity patients would do but did not do because of their shoulder replacement. The total shoulder arthroplasty and hemiarthroplasty groups listed several activities and sets of activities they were unable to do as a result of their shoulder replacement (Table VIII). The 4 most common activities that respondents could not participate in because of their shoulder replacements were overhead household activities, combing or curling one's hair, heavy lifting, and canoeing/biking/golf. There was no significance difference in the reported activities that were unachievable between the 2 groups.

Discussion

The results of this survey suggest that patients on average 9 years following shoulder replacement surgery are able to maintain a relatively high level of physical activity following either total shoulder arthroplasty or hemiarthroplasty. There was a trend for a higher activity level in the total shoulder arthroplasty group, who reported an average of 9.6 activities per person with 89% of those activities in the medium to high demand category. In contrast, the hemiarthroplasty reported an average of 8.5 activities per person with 77% of those activities in the

Table IV Distribution of patient reported activities and comparisons of the total shoulder arthroplasty and hemiarthroplasty groups. Activities are grouped as low, medium, and high demand. Comparisons were made using Fisher's Exact Test

Activity level	Activity	Total shoulder arthroplasty group (# respondents)	Hemiarthroplasty group (# respondents)	*P* value
Low demand	Cooking	43	38	1.0
	Baking	36	34	.83
	Driving	31	31	.54
	Sewing	24	14	.1
	Stationary biking	16	12	.66
	Treadmill	14	11	.82
	Horseshoes	3	1	.62
	Snowshoe	0	1	n/a
Medium demand	Gardening	34	22	.07
	Leaf raking	26	20	.55
	Lawn mowing	25	17	.31
	Fishing	15	12	.82
	Musical instrument	15	13	1.0
	Dancing	14	9	.48
	Swimming	13	12	1.0
	Woodwork	12	7	.32
	Motorboating	8	8	1.0
	Hiking	8	12	.22
	Metalwork	7	3	.32
	Golf	7	6	1.0
	Bowling	3	4	.71
	Jogging	2	5	.25
	Down-hill ski	2	0	n/a
	Aerobics	2	6	.15
	Yoga	2	1	1.0
	X-country ski	1	0	n/a
	Pilates	1	3	.34
	Diving	0	1	n/a
High demand	Snow shoveling	27	20	.42
	Wheelbarrow	23	17	.54
	Shoveling dirt	18	13	.52
	Sawing wood	14	6	.13
	Road biking	10	5	.27
	Free weights	8	3	.21
	Chopping wood	7	5	.76
	Hunting/shooting	7	4	.53
	All-terrain vehicle	7	5	.76
	Canoe/kayak	4	5	.73
	Weight machines	4	5	.73
	Motorbiking	4	5	.73
	Snowmobiling	3	3	1.0
	Basketball	2	1	1.0
	Baseball	2	0	n/a
	Horseback riding	2	1	1.0
	Waterskiing	1	1	1.0
	Rowing	1	2	.60
	Sailing	1	1	1.0
	Archery	1	2	.6
	Mountain biking	1	0	n/a
	Ice hockey	1	0	n/a
	Football	1	0	n/a
	Karate judo	0	1	n/a
	Boxing	0	1	n/a
	Singles tennis	0	1	n/a

Table V Patients were classified as having low, medium, or high demand for shoulder use depending on their highest reported level of activity. There was no significant difference between groups $P = .18$. Comparison using an extension of Fisher's exact test for ordered contingency tables

	Total shoulder arthroplasty group	Hemiarthroplasty group
Low	6 (11%)	11 (23%)
Medium	17 (33%)	17 (36%)
High	29 (56%)	19 (41%)

Table VI Patients were classified as having low, medium, or high demand for shoulder use depending on their highest reported level of activity. There was no significant difference between groups $P = .16$. Comparison using an extension of Fisher's exact test for ordered contingency tables (after removing patients with a revision, acute fractures, neoplasia and cuff tear arthropathy)

	Total shoulder Arthroplasty group	Hemiarthroplasty group
Low	5 (10%)	8 (22%)
Medium	17 (33%)	14 (39%)
High	29 (57%)	14 (39%)

Table VII Patients were classified as having low, medium, or high demand for shoulder use depending on their highest reported level of activity. There was no significant difference between groups $P = .44$. Comparison using an extension of Fisher's exact test for ordered contingency tables (after removing patients with a revision, acute fractures, neoplasia, cuff tear arthropathy, and rotator cuff tears)

	Total shoulder Arthroplasty group	Hemiarthroplasty group
Low	3 (7%)	3 (12%)
Medium	15 (33%)	10 (42%)
High	27 (60%)	11 (46%)

Table VIII Patient reported activities they would like to do but were unable to as a result of their replacement

	Total shoulder arthroplasty group	Hemiarthroplasty group
Overhead activity	7	5
Canoe/bike/golf	4	5
Comb or curl own hair	4	3
Lift heavy objects	5	3
Wash/dry back	3	2
Sleep on operated side	3	2
Throw a ball	3	3
Dress or undress self	4	2
Hunt/fish/archery	2	0
Piano/violin/flute	3	0

medium to high demand category. Although no significant difference in level of activity was found between the groups, this may be due in part to the sample size. For example, with sample sizes of 52 and 47 in the total shoulder and hemiarthroplasty groups, assuming use of an activity in 50% of the total arthroplasty patients, there was an 80% power with a 2-sided Chi-square test to detect a significant difference in achieving an activity in a hemiarthroplasty group when they responded affirmatively or negatively to doing the activity 77% or more of the time. The total shoulder arthroplasty group did report statistically better range of motion and strength compared with the hemiarthroplasty group. This is consistent with other studies in the literature comparing total shoulder arthroplasty and hemiarthroplasty with better short-term functional results in the total shoulder arthroplasty group.[4,6,7,14] In our study, slightly superior functional result in the total shoulder arthroplasty group may, in fact, have contributed to a patient's ability to remain more active.[16] However, the inclusion of certain diagnoses (revision, acute fractures, neoplasia, cuff tear arthropathy), more commonly in the hemiarthroplasty group and a significantly higher presence of rotator cuff pathology among the hemiarthroplasty group, may also account for this group's poorer functional result both in terms of strength and range of motion, and may also, to some degree, explain the lower level of self-reported activity.

Given the better functional result from patient reports in the total shoulder arthroplasty group and trend for a higher level of activity, perhaps total shoulder arthroplasty should be considered more often for the intermittently active patient, despite the potential for glenoid wear and loosening. Furthermore, it is still unclear what level of activity is appropriate and what level is potentially dangerous for the implant. The only published guidance that we have so far is from expert opinion, as described by Healy et al (Table IX).[8] Activities of daily living, for example, that are a requirement for independent living such as snow shoveling or chopping wood in the Midwestern States, may perhaps be justified by necessity. In contrast, such sporting activities as waterskiing or motor biking, which impose a high load across the shoulder and may shorten the life of the prosthesis, are purely voluntary activities and could be avoided. The actual risks of wear, loosening, or fracture have not been directly attributed to any one specific physical activity.[10]

The average age in our patient population at the time of surgery was 53 years in both groups and 62 years at the time of the questionnaire. We purposely included younger patients in the survey to assure that there was adequate follow-up, and so that there was the potential for a wide spectrum of activities to be represented. One potential limitation of this study is that this cohort of patients is younger than the typical patient population undergoing such a procedure. It is possible that this cohort of patients is more active based purely on age than the typically aged patient undergoing such an operation. These patients were

Table IX 1999 American Shoulder and Elbow Society Survey — Activity after Shoulder Arthroplasty

Recommended/allowed	Allowed with experience	Not recommended	No conclusion
Cross-country skiing	Golf	Football	High-impact aerobics
Stationary skiing	Ice skating	Gymnastics	Baseball/softball
Speed walking or jogging	Shooting	Hockey	Fencing
Swimming	Downhill skiing	Rock climbing	Handball
Doubles tennis			Horseback riding
Low-impact aerobics			Lacrosse
Bicycling, road and stationary			Racquetball, squash
Bowling			Skating, roller/inline
Canoeing			Rowing
Croquet			Soccer
Shuffleboard			Tennis, singles
Horseshoes			Volleyball
Dancing: ballroom, square, and jazz			Weight training

Reprinted with permission from Healy et.al., 2001.[8]

also selected from a database of patients who had not undergone revision at the time of the survey. This introduces a selection bias and may not be representative of the whole cohort population of patients who have undergone a shoulder replacement with or without a revision, and potentially reporting only more successful results. Another limitation is the mix of diagnoses among the 2 groups with more osteoarthritic patients in the TSA group and a greater variety of diagnoses in the HA group. It would probably be better as a study to select only 1 diagnosis, such as osteoarthritis, to eliminate the diagnostic variable; but, the group of diagnoses included in this study seem typical for the indications for these procedures. McCarty et al, in analyzing sports activities after shoulder replacement, also selected the mixed diagnosis model.[15]

A fourth limitation of this study is the lack of a control group of people unrestricted by shoulder problems to make an age-matched comparison of patients with similar demographic characteristics. Finally, the classification of activities in this study as low, medium, or high demand is subjective. Swimming, for example, in this study was classified as medium demand, and could equally be classified as low or high demand depending on the intensity of participation.

It is the authors' impression from summarizing all the comments from this survey that patients self-regulate their individual level of activity. This self-regulatory behavior is due, in part, to common sense and a patient's desire to protect the shoulder replacement, and seemingly secondarily due to the general advice received in the past from the surgeon or a physical therapist. Additionally, some patients may have pain either during or following over-exertion; for example, lifting heavy loads could temporarily cause pain. As one retired farmer wrote: "Once in awhile it will hurt if I do heavy lifting, but if I take my other hand and assist, the arm seems to be in a better position and stops hurting." Perhaps the best recommendation that can be made to counsel patients is to use their common sense and to avoid not only heavier activities and those with forceful impact, but also to avoid activities that induce pain or discomfort. Another patient wrote: "I have no doubt that I can accomplish most activities but with a big price…yes there is some pain, discomfort, and aching."

The discussion of activity following shoulder replacement is an important component of the counseling and consent process. Remarkably, little is known about what can safely be recommended following shoulder replacement. Future prospective trials where activity level is controlled would be beneficial to determine what level of activity is safe and if there is any difference between prosthetic design. Innovative biomechanical studies as well as retrieval studies would also give insight into the mode of failure following shoulder replacement where activity level is known or controlled.

Conclusion

The conventional thinking that hemiarthroplasty is less prone to failure would suggest that these patients have the potential for a greater level of activity compared with a total shoulder replacement. This study, however, has demonstrated that following total shoulder arthroplasty, patients reported better motion and strength and were equally as active as the hemiarthroplasty group.

Disclaimer

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