



Return to Play After Shoulder Replacement Surgery

What Is Realistic and What Does the Evidence Tell Us

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KEYWORDS

- Total shoulder arthroplasty • Hemiarthroplasty • Reverse total shoulder arthroplasty
- Return to play • Shoulder arthroplasty

KEY POINTS

- Most patients return to preoperative sports activities following shoulder arthroplasty.
- The literature reports that rates of return for total shoulder arthroplasty are slightly higher than those reported for reverse total shoulder arthroplasty and hemiarthroplasty.
- Usually, patients can expect to return to sport within 6 months postoperatively.

INTRODUCTION

Shoulder replacement continues to increase in popularity in the United States, with an estimated 53,000 procedures in 2015, which is 200% greater than in 2003.^{1,2} This exponential increase is the result of several factors, including US Food and Drug Administration (FDA) approval of the reverse shoulder replacement in 2003, improved functional outcomes following shoulder arthroplasty,³ and evidence that early arthroplasty has better outcomes than delaying surgery.⁴ Although it is more routine in an elderly patient population, younger active patients are beginning to undergo shoulder replacements more commonly.^{5–8}

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As younger, more active, patients undergo shoulder replacement surgery, return to sport has become increasingly important.^{9–12} More often than in prior decades, patients now inquire about the type of sports they will be able to resume postoperatively.⁹ However, compared with the literature on hip and knee arthroplasty, the amount of literature pertaining to return to sport after shoulder arthroplasty is very limited.^{13–18}

Surgeons would benefit from a review that integrates the evidence behind return to sport following different shoulder replacement surgeries.¹⁹ This article summarizes and synthesizes the information regarding return to sport following shoulder arthroplasty, and discusses how it has been studied and reported in the literature. This information will be useful to clinicians in counseling their patients on expectations about return to sports following shoulder arthroplasty.

RETURN TO SPORT AFTER TOTAL SHOULDER ARTHROPLASTY

The trend of increased use of total shoulder arthroplasty (TSA) is anticipated to continue and patients' expectations regarding function postoperatively have increased.²⁰ As a result, return to sport following TSA has become a topic of interest in the current orthopedic literature, although the topic remains understudied compared with lower extremity arthroplasty.

McCarty and colleagues¹⁰ examined 75 subjects (86 shoulders) with an average follow-up of 3.7 years; 54 of these subjects underwent TSA and the others received hemiarthroplasty (HA). Of these subjects, 64% stated that returning to sports was among their reasons for undergoing the procedure. Following TSA, 81% were able to resume at least 1 sport and 71% endorsed an improved ability in the sport. The sports associated with the highest rates of return included fishing (92%), swimming (86%), and skiing (81%), whereas bowling (40%) and softball (20%) had the poorest rates of return. Interestingly, 71% of subjects required an analgesic medication (eg, ibuprofen, acetaminophen, or narcotic medication) to participate in sport preoperatively but only 39% of subjects required an analgesic postoperatively. Most subjects made full return to sport at 6 months postoperatively and reported that they were able to participate with a higher frequency than they were preoperatively (1.7 days per week vs 0.7 days per week).

Bulhoff and colleagues²¹ reported on 154 TSAs with an average follow-up of 6.2 years. The cohort included 105 TSA subjects who had participated in a sport preoperatively and 49 subjects who had never participated in sports. At final follow-up, 39% of subjects were participating in sports, all of whom had participated preoperatively. Of subjects who had participated in sports at some point preoperatively, 57% returned to sports following surgery. Their findings indicate that patients who did not participate in sports preoperatively are unlikely to do so postoperatively. For the 57 subjects who were participating in sports right up to the time of the surgery, 100% returned to sport postoperatively.

Schumann and colleagues¹² reported on 100 TSA subjects with at least a 1-year follow-up. Of the subjects who participated in sports preoperatively (49 of 55), 89% were able to resume participating in that sport at an average follow-up of 3 years. For the 17 subjects who had given up sports preoperatively, 11 of the subjects were able to resume sports postoperatively. No subjects stated TSA as a reason for stopping a sport. However, more than one-third of the subjects (36.7%) reported restricting their activities because of their shoulder. Subjects who participated in sports preoperatively had better constant scores ($P = .007$) and Short Form Health Survey-36 physical component scores ($P = .02$) than the nonsport counterparts.

Jensen and Rockwood¹¹ reported on return to golf in 24 subjects (26 shoulders). The investigators found that 96% of these subjects were able to return to a full round of golf postoperatively at a mean of 4.5 months. The 18 subjects who had a handicap preoperatively decreased their handicap by an average of 5 strokes postoperatively. Compared with 76 controls who did not play golf, the golfers did not have an increased risk of implant loosening at an average follow-up of 52.4 months.

In another golf-specific study, Papaliodis and colleagues²² sent out 367 anonymous voluntary surveys to patients who underwent TSA. Of the respondents, 31 of the 35 golfers were able to resume golf postoperatively at a mean of 8.4 months postoperatively. Thirty of these 31 patients who returned to golf reported improvements in their game. In another small study looking at both upper and lower extremity arthroplasty procedures, Lefevre and colleagues²³ reported that 2 of 3 patients who underwent TSA were able to return to judo.

RETURN TO SPORT AFTER REVERSE TOTAL SHOULDER ARTHROPLASTY

Reverse TSA (RTSA) was approved by the FDA in 2003 for treatment of patients with rotator cuff tear arthropathy.²⁴ Initially, the RTSA was limited to use in elderly patients but indications have expanded to include proximal humerus fracture revisions and TSA revisions.¹⁹ The increasing number of shoulder replacements can mainly be accounted for by the increase in RTSA because half of all shoulder replacement surgeries have been RTSAs.²⁵ Patient satisfaction is primarily linked to return to sport^{26,27} but information on return to sport following RTSA is lacking.

Simovitch and colleagues²⁸ reported on 67 subjects who played high-impact or low-impact sports before undergoing an RTSA operation with a mean follow-up of 43 plus or minus 12 months. Of these, 60% (40 of 67) returned to sport postoperatively. Of the subjects who resumed sports postoperatively, 30% indicated that they were able to perform at a higher level, whereas 65% reported no change in performance. Most (87%) subjects who resumed sports postoperatively were able to do so without pain in the operative extremity.

Fink Barnes and colleagues²⁹ reported on 78 RTSA subjects with a mean follow-up of 4.8 years. They found that 23.1% of postoperative subjects were able to engage in high-intensity activities, such as golf and skiing, whereas 48.7% were able to engage in moderate-intensity activities, such as bowling or swimming. Of these subjects, 19.2% cited shoulder issues as a factor limiting their activities.

Garcia and colleagues¹⁹ reported on 76 RTSAs with an average follow-up of 31.6 months. All of the subjects participated in sports preoperatively and 85.5% of subjects returned to at least one sport following RTSA. The average time to return to full sport was 5.3 months. Of these subjects, 88.2% reported their satisfaction with sports as good to excellent postoperatively. Fitness sports (81.5%), swimming (66.7%), and running (57.1%) had the highest return rates. Pain (13.1%), shoulder issues (11.8%), and loss of interest (9.2%) were the most common reasons for not resuming a sport postoperatively. Proximal humerus fractures (76.9%) and cuff tear arthropathy (80.9%) were the preoperative indications with the least return to sport.

The available data demonstrate that after RTSA most patients are able to return to low-impact sports, such as swimming, biking, and running. However, sports that require overhead motions, such as swimming and tennis, are more unpredictable. Sports that require rotation, such as golf, are also somewhat unpredictable because rotation, particularly internal rotation, can be limited following RTSA. Further studies are required to determine the long-term impact of activity following RTSA.

RETURN TO SPORT AFTER HEMIARTHROPLASTY

Despite exponential increases in RTSA and TSA procedures performed annually, the rate of HA shoulder procedures also continues to grow.¹ Glenohumeral HA is a well-established treatment option for glenohumeral arthritis, as well as complex 3-part and 4-part proximal humerus fractures.³⁰ Owing to its low failure rate, surgeons have traditionally favored HA compared with RTSA and TSA in young patients who wish to remain active.^{28,31} However, others encourage the judicious use of HA in this population because long-term data show deteriorating outcomes and worsening glenoid erosion for shoulders that undergo HA for osteoarthritis.³² Despite its perceived value in patients who wish to resume sporting activities,³³ there are limited data on rates of return to sport after HA.

Garcia and colleagues³⁴ reported return to activity levels in 79 subjects who underwent shoulder HA with a mean follow-up of 63.1 months. Of the 58 subjects who played a sport preoperatively, 67.2% resumed at least 1 sport following surgery. The average return to full sport was 6.5 months. The investigators found that fitness sports (69%), swimming (65%), and running (64%) were associated with the highest rates of return. Interestingly, subjects who received a TSA were more satisfied with their ability to return to sports compared with the HA cohort.

In a very small series, Skutek and colleagues³⁵ evaluated 13 HA subjects and reported a 76% rate of return to preoperative sport. The average time to return to sport was 33 weeks, and swimming ($n = 6$) and cycling ($n = 3$) were the most common sports resumed postoperatively.

With a lower risk of component failure or loosening, return to sport has been considered safer following HA than TSA or RTSA³⁶ However, the reported rates of return to sports following HA (67%–76%)^{19,35} are slightly lower than those reported for TSA (75%–100%)^{10–12} and RTSA (75%–85%).^{19,37} In addition, poor results have been reported with long-term follow-up of HA subjects, with 1 study finding that only 25% of HA subjects were satisfied with their outcome 17 years after operation.³² Despite these results, HA continues to be a common procedure for the treatment of younger, active patients, though its popularity continues to decline.³⁸

COMPARISON BETWEEN RETURN TO SPORT IN HEMIARTHROPLASTY AND TOTAL SHOULDER ARTHROPLASTY

TSA and HA are treatment options for patients with primary glenohumeral osteoarthritis. The preferred treatment option is mainly determined by the presence or absence of glenoid arthrosis but also in part by the patient's age and intended activity level. Compared with HA, TSA has been shown to provide better pain relief, function, range of motion, and patient satisfaction.^{39–41} However, proponents of shoulder HA contend that HA provides reliable pain relief in a less technically demanding and less costly procedure. Moreover, many shoulder surgeons permit HA patients to return to sports with fewer restrictions than their TSA patients.^{42,43} These differences may be due to concerns about implant longevity and glenoid loosening in young active patients.³⁹ To date, only 3 studies have directly compared the return to sport following the 2 procedures.^{10,33,39}

McCarty and colleagues¹⁰ reported on 54 subjects who underwent TSA and 21 subjects who underwent HA. They found equivalent rates of return to sports (81%) in both the TSA (44 of 54) and HA (17 of 21) subjects. They concluded that there was no difference between rates of return to sports following TSA and HA.

Zarkadas and colleagues³³ surveyed 99 TSA and HA patients to assess patient-reported activity level after the procedures. Activities were classified as low-demand (stationary bike, treadmill), medium-demand (fishing, swimming), and

high-demand (free weights, hunting). The TSA group reported better range of motion and strength than the HA group ($P < .05$). Sixty percent of TSA patients (27 of 52) reported participation in high-demand activities compared with 46% of HA patients (11 of 47); however, this difference was not statistically significant given the relatively low numbers in the study.

Most recently, Garcia and colleagues³⁹ compared rates of return to sport in a matched cohort of HA and TSA subjects with a minimum follow-up of 2 years. The investigators found significantly higher rates of return to sports in the TSA group compared with the HA group, with 97% of TSA subjects (36 of 37) resuming at least 1 sport postoperatively compared with 65% of HA subjects (19 of 29). The average time to return to full sports was similar in both groups (5.5 months and 5.4 months for HA and TSA subjects, respectively).

There have been 2 recent meta-analyses comparing returns to sport in different types of shoulder arthroplasties. Aim and colleagues⁴⁴ looked at 9 retrospective studies and found that the subgroup analysis showed a lower rate of return to sport for RTSA 76.5% (95% CI 60%–87%) versus all types of shoulder arthroplasty combined 80.75 (95% CI 70.9%–87.8%). Another recent meta-analysis, by Liu and colleagues,⁴⁵ looked at 13 retrospective studies, all of which are referenced in this article, and demonstrated that subjects undergoing TSA had a significantly higher return to sport rate than subjects undergoing HA (92.6% vs 71.1% $P = .02$).

Of the 3 studies that have compared return to sport following TSA and HA, only Garcia and colleagues³⁹ demonstrated a difference between the 2 procedures. Their study found that TSA had a more favorable rate of return to any sport compared with HA.³⁹ However, all of these studies are limited by small sample sizes, retrospective study design, and variable follow-up. Comparison of these 2 procedures is further limited by potential differences in patient populations, indications for surgery, and surgeons' postoperative restrictions.

COMPARISON BETWEEN RETURN TO SPORT IN HEMIARTHROPLASTY AND REVERSE SHOULDER ARTHROPLASTY

RTSA and HA are treatment options for patients who are not candidates for a TSA owing to rotator cuff dysfunction, rheumatoid arthritis, or proximal humerus fractures. The decision between RTSA and HA in this population remains controversial. One consideration is that RTSA has been shown to have improved functional and range of motion outcomes when compared with HA.^{46–50} The other consideration is that HA has a low failure rate and is thus perceived to be the safer option, particularly in patients who intend to remain active.³⁶ Consistent with this notion, shoulder surgeons have been shown to place fewer postoperative restrictions on HA patients than RTSA patients.^{42,43}

Only 1 study to date has compared return to sport after RTSA and HA. Liu and colleagues³⁶ reported on 102 RTSA and 71 HA subjects with a minimum of 1-year follow-up. Subjects who underwent RTSA had significantly higher rates of return to sports than subjects who underwent HA (85.9% vs 66.7%, respectively). Among subjects who returned to sports, there was no significant difference in time to return to sport after HA (6.2 months) and RTSA (5.3 months). Multivariate analysis demonstrated that female sex, age younger than 70 years, surgery on the dominant extremity, and a preoperative diagnosis of rotator cuff dysfunction independently predicted a higher likelihood of return to sports following RTSA than HA.

The systematic review by Liu and colleagues⁴⁵ did a subgroup analysis of return to sport with HA 71.1% (95% CI 61%–80.3%), which was found to be similar to RTSA 74.9% (95% CI 49.7%–94.2%).

Although surgeons tend to place more restrictions on activities following RTSA than HA, the only study to directly compare the 2 procedures found higher rates of return to sports following RTSA than HA.³⁶ However, the conclusions of the aforementioned study should be interpreted in light of its limitations, including differences in the 2 surgical groups and differential follow-up (31 months for the RTSA group and 62 months for the HA group).

SUMMARY

Most subjects are able to return to preoperative sport activities following TSA, RTSA, and shoulder HA. The rates of return for TSA (75%–100%)^{34,35} are slightly higher than those reported for HA (67% to 76%)^{34,35} and RTSA (75%–85%),^{19,37} although these differences may reflect differences in subject population or surgical indications. Patients may be counseled that noncontact, low-demand activities have higher return rates than contact sports or high-demand activities. Most patients can expect to return to sports within 6 months postoperatively and many may experience an improvement in their ability to participate in sport following the arthroplasty procedure.

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