

# Return to Swimming after Shoulder Arthroplasty: Performance and Outcome Scores

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**INTRODUCTION:** Swimming is one of the most common sporting activities in the United States, and often popular among shoulder arthroplasty patients. While return to sport has become a popular topic recently, the literature focused on swimming is limited. The purpose of this study is to report the rate of return to swim after primary shoulder arthroplasty and evaluate changes in performance after surgery.

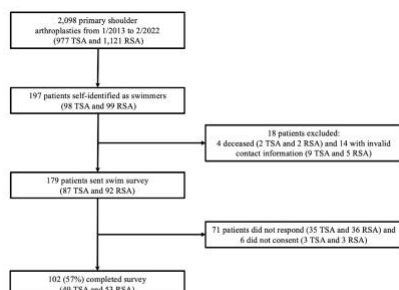
**METHODS:** A retrospective query of a single institution's shoulder and elbow surgery repository identified patients treated with primary total anatomic (TSA) or reverse shoulder arthroplasty (RSA) by a single fellowship-trained shoulder and elbow surgeon between 1/2013 and 1/2022. Those patients who were self-identified as swimmers were surveyed to complete a swimming-specific questionnaire at a minimum two-year follow-up. The questionnaire was used to evaluate the ability to return and swimming performance after surgery. Additionally, patient-reported outcome measures (PROMs), range of motion, strength, and satisfaction were evaluated.

**RESULTS:** A total of 102 (49 TSA, 53 RSA) patients responded at an average follow-up of 5.3 years. TSA patients returned to swimming at a greater rate than RSA patients (82% vs. 64%;  $p=.048$ ), but no significant difference in the amount of time taken to return was observed of those who did return to swimming. Patients who returned to swim did so with longer swimming duration per session than they did pre-operatively and maintained their primary swim stroke. Of those who returned to swim, overall swimming ability increased in 70% of TSA and 74% of RSA patients, and overall enjoyment increased in 70% of TSA and 71% of RSA patients.

**DISCUSSION:** TSA patients return to swimming at a higher rate than RSA patients. However, of those patients who were able to return to swim, there were minimal differences in performance between TSA and RSA. Both cohorts demonstrated improved swimming ability and increased enjoyment post operatively.

**SIGNIFICANCE/CLINICAL RELEVANCE:** This study provides important guidance in setting post-operative expectations of return to swimming after TSA and RSA.

**IMAGES AND TABLES:**



**Figure 1.** A Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) flow diagram displaying number of and reason why patients were excluded. TSA, Total Shoulder Arthroplasty; RSA, Reverse Shoulder Arthroplasty

| Table I. Demographics and Preoperative Comparison of Swimmers |                                                         |                                                         |  |       |
|---------------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|--|-------|
|                                                               | TSA (n=49)<br>Median (IQR) or N (%) or<br>Mean $\pm$ SD | RSA (n=53)<br>Median (IQR) or N (%) or<br>Mean $\pm$ SD |  | P     |
| Age at time of surgery (yrs)                                  | 70 (65-74)                                              | 75 (67-78)                                              |  | .007  |
| Gender (female)                                               | 18 (37)                                                 | 31 (58)                                                 |  | .028  |
| Surgery on Dominant Arm                                       | 22 (45)                                                 | 30 (57)                                                 |  | .237  |
| Follow-up (yrs)                                               | 5.5 (3.3-8.0)                                           | 4.8 (3.0-6.8)                                           |  | .480  |
| Surgical Indication                                           |                                                         |                                                         |  | <.001 |
| Osteoarthritis                                                | 47 (96)                                                 | 18 (34)                                                 |  |       |
| Inflammatory Arthritis                                        | 2 (4)                                                   | 2 (4)                                                   |  |       |
| Cuff Tear Arthropathy                                         | 0                                                       | 26 (49)                                                 |  |       |
| Fracture Sequelae                                             | 0                                                       | 7 (13)                                                  |  |       |
| Did swim factor into your decision to undergo surgery? (yes)  | 25 (51)                                                 | 23 (43)                                                 |  | .441  |
| Strokes able to swim                                          |                                                         |                                                         |  |       |
| Butterfly                                                     | 6 (12)                                                  | 8 (15)                                                  |  | .676  |
| Backstroke                                                    | 17 (35)                                                 | 20 (38)                                                 |  | .750  |
| Breaststroke                                                  | 37 (76)                                                 | 26 (49)                                                 |  | .006  |
| Freestyle                                                     | 49 (100)                                                | 53 (100)                                                |  | 1.00  |
| Primary Stroke                                                |                                                         |                                                         |  |       |
| Butterfly                                                     | 0                                                       | 0                                                       |  | .148  |
| Backstroke                                                    | 4 (8)                                                   | 3 (6)                                                   |  |       |
| Breaststroke                                                  | 18 (37)                                                 | 11 (21)                                                 |  |       |
| Freestyle                                                     | 27 (55)                                                 | 39 (73)                                                 |  |       |
| Days per week spent swimming (TSA n=45/RSA n=52)              |                                                         |                                                         |  | .730  |
| 1                                                             | 8 (17)                                                  | 13 (25)                                                 |  |       |
| 2                                                             | 10 (22)                                                 | 13 (25)                                                 |  |       |
| 3                                                             | 16 (35)                                                 | 15 (29)                                                 |  |       |
| 4+                                                            | 12 (26)                                                 | 11 (21)                                                 |  |       |
| Average time per session (minutes) (TSA n=46/RSA n=51)        | 35 $\pm$ 22                                             | 31 $\pm$ 14                                             |  | .674  |
| VAS Pain (while swimming) (TSA n=44/RSA n=50)                 | 6.5 (5-7)                                               | 6 (3-7)                                                 |  | .499  |

TSA, Total Shoulder Arthroplasty; RSA, Reverse Shoulder Arthroplasty; IQR, Interquartile Range; SD, Standard Deviation; VAS, Visual Analog Scale.

| Table II. Postoperative Comparison of Patients' Experiences Returning to Swim |    |                              |                              |      |
|-------------------------------------------------------------------------------|----|------------------------------|------------------------------|------|
|                                                                               | n  | TSA<br>Median (IQR) or N (%) | RSA<br>Median (IQR) or N (%) | P    |
| Returned to Swim                                                              | 49 | 40 (82)                      | 34 (64)                      | .048 |
| Time to return (months)                                                       | 33 | 4 (2-6)                      | 3 (3-6)                      | .298 |
| Strokes able to swim                                                          | 40 |                              |                              |      |
| Butterfly                                                                     |    | 6 (15)                       | 7 (20.5)                     | .529 |
| Backstroke                                                                    |    | 24 (60)                      | 14 (41)                      | .106 |
| Breaststroke                                                                  |    | 37 (93)                      | 22 (65)                      | .004 |
| Freestyle                                                                     |    | 40 (100)                     | 34 (100)                     | 1.00 |
| Primary Stroke                                                                | 40 |                              |                              | .088 |
| Butterfly                                                                     |    | 0                            | 0                            |      |
| Backstroke                                                                    |    | 2 (5)                        | 2 (6)                        |      |
| Breaststroke                                                                  |    | 18 (45)                      | 7 (21)                       |      |
| Freestyle                                                                     |    | 20 (50)                      | 25 (73)                      |      |
| Days per week spent swimming                                                  | 38 |                              |                              | .627 |
| 1                                                                             |    | 4 (11)                       | 4 (12)                       |      |
| 2                                                                             |    | 5 (13)                       | 5 (15)                       |      |
| 3                                                                             |    | 18 (47)                      | 11 (32)                      |      |
| 4+                                                                            |    | 11 (29)                      | 14 (41)                      |      |
| Average time per session (minutes)                                            | 38 | 42.5 (30-60)                 | 32 (30-45)                   | .296 |
| VAS Pain (while swimming)                                                     | 38 | 0 (0-2)                      | 0 (0-1)                      | .274 |
| Swimming Frequency                                                            | 40 |                              |                              | .533 |
| Increased                                                                     |    | 16 (40)                      | 15 (44)                      |      |
| No change                                                                     |    | 21 (53)                      | 14 (41)                      |      |
| Decreased                                                                     |    | 3 (7)                        | 5 (15)                       |      |
| Overall Ability                                                               | 40 |                              |                              | 1.00 |
| Increased                                                                     |    | 28 (70)                      | 25 (73.5)                    |      |
| No change                                                                     |    | 11 (27.5)                    | 9 (26.5)                     |      |
| Decreased                                                                     |    | 1 (2.5)                      | 0                            |      |
| Overall Enjoyment                                                             | 40 |                              |                              | 1.00 |
| Increased                                                                     |    | 28 (70)                      | 24 (71)                      |      |
| No change                                                                     |    | 11 (27.5)                    | 10 (29)                      |      |
| Decreased                                                                     |    | 1 (2.5)                      | 0                            |      |
| Satisfaction                                                                  | 40 |                              |                              | .520 |
| Excellent                                                                     |    | 31 (77.5)                    | 29 (88)                      |      |
| Good                                                                          |    | 7 (17.5)                     | 4 (12)                       |      |
| Satisfactory                                                                  |    | 2 (5)                        | 0                            |      |
| Unsatisfactory                                                                |    | 0                            | 0                            |      |
| Same procedure again? (yes)                                                   | 40 | 38 (95)                      | 33 (94)                      | 1.00 |

\*Internal rotation was scored on a 10-point scale using the following conversion: buttock, greater trochanter = 2, sacrum = 4, L1-L3 = 6, T8-T12 = 8, T1-T7 = 10. TSA, Total Shoulder Arthroplasty; RSA, Reverse Shoulder Arthroplasty; IQR, Interquartile Range; VAS, Visual Analog Scale.