

Ream-and-Run Procedure in Carefully Selected Patients Leads to Predictable Return to Strenuous Sport and Work

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Introduction: The ream-and-run procedure (RnR) combines prosthetic humeral head replacement with concentric reaming of the glenoid. The procedure eliminates the long-term complications related to loosening and wear of the polyethylene glenoid implant and represents one surgical solution for the treatment of end-stage glenohumeral osteoarthritis in young and active patients, especially for those patients intending to resume unrestricted strenuous activity. The purpose of this study was to evaluate short to mid-term outcomes of patients undergoing the RnR procedure and assess their ability to return to physical work and strenuous sport or recreational activity.

Methods: The outcomes of a consecutive series of RnR procedures performed by a single surgeon (SSH) were reviewed retrospectively. Pre- and post-operative active range of motion (ROM), patient reported outcome measures (PROM), and complications were collected. Post-operative ROM was assessed at a mean follow-up of 2 years and PROM at a mean follow-up of 3 years. Patients were contacted by phone and asked to rate their ability to perform their strenuous job, preferred sport, and report their satisfaction at a mean of 3 years post-operative. Strenuous occupations were classified as labor exerting 50 to 100 pounds occasionally, 25 to 50 pounds frequently, or 10 to 20 pounds constantly. Sporting activities were classified as strenuous if they involved repetitive and significant eccentric loading of the shoulder girdle and obligate overhead shoulder motion. Patients were then stratified by their level of return to activity, rated as having no difficulty, some difficulty, or unable to return. Pre- and post-operative comparisons were made using the paired t-test and categorical data were analyzed using the Fisher's exact test.

Results: Of 715 anatomic shoulder arthroplasties performed between 2013 to 2023 by the surgeon, 27 (3.8%) were RnR procedures and 21 shoulders were eligible for inclusion. The mean age at arthroplasty was 46.7 ± 9.7 years and all patients were male. All ROM and PROMs improved significantly ($p < .005$ and $p < .001$, respectively). The minimal clinically important difference (MCID) for anatomic total shoulder arthroplasty was met in over 85% of patients for all PROMs. The percentage maximal possible improvement (%MPI) exceeded 70% for all PROMs. Fifteen shoulders (71%) participated preoperatively in strenuous work- or sport-related activity. Of these patients, all returned to strenuous work (88% with no difficulty), and 78% returned to strenuous activities, (67% with no difficulty).

Conclusion: RnR provides clinically significant improvement in ROM and PROMs and a high rate of return to strenuous work in young and active patients with end-stage osteoarthritis at short to midterm follow-up. RnR is a reasonable alternative to conventional anatomic total shoulder

arthroplasty in appropriately selected patients aiming to resume a lifestyle of strenuous lifting for work or recreation.

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Background

- **Glenohumeral osteoarthritis (GHOA)** is commonly treated with anatomic total shoulder arthroplasty (aTSA) or humeral hemiarthroplasty.
- **aTSA** improves range of motion and pain relief but risks long-term glenoid component failure in **young patients** performing **high-load activities**.¹
- The **Ream-and-Run (RnR)** procedure offers an alternative, avoiding polyethylene complications by combining **humeral hemiarthroplasty** with **glenoid reaming**.
- Current literature shows **mixed short-term outcomes** for RnR, with some reporting **post-operative stiffness** and **dissatisfaction**.²

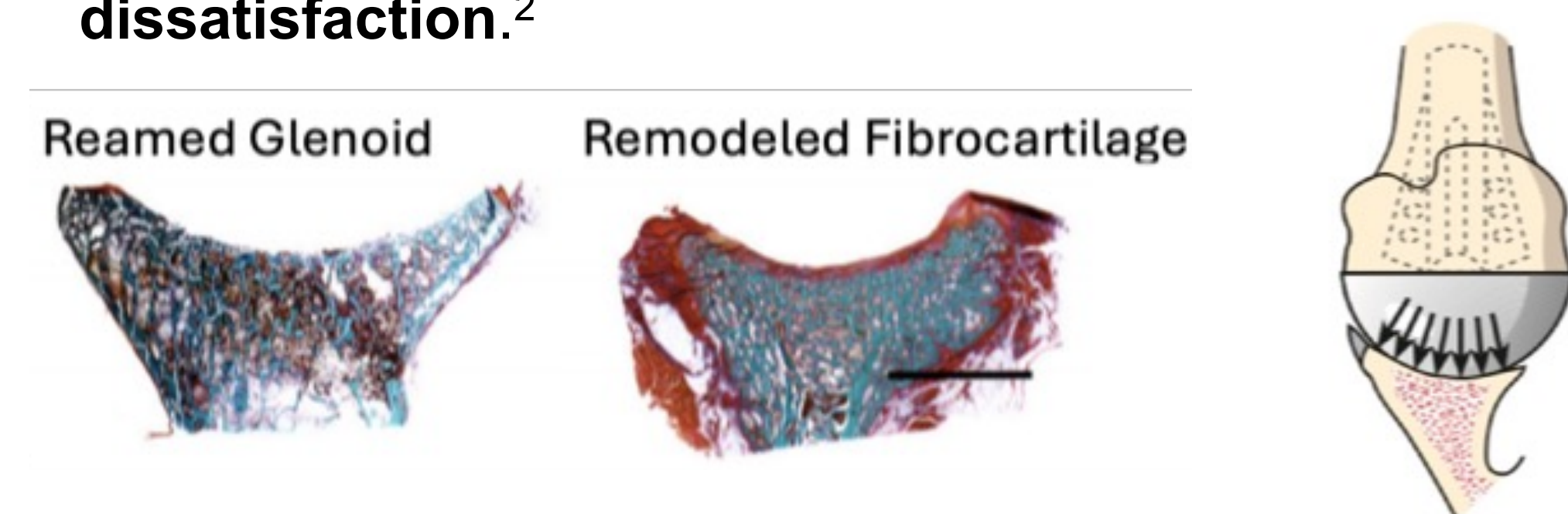


Figure 1. Frederick Matsen. Principle of ream-and-run. Retrieved from UW Shoulder and Elbow Academy.³

Aim & Hypothesis

- This study **aims** to evaluate the **clinical outcomes** and **return to activity** following RnR in young, highly-active patients at **mid-term follow-up**.
- We **hypothesize** significant improvements in range of motion, patient-reported outcomes, and low complication rates.

Methods

- **Study Design:** Retrospective case series of patients undergoing RnR surgery at Mercy Health Cincinnati Sports Medicine and Orthopaedic Center.

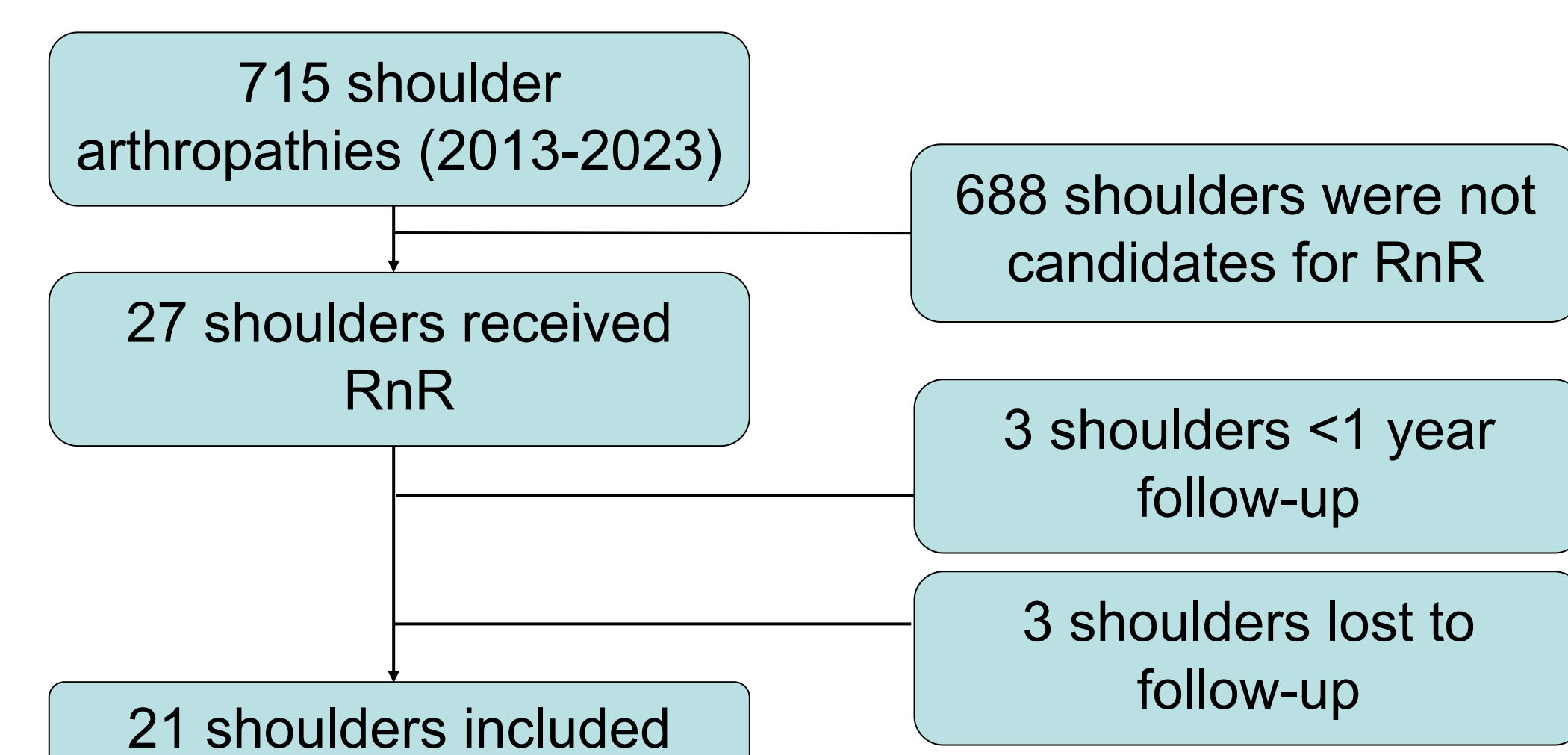


Figure 2. Inclusion and exclusion criteria

- **Outcome measures:** Range of motion, patient reported outcomes, radiographic analyses, and return to activity were assessed.
- **Statistical Analysis:** Paired t-test for outcomes data; Fisher's exact test for categorical data; results expressed as mean \pm SD.

Results

46.7 years

± 9.7 was the mean age at surgery.

100%

of the cohort was male.

Table 1	Mean pre- and post-operative range of motion values				
Score	Mean preoperative	Mean postoperative	Mean improvement (all $P < .005$)	% achieved MCID	% achieved SCB
Forward elevation	116.2° \pm 29.9°	147.3° \pm 29.0°	31.8° \pm 30.7°	66.7	42.3
Abduction	101.4° \pm 36.8°	139.3° \pm 36.4°	37.3° \pm 35.7°	80.1	61.9
External rotation	27.1° \pm 15.6°	43.5° \pm 16.5°	17.0° \pm 16.1°	80.1	61.9
Internal rotation\ddagger	L4 \pm 2.6	T12 \pm 2.3	2.6 \pm 2.1	n/a	n/a

Note: MCID, minimal clinically important difference; SCB, substantial clinical benefit. \ddagger Passive motion, all others were active motion. Mean \pm SD. N = 21

Table 1. Patients showed significant improvements in range of motion measures ($P < .005$), with over 80% achieving the minimal clinically important difference for abduction and external rotation, and more than 65% for forward elevation.

- Published MCID and SCB for aTSA were used as cutoffs values.^{4,5}

3 years

(1 – 8 years) was the mean follow-up for patient-reported outcomes, satisfaction, and return to activity.

21 shoulders

(21 of 21) displayed centered glenohumeral registry.

89% satisfaction

(17 of 19) of the patients surveyed reported satisfaction with the RnR surgery.



Figure 3. Frederick Matsen. Pre- and post-operative radiographs displaying centered glenohumeral registry. Retrieved from UW Shoulder and Elbow Academy.⁶

- Arthritic joint (left) and implant (right).

Table 2	Mean pre- and post-operative patient-reported outcome measure values					
Score	Mean preoperative	Mean postoperative	Mean improvement (all $P < .001$)	% achieved MCID	% achieved SCB	% achieved PASS
Simple shoulder test	5.0 \pm 3.4	10.0 \pm 2.7	5.0 \pm 3.8	85.7 (2.9)	71.4 (3.4)	81.0 (8.4)
Visual analog pain scale	5.4 \pm 1.7	1.3 \pm 1.6	4.1 \pm 2.0	90.5 (2.1)	66.7 (3.2)	61.9 (1.5)
ASES	46.1 \pm 17.1	84.2 \pm 15.6	37.4 \pm 16.1	95.2 (16.9)	71.4 (23.9)	81.0 (76)
SANE	38.4 \pm 19.0	80.1 \pm 18.9	41.6 \pm 23.7	n/a	n/a	n/a

Note: ASES, American Shoulder and Elbow Surgeons form; SANE, single assessment numeric evaluation; PASS, patient acceptable symptomatic state. Mean \pm SD. N = 21

Table 2. Significant improvements were observed in SST, VAS pain, ASES, and SANE scores ($P < .001$), with over 85% achieving MCID for SST, 90% for VAS pain, and 95% for ASES.

- The majority also reached substantial clinical benefit (SCB) and patient acceptable symptomatic state (PASS) thresholds for these outcome measures.

Results Cont.

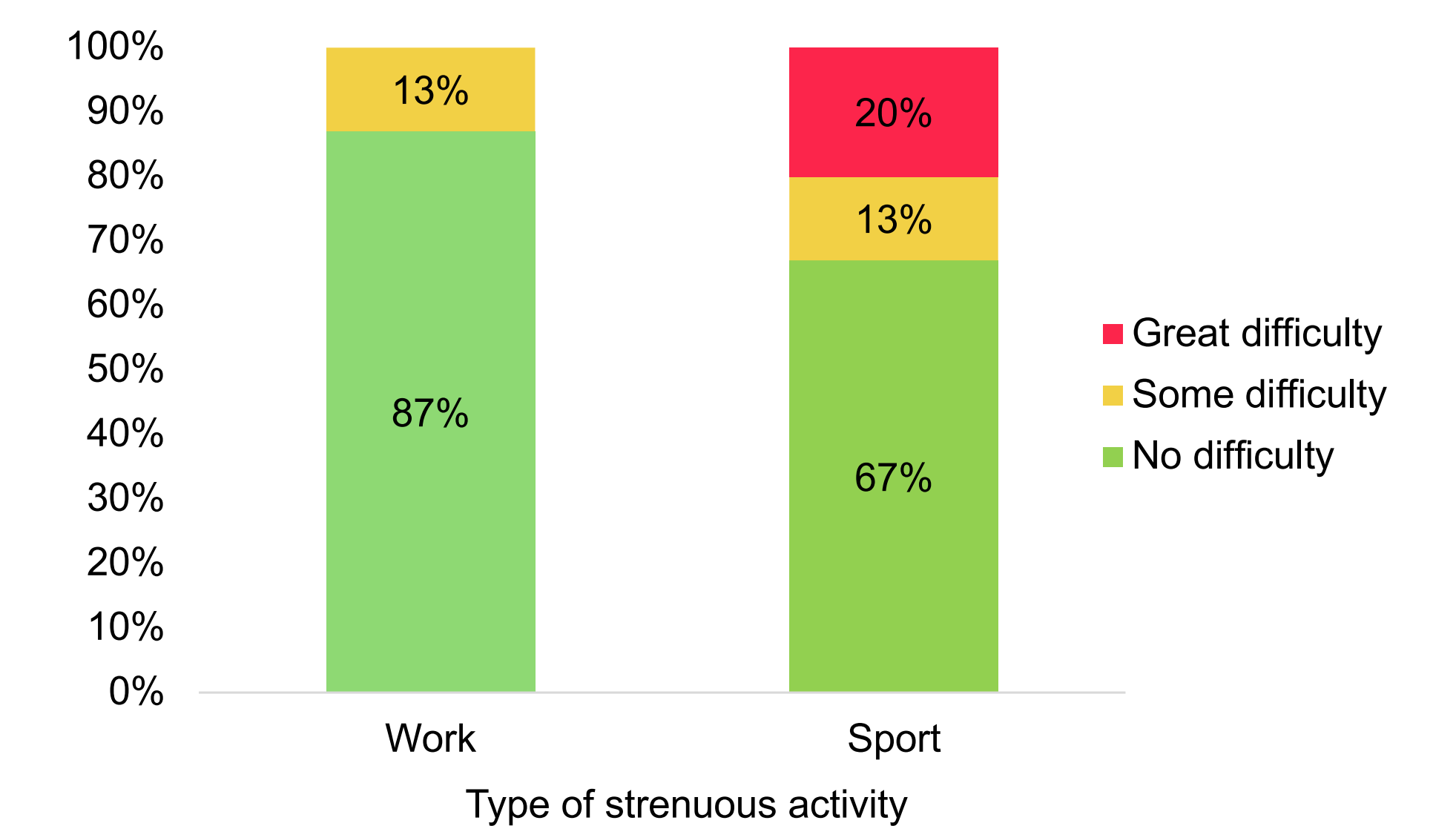


Figure 4. Ability to return to strenuous activity. N = 15

- Among those engaged in an operationally-defined **strenuous activity** (n=15), 100% returned to work and 80% returned to their usual sport, with **87%** returning to work **with no difficulty**.

Discussion

- **RnR** demonstrated **clinically-significant improvements** in range of motion and patient reported outcomes **comparable** to those reported in the literature for aTSA.
- In a cohort that often demonstrates **higher rates of complication** following shoulder arthroplasty, a majority reported **satisfaction** and **return to strenuous activity**.
- As the **prevalence** of shoulder arthroplasty in **younger** patients increases, more patients will **prioritize return to activity**, highlighting the need to address the unique expectations of active individuals with GHOA.

Conclusion

- **RnR** improves **range of motion** and **patient-reported outcomes** in **young, active patients** with glenohumeral osteoarthritis.
- Most patients were **satisfied with surgery** and resumed **strenuous activities** with minimal difficulty.
- RnR is a viable **alternative to aTSA** for patients seeking a return to **unrestricted strenuous activity**.
- **Longer-term studies** are needed to further optimize patient selection and confirm long-term outcomes.

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