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Can We Accelerate Rehabilitation Following Reverse Shoulder Arthroplasty? A Systematic Review

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There is no consensus concerning the rehabilitation protocol following Reverse shoulder arthroplasty (RSA). Several patients, are expecting to be able to use their arm for sports or recreation shortly after their operation.

Keywords found in title or abstract:

“shoulder” combined with “arthroplasty” OR
“replacement”, “reverse” OR “inverse” and
“rehabilitation” OR “physiotherapy” OR
“therapy”.

Population	Intervention	Comparison	Outcome	Time
Patients with RCA, OA, RA, Revision of TSA, fracture of the proximal humerus, massive irreparable RC tears	RSA	Defined rehabilitation protocols and physiotherapy regimes	Clinical and patient reported outcomes including pain and ROM Complication type and rate	Minimum 12 months of follow-up

RCA, rotator cuff arthropathy; OA, osteoarthritis; RA, rheumatoid arthritis; TSA, total shoulder arthroplasty; RC, rotator cuff; RSA, reverse shoulder arthroplasty; ROM, range of motion

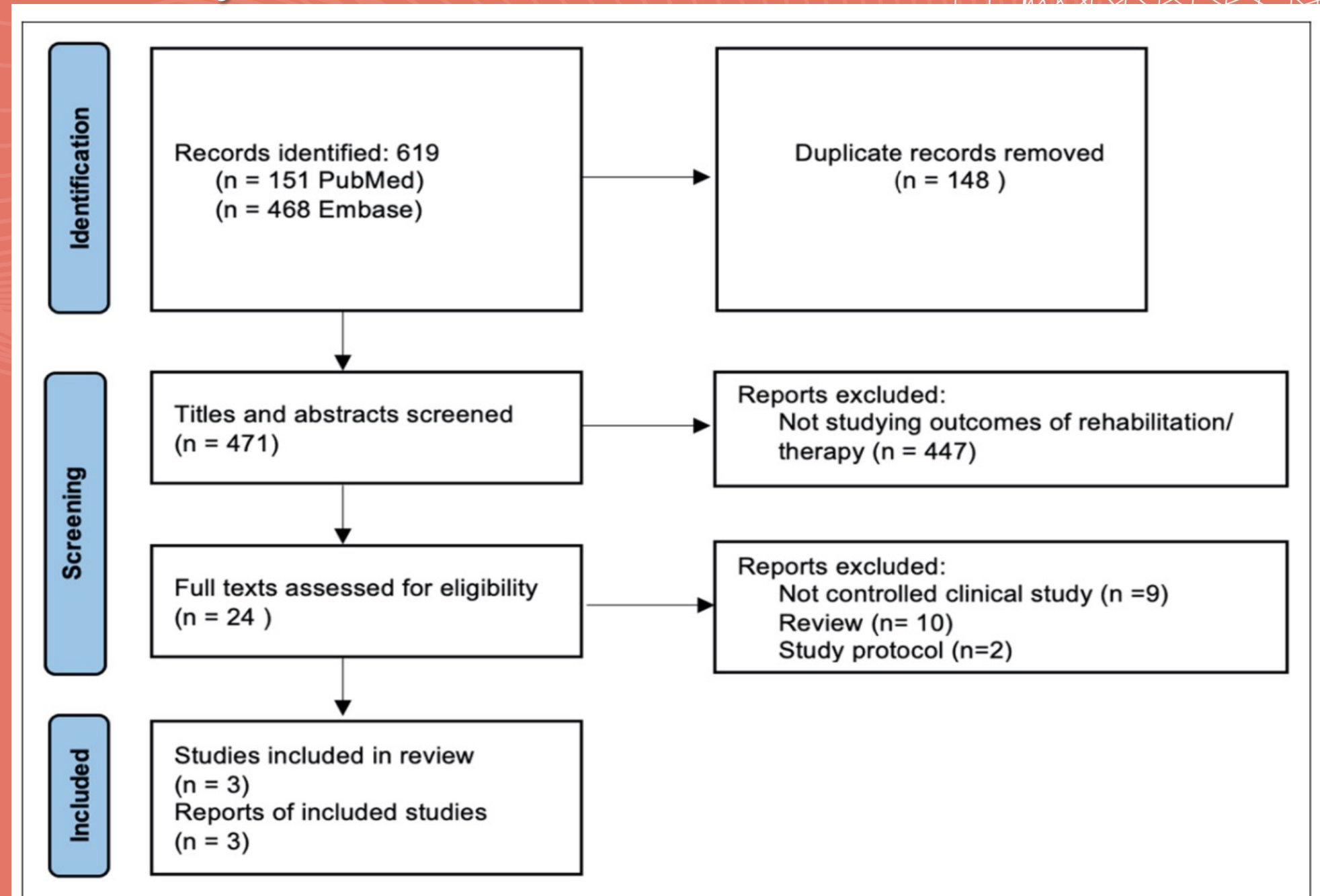
PICO table



Can We Accelerate Rehabilitation Following Reverse Shoulder Arthroplasty? A Systematic Review

3 studies

finally included



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- Oxford Centre for Evidence-based Medicine levels
- Methodological Index for Non-randomized Studies (MINORS) tool
- Cochrane Collaboration Risk of Bias tool
- Grading of Recommendations Assessment, Development, and Evaluation (GRADE) system



- Excel worksheet with: Demographics & clinical & patient reported outcomes



Results

Preoperative
Diagnosis

Clinical & Personal
Reported Outcomes

Complications

Quality of Evidence: very
low-to-low methodological
quality



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Results

	Hagen et al 2020		Edwards et al 2021		Lee et al 2021		
Allowed Activity	Early Rehabilitation	Delayed Rehabilitation	Early Rehabilitation	Delayed Rehabilitation	No Immobilization	3 weeks Immobilization	6 weeks Immobilization
Shoulder Immobilization	Sling used for 6 weeks but removable for everyday activities.	Strict immobilization with sling for 6 weeks.	Two first weeks strict shoulder immobilization, then sling use up to 6 th week, but removable for AAROM exercises.	Two first weeks shoulder immobilization, then sling use up to 6 th week.	Body belt and sling for 48 hours. Then no sling throughout the day.	Body belt and sling for 48 hours. Sling for the first 3 weeks, removable for exercises.	Body belt and sling for 3 weeks.. Then sling use for another 3 weeks, removable only for exercises
PROM	PROM as tolerated from days 7-10.	PROM as tolerated after 6 weeks.	Passive ROM to all planes as tolerated after 2 weeks.	Passive FF up to 90° after 2 weeks.	Full ROM as tolerated from the 2 nd day. Induction of the Deltoid Rehabilitation regime.	After 2 nd day begin with pendulum exercises, passive ROM followed by stretching.	Gentle PROM exercises for the first 3 weeks, pendulum exercises, stretching.
AAROM	Gradual commencement after 7 th -1 th day.	Gradual commencement after 6 weeks.	Gradual commencement after 2 weeks.	Gradual commencement after 6 weeks.	From 2 nd day, through the Deltoid Rehabilitation regime.	Start from 2 nd day, goal to fully progress after 3 rd week.	Gradual commencement after 3 weeks.
AROM	Progression from AAROM to AROM during the first 12 weeks.	Progression from AAROM to AROM between the 6 th and 12 th week.	Progression from AAROM to AROM after the 6 th week.	Not specified. Activity as tolerated after the 12 th week.	As tolerated from 2 nd day through the Deltoid Rehabilitation regime.	From 2 nd day, progress after 3 rd week with the Deltoid Rehabilitation regime	Gradual commencement after 3 week. Deltoid Rehabilitation regime after 6 weeks.
Resistance training	Induction after 12 weeks.	Induction after 12 weeks.	Active External rotation after 6 weeks. Resistance training after 12 weeks.	Not specified. Activity as tolerated after the 12 th week.			

Abbreviations: ROM, range of motion; PROM, passive range of motion; AAROM, active-assisted range of motion; AROM, active range of motion.

Results

Author & Publication Year	Study type and number of included shoulders	Population sample and prosthesis used	Summarized types of Rehabilitation	Outcome measures and follow-up time points	Findings
Hagen et al 2020	<p>Study type: Randomized single-blinded controlled trial</p> <p>Shoulders Number: 107 (86 at 1 year follow-up; 65 at 2 year follow-up)</p> <p>Early rehabilitation: 53 (42 at 1 year follow-up; 30 at 2 year follow-up)</p> <p>Standard (delayed) rehabilitation: 54 (44 at 1 year follow-up; 35 at 2 year follow-up)</p>	<p>Population: RSA done for any eligible reason – no repair of subscapularis</p> <p>Mean Age: 68,87 years</p> <p>Prosthesis: Zimmer Biomet Trabecular Metal reverse shoulder system</p>	<p>Early Rehabilitation:</p> <p>Sling used for 6 weeks but removable for washing, exercise, and everyday activities. Scapular exercises commenced immediately.</p> <p>Delayed Rehabilitation:</p> <p>For 6 weeks, the shoulder was immobilized day and night in a sling with no passive or active movement.</p>	<p>Main outcome: forward flexion (as part of ROM, active or passive not defined)</p> <p>Other outcomes: AROM, PROM, ASES score, Scapular notching</p> <p>Time points: Baseline, 6 weeks, 3 months, 1 year, 2 years post-op (For scapular notching 1 year post-op)</p>	<p>AROM: Between group analysis of ROM change from pre-op to each timepoint found no SSD- no figures.</p> <p>PROM: Between group analysis of ROM change from pre-op to each timepoint found no SSD- no figures.</p> <p>ASES: No between-group SSD in mean change from baseline seen at any timepoint except 6 months: ASES pain and composite scores better for the delayed therapy group; pain score mean change from baseline 16.7 SD 11.6 ER group, mean change 26.3 SD 16.3 DR group, P = 0.008, composite score mean change from baseline 30.0 SD 18.8 ER group, mean change 40.2 SD 20.1 DR group, P = 0.038.</p> <p>Scapular notching: Intervention group - 27 cases of Nerot-Sirveaux class 0, 13 cases of class 1 and 2 cases of class 2. Control group - 20 cases of Nerot-Sirveaux class 0, and 24 cases of class 1.</p>

Abbreviations: RCA, rotator cuff arthropathy; OA, osteoarthritis; RA, rheumatoid arthritis; RC, rotator cuff; RSA, reverse shoulder arthroplasty; ROM, range of motion; SSD, statistically significant difference; SD, standard deviation; ER, early rehabilitation; DR, delayed rehabilitation; PROM, passive range of motion; AAROM, active-assisted range of motion; AROM, active range of motion; VAS, Visual Analogue Scale; GSF, Global Shoulder Function; SANE, single-assessment numerical evaluation; AQOL-4D, assessment of quality of life instrument; SAS, shoulder activity scale; ASES, American Shoulder and Elbow Surgeons; FF, forward flexion; NI, no immobilization; 3WI, 3 weeks immobilization; 6WI, 6 weeks immobilization.

Results

Author & Publication Year	Study type and number of included shoulders	Population sample and prosthesis used	Summarized types of Rehabilitation	Outcome measures and follow-up time points	Findings
Edwards et al 2021	<p>Study type: Randomized controlled trial</p> <p>Shoulders Number: 63 (55 completed 1 year follow-up, but all 63 included in analysis)</p> <p>Early rehabilitation:30 (27 completed 1 year follow-up)</p> <p>Standard (delayed) rehabilitation: 33 (28 completed 1 year follow-up)</p>	<p>Population: RSA only due to symptomatic massive RC tears, glenohumeral OA – no repair of subscapularis</p> <p>Mean Age: 74.31 years</p> <p>Prosthesis: Exactech Equinox Reverse Shoulder System</p>	<p>Early Rehabilitation: Two first weeks shoulder immobilization, then sling use up to 6th week, but removable for PROM and AAROM exercises. AROM after 6th week.</p> <p>Delayed Rehabilitation: Two first weeks shoulder immobilization, then sling use up to 6th week, but removable for PROM exercises. AAROM after 6th week. AROM As tolerated after 12th week.</p>	<p>Main outcome: ASES score</p> <p>Other outcomes: Pain VAS, GSF, SANE, SAS, AQOL-4D, Constant, ROM, Peak isometric strength scores</p> <p>Time points: Baseline, 3 months, 6 months, 1 year post-op (no baseline for Constant, ROM and peak isometric strength)</p>	<p>Scores presented as mean.</p> <p>ASES: No SSD found between groups. At last follow-up, ER 57; DR 52.5.</p> <p>Pain VAS: No SSD found between groups. At last follow-up, ER -6.2; DR -5.4.</p> <p>GSF: No SSD found between groups. At last follow-up, ER 5.5; DR 4.8.</p> <p>SANE: No SSD found between groups. At last follow-up, ER 55.6 ; DR 47.1 .</p> <p>SAS: No SSD found between groups. At last follow-up, ER 5.1; DR 6.3.</p> <p>AQOL-4D: No SSD found between groups. At last follow-up, ER 12.9; DR 14.9.</p> <p>Constant score: No SSD found between groups at any time point.</p> <p>ROM: SSD found in FF, favoring ER, three months post-op.</p> <p>Peak isometric strength scores: At the three- to six-month interval, there was a SSD improvement for arm flexion strength (mean difference, 0.8; 95% CI: 1.5 to 0.4; p 14 0.038) favoring the DA group.</p>

Abbreviations: RCA, rotator cuff arthropathy; OA, osteoarthritis; RA, rheumatoid arthritis; RC, rotator cuff; RSA, reverse shoulder arthroplasty; ROM, range of motion; SSD, statistically significant difference; SD, standard deviation; ER, early rehabilitation; DR, delayed rehabilitation; PROM, passive range of motion; AAROM, active-assisted range of motion; AROM, active range of motion; VAS, Visual Analogue Scale; GSF, Global Shoulder Function; SANE, single-assessment numerical evaluation; AQOL-4D, assessment of quality of life instrument; SAS, shoulder activity scale; ASES, American Shoulder and Elbow Surgeons; FF, forward flexion; NI, no immobilization; 3WI, 3 weeks immobilization; 6WI, 6 weeks immobilization.

Results

Author & Publication Year	Study type	Population sample and prosthesis used	Summarized types of Rehabilitation	Outcome measures and time points	Findings
Lee et al 2021	Study type: Retrospective Cohort Comparison trial Shoulders Number: 357	Population: RSA done for all eligible reasons apart from acute proximal humerus fractures and revision of primary RSA – in all cases repair of subscapularis was done Mean Age: 76 years (range 40- 93)	No immobilization: Body belt and sling for 48 hours. Then no sling throughout the day. Immediate commencement of PROM and gradually AAROM and AROM exercises. Immediate induction of the Deltoid Rehabilitation regime. 3 weeks immobilization: Body belt and sling for 48 hours. Sling for the first 3 weeks. Then commencement of PROM and gradually AAROM and AROM exercises, induction of the Deltoid Rehabilitation regime. 6 weeks immobilization: Body belt and sling for 3 weeks, removable only for gentle PROM exercises. Sling for another 3 weeks, removable only for PROM and AAROM exercises. At 6 weeks, sling removal and induction of the Deltoid Rehabilitation regime.	Outcomes: Constant, SSV, Pain score, ROM (elevation, abduction) Time points: Only outcomes from baseline and the last follow-up (1 year) have been analyzed. However the authors report that outcomes were also measured at 3 weeks, 3 months, 6 months and 1 year post-op.	Constant score: No SSD found between groups at any time point. At last follow-up, NI adjusted mean 94.9; 3WI adjusted mean 98.4; 6WI adjusted mean 91.5. SSV: No SSD found between groups at any time point. At last follow-up, NI mean 8.1; 3WI mean 8.6; 6WI mean 8.5. Pain score: No SSD found between groups at any time point. At last follow-up, NI mean 12.5/15; 3WI mean 13/15; 6WI mean 12.5/15. ROM: No SSD found between groups at any time point. At last follow-up, NI elevation mean 149° and abduction mean 146°; 3WI elevation mean 153° and abduction mean 144°; 6WI elevation mean 142° and abduction mean 131°
	No immobilization : 118 3 week immobilization: 125 6 week immobilization: 114	Prosthesis: Verso Stemless Metaphyseal Reverse Shoulder Prosthesis			

Abbreviations: RCA, rotator cuff arthropathy; OA, osteoarthritis; RA, rheumatoid arthritis; RC, rotator cuff; RSA, reverse shoulder arthroplasty; ROM, range of motion; SSD, statistically significant difference; SD, standard deviation; ER, early rehabilitation; DR, delayed rehabilitation; PROM, passive range of motion; AAROM, active-assisted range of motion; AROM, active range of motion; VAS, Visual Analogue Scale; GSF, Global Shoulder Function; SANE, single-assessment numerical evaluation; AQOL-4D, assessment of quality of life instrument; SAS, shoulder activity scale; ASES, American Shoulder and Elbow Surgeons; FF, forward flexion; NI, no immobilization; 3WI, 3 weeks immobilization; 6WI, 6 weeks immobilization.

Results

	Hagen et al, 2020		Edwards et al, 2021		Lee et al, 2021		
Complications	Early Rehabilitation	Delayed Rehabilitation	Early Rehabilitation	Delayed Rehabilitation	No Immobilization	3 weeks Immobilization	6 weeks Immobilization
	42 cases	44 cases	27 cases	28 cases	118 cases	125 cases	114 cases
Infection					1	1	
Dislocation		1					3
Acromial Fracture	1			1			2
Scapular spine fracture				1	1	1	6
Periprosthetic fracture		1			2 glenoid, 1 humeral	1 glenoid, 2 humeral	4 glenoid, 13 humeral
Other	1 GD, 1 PE	1DVT, 1 lymphedema					
Total	3	4	0	2	5	5	28

Cases shown below groups correspond to cases analyzed up to 1year post-op follow-up. Numbers inside cells = number of shoulder cases with described complication. Abbreviations: GD, glenosphere dissociation; PE, pulmonary embolism; DVT, deep vein thromboembolism

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Conclusion

- Few studies have provided early rehabilitation protocols for patients undergoing reverse shoulder arthroplasty. Three studies were included in this review.
- Data provided by included studies was of very low-to-low methodological quality.
- At the 3-month follow-up time point, forward flexion was significantly better in the early rehabilitation group of one study. Otherwise, no study discovered a minimally significant difference in clinical or patient-reported outcomes between early and delayed rehabilitation groups.
- Also, one study found that the delayed 6-week immobilization group had a higher complication rate.

Early shoulder mobilization seems safe without jeopardizing arthroplasty outcomes. However, it may not be wholly applied to all patients and future studies are needed in order to consolidate the above findings.



Key References

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