

Postoperative rehabilitation after shoulder arthroplasty: protocols, challenges and functional outcome

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Disclosure statement

**I have no actual or potential conflict of interest in relation to
this program/presentation.**

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~200,000

shoulder replacements

are performed annually in the United States,
with rapidly increasing global demand

Statistics Worldwide

- ✓ Shoulder replacements are increasing in all countries
- ✓ Shoulder arthroplasty incidence varies significantly worldwide (11.7–30.4 per 100,000)
- ✓ Germany and Australia show the highest procedure rates
- ✓ The United Kingdom has the lowest incidence but the fastest growth
- ✓ Overall global trend: rapidly increasing utilization
- ✓ **Rupani N et al. Acta Orthop. 2024;95:348–357**

Rehabilitation following shoulder arthroplasty

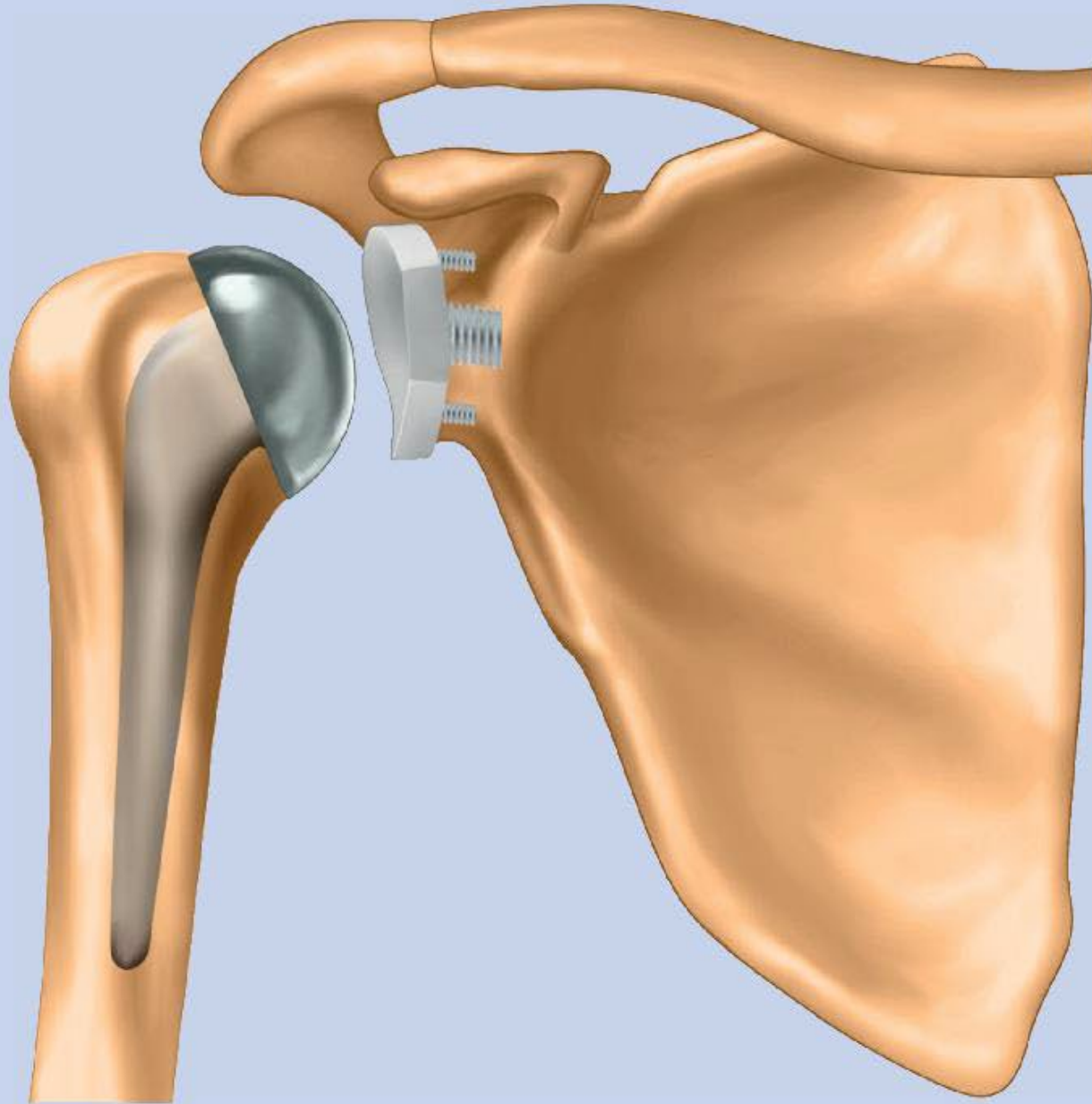
Types of shoulder prostheses

- ✓ Anatomical (TSA) - Total Shoulder Arthroplasty
- ✓ Reverse (RSA) - Reverse Shoulder Arthroplasty

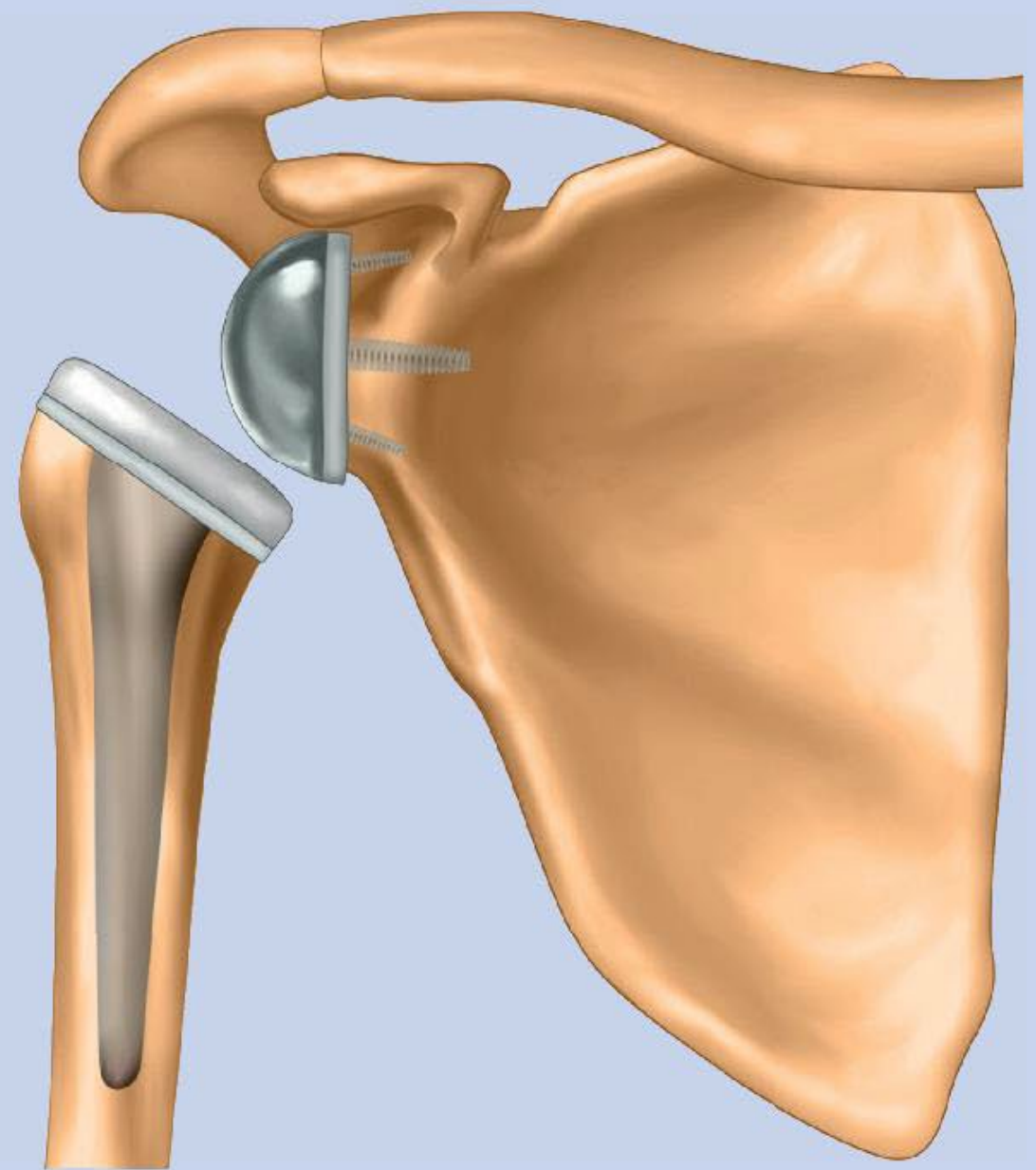
Indications

- ✓ Primary osteoarthritis
- ✓ Avascular necrosis
- ✓ Massive rotator cuff tear (RSA)
- ✓ Complex proximal humerus fracture

Anatomical total shoulder replacement



Reverse total shoulder replacement



Preoperative Rehabilitation (Prehabilitation)

- ✓ Prepare the patient for postoperative recovery
- ✓ Improve understanding of rehabilitation process
- ✓ Optimize functional outcomes

Key Components

- Patient education on:
 - postoperative exercises
 - activity restrictions (ADL)
- Explanation of **surgical procedure and precautions**
- Planning for **postoperative support at home**

Postoperative precautions

- **TSA (anatomical)**

- Avoid external rotation $> 30^\circ$ during the first 4–6 weeks
- Avoid combined abduction + external rotation
- Avoid lifting more than 1 kg

- **RSA (reverse)**

- Avoid adduction + internal rotation (the “hand behind the back” movement)
- Avoid active extension of the arm backward
- Protect the deltoid muscle and the tuberosities (in fractures)

General principles of rehabilitation

- ✓ Protection of the involved/repaired structures
- ✓ Pain and inflammation control
- ✓ Prevention of stiffness
- ✓ Gradual progression of mobility and strength
- ✓ Return to specific functions



Phase I: 0–4 weeks

Objectives

- ✓ Protection of the repair
- ✓ Pain and inflammation control
- ✓ Prevention of severe stiffness

Interventions

- ✓ Wearing an orthosis (brace)
- ✓ Cryotherapy
- ✓ Passive mobilization: flexion 90°, abduction 60° (variable depending on protocol)
- ✓ Scapular mobility
- ✓ Wrist/elbow exercises
- ✓ Constant –Murley Score

Prospective data

Kornuijt A, de Vries L, van der Weegen W, Hillen RJ, Bogie R, Stokman R, van Kampen D. Direct active rehabilitation after reverse total shoulder arthroplasty: an international multicentre prospective cohort safety study with 1-year follow up. BMJ Open. 2023 Apr 18;13(4):e070934. doi: 10.1136/bmjopen-2022-070934. PMID: 37072366; PMCID: PMC10124285.

Study Objective

- ✓ To evaluate the safety of direct active rehabilitation
- ✓ After reverse total shoulder arthroplasty (rTSA)
- ✓ Without immobilisation or precautions

BMJ Open

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► BMJ Open. 2023 Apr 18;13(4):e070934. doi: [10.1136/bmjopen-2022-070934](https://doi.org/10.1136/bmjopen-2022-070934)

Direct active rehabilitation after reverse total shoulder arthroplasty: an international multicentre prospective cohort safety study with 1-year follow up

[Anke Kornuijt](#)^{1,✉}, [Lieke de Vries](#)², [Walter van der Weegen](#)¹, [Robert Jan Hillen](#)², [Rob Bogie](#)¹, [Remco Stokman](#)³, [Derk van Kampen](#)²

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PMCID: PMC10124285 PMID: [37072366](https://pubmed.ncbi.nlm.nih.gov/37072366/)

Abstract

Main results

- ✓ Study Design: International multicentre prospective cohort study
- ✓ 100 patients, mean age 74 years
- ✓ Follow-up: 6 weeks, 3 months, 1 year
- ✓ Intervention: Immediate active mobilisation (day 1 post-op) ,No sling (except first day) ,Progressive rehabilitation ≥ 12 weeks

Key Results

- 17% total complications
 - Only 5% related to rehabilitation
- Significant improvements in:
 - Range of motion (ROM)
 - Pain (NPRS)
 - Function (Oxford Shoulder Score)
- Quality of life improved from 3 months onward

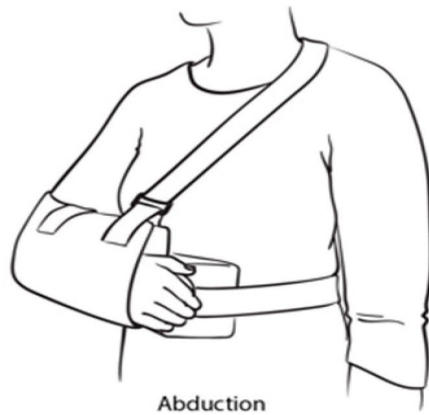
Study (year)	Level of evidence	Immediate motion protocol	Delayed motion protocol	Outcomes	Complications
Hagen et al. (2020)	I, randomized controlled trial	Immediate physical therapy for passive and active ROM	No ROM for 6 weeks	No significant differences were found between groups for any postoperative measure, with the exception of the ASES functional score favoring the delayed-therapy group at 6 months (26.3-point improvement vs. 16.7-point improvement) No differences in complications, notching, or narcotic use between groups	Immediate motion – 1 glenosphere dissociation, 1 acromial stress fracture, 1 post-op PE Delayed motion—1 prosthetic shoulder dislocation requiring surgery (< 1 month postoperatively), 1 periprosthetic fracture (at 1 year postoperatively), 1 deep venous thromboembolism, and 1 case of lymphedema



Simple sling



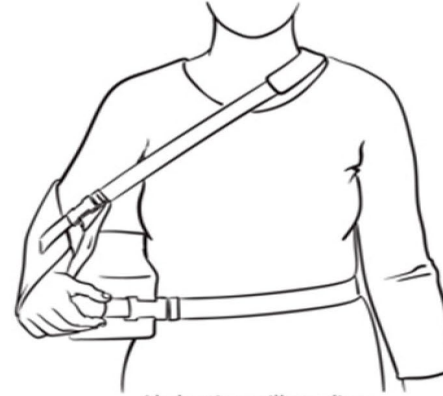
Shoulder immobilizer



Abduction pillow sling



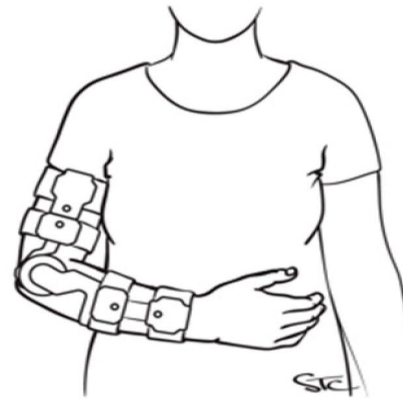
Neutral rotation sling



Abduction pillow sling in neutral rotation



Abduction pillow/
barrel (no sling)



Elbow range of
motion brace

Phase II: 4–8 weeks

Objectives

- Progressive increase of passive and active-assisted ROM
- Activation of scapular musculature
- Initiation of controlled active mobilization

Exercises

- Active-assisted mobilization (AAROM) –with a stick
- Scapular mobilization
- Deltoid isometric exercises (RSA)

Phase III: 8–12 weeks

Objectives

- ✓ Achieving functional ROM
- ✓ Increasing strength and neuromuscular control

Interventions

- ✓ Active exercises without compensations
- ✓ Progressive strengthening: resistance bands, light weights
- ✓ Proprioceptive exercises and scapulothoracic stability

Phase IV: after 12 weeks

Objectives

- ✓ Near-normal strength and function
- ✓ Gradual return to sports/occupational activities

Interventions

- ✓ Moderate resistance exercises
- ✓ Closed kinetic chain exercises
- ✓ Recreational activities: swimming (breaststroke), arm ergometer
- ✓ Progressive overhead movements
- ✓ Avoidance of contact sports permanently

! Take away message !

- ✓ Most patients achieve significant pain relief, but full ROM is not always restored
- ✓ Successful outcomes after shoulder arthroplasty depend as much on rehabilitation as on surgical technique
- ✓ Rehabilitation protocols must be individualized according to prosthesis type, patient factors, and surgical indications

Thank you!

