

## **Total shoulder replacement, Reverse Shoulder Replacement and Hemi-arthroplasty**

### **Introduction:**

Surgery: The humeral head is replaced in a hemi arthroplasty and the humeral head and the glenoid replaced in a total shoulder replacement (TSA) and reverse shoulder replacement (RSA). The soft tissues around the implant require reconstruction and rehabilitation.

Indications for surgery: Old trauma, osteoarthritis, dislocation arthritis, rheumatoid arthritis, neoplasm, cuff tear arthropathy, congenital dysplasia, severe comminuted proximal humeral fractures. Primarily for pain relief, improved function, possible improved range of movement (ROM) but not necessarily.

Expected length of stay: 2 to 4 days. This is variable and depends on factors such as support at home and not just initial surgical outcome.

Surgeons: Miss McBirnie, Professor Howie, Mr Robinson, Mr Reid, Mr Brown, Professor Breusch.

### **Scope of Practice:**

These guidelines are designed to guide physiotherapists when treating patients following these surgical procedures. These guidelines were produced by a process of systematic review of the current evidence based literature, medical and peer consultation. They were correct at the time of writing. The guidelines should be used in conjunction with the clinical reasoning skills of the physiotherapist and patients should always be treated on a case-by-case basis.

### **Aim:**

The aim of these guidelines is to provide physiotherapy staff with a series of recommendations from the current evidence base to assist them in the management of patients who have undergone these surgical procedures.

### **Literature review question:**

What is the physiotherapy rehabilitation post total shoulder replacement / reverse shoulder replacement?

### **Search Process:**

Appraisal proves: the databases were searched between 2016 and 2020, as previous guidelines were searched up until 2016.

The titles and abstracts of all identified studies were assessed to determine whether they were pertinent to the research question. Relevant articles were crosschecked and duplicates were discarded.

Number of articles selected: 45

Total number of articles discarded: 34.

Databases:

Databases	Dates	Limitations
Medline	2016 to current	English, human
Cinhal	2016 to current	English, human
Pedro	2016 to current	English, human
Amed	2016 to current	English, human
Embase	2016 to current	English, human
Cochrane	2016 to current	English, human

Key Words: in various combinations

Physiotherapy	Post-operative
Shoulder	Reverse
Arthroplasty	Prognosis
Hemiarthroplasty	Function
Total	Exercises
Physical Therapy	Strength
Rehabilitation	Range of Movement
Glenohumeral	Activities of Daily Living
Replacement	

## Results:

There continues to be a lack of in-depth evidence for post-shoulder replacement rehabilitation since the guidelines were previously reviewed. Most are based on expert opinion and anecdotal evidence. A limitation in the literature search was the insufficient reporting of the rehabilitation protocols. There are two randomised control trials (RCTs) and one systematic review. There is a variation on opinion on the optimum post-operative physiotherapy management, however the consensus supports early mobilisation to improve general function.

Information was extrapolated from the literature evaluation and consensus sought from expert consultation with orthopaedic surgeons and advanced physiotherapy practitioners in NHS Lothian.

These guidelines have been expanded from the previous guidelines covering the literature between 2008 to 2016. The previous literature search used as a point of reference.

## REHABILITATION GUIDELINES FOR HEMIARTHROPLASTY AND TSA

To note: there is additional information for RSA at the end of these guidelines.

### Key Points:

- Pre-op information is important – patients must be familiar with the stages of rehab (28)
- Rehabilitation should be individualised (28)
- Communication with the surgical team is important (4) particularly if there are any additional procedures carried out
- Timescales are approximate and will depend on the surgical procedure
- Avoid HBB beyond thigh for 8 weeks in Miss McBirnies patients (6 weeks for all other consultants)

### Pre-operative phase:

#### Goals

Maintain ROM and strength  
Pain relief

#### Recommendations

AROM exercises and isometrics (31)  
Consider heat, isometrics, relaxation (31) **C**

### Early Phase (0-3 weeks)

The aim of this phase is to start recovering ROM and start recovering or maintaining scapular stability. The majority of papers recommend a sling for 4-6 weeks (off for hygiene and exercises) (4,5,7,17,19,26,33) but consultant preference is detailed below.

#### Goals

Protect

#### Recommendations

Arm in sling as required (1-2 weeks for Miss McBirnies patients)  
Sling off for hygiene and exercises (4,17,19,26,28,33)  
Do not mobilise into pain (8) **C**

Increase ROM

Exercises to begin immediately (4,16,27,28)  
little and often (8)  
Neck, elbow, wrist and hand active ROM exercises (4,7,8,27,26,28)  
Shoulder active assisted/passive ROM exercises (avoiding HBB)  
ER with arm by side to maximum 20-30 degrees (4,8,18,23,27, 31) but don't push to achieve this  
Pillows or a rolled up towel may be used under the elbow to support arm from falling behind midline (4)  
Pendular exercises (4,7,8,28) **C**

Scapular re-education

Massage as required (8)  
Scapula strengthening (4,7,8) in upright only (no prone lying) C

**Early Phase (3-4 weeks):**

**Goals**

Increase ROM

**Recommendations**

Continue with active assisted/passive ROM as required (4,7)

Supine passive ROM in the scapular plane (8,17,23,31) C

Can use pulleys (8,28)

Increase muscle strength

Isometric exercises except for IR (4,7,8,18) C

**Early Phase (4-6 weeks):**

**Goals**

Increase ROM

**Recommendations**

Active ROM exercises in a non-painful range (4,8,28) except for HBB

**Middle Phase (6-12 weeks):**

The aim of this phase is to improve strength and continue pacing with light functional activities and exercises.

**Goals**

Increase ROM

**Recommendations**

Gradually increase active ROM with optimum scapular control (4)

If able, begin active IR at week 6 (4,7); 8 weeks for Miss McBirnies patients but don't push to achieve this

Continue passive ROM as required

Increase strength

Can begin isometric internal rotation (4,8,26,27) at week 8

Progress strengthening exercises from isometric to isotonic exercises (4,8,26,27) graduating from supine, adding light weights then progress to sitting and standing as able (8)

Exercise band once satisfactory muscle strength achieved (23)

Closed chain exercises (4,7)

Function	Light functional activities (8) Avoid heavy lifting (8, 26)	C
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**Late stage (12 weeks – 6 months)**

The aim is to regain strength, movement and allow maximal function, as limited by expectations.

Avoid heavy activities or pain provoking activities (8,26)

<b>Goals</b>	<b>Recommendations</b>
Increase ROM	Gradually increase ROM as able (26) Stretch if indicated (8) <b>C</b>
Increase strength	Gradually progress strength as appropriate Rotator cuff strengthening (26, 31) Isokinetic rehab is recommended for younger patients with resurfacing, but not recommended for elderly patients with stemmed prosthesis (8) <b>C</b>
Increase proprioception	Proprioceptive exercises (8)
Function	Encourage self-management (31)

It is clear from the evidence that patients with rotator cuff compromise do not do as well post operatively. Those with Rheumatoid arthritis may require modifications of the programme as auto assisted movements are often difficult. Following trauma rehabilitation must take in to consideration the amount of soft tissue damage. Expectations for these patients should therefore be modified accordingly.

Pain will continue to reduce for up to 6 months  
IR/ER should continue to improve for up to 1 year (20)

**Return to function**

Return to driving after 3 months (8, 26)  
4-6 months for return to golf (10); Average time 8.4 months (24)  
Moderate/non-contact sports activities from 6 months (8, 37)

Physiotherapy intervention at 2-3 years post op may improve range and ADL function (34)

## REVERSE TOTAL ARTHROPLASTY

The following guidelines were adapted from Blacknall & Neumann (1), one RCT (12) and 1 systematic review (3) as well as expert opinion from orthopaedic surgeons and offer further guidance and recommendations for physiotherapy post reverse arthroplasty. These patients are rotator cuff deficient, which is the primary reason for selecting this surgery. The emphasis should be on deltoid training to compensate for deficient rotator cuff muscles.

Key points for Miss McBirnie patients:

- Kept in sling between 2-4 weeks
- No outpatient physiotherapy until clinic review at 3 months – she will refer to physiotherapy if required

### **Pre-operative phase:**

#### **Goals**

Maintain ROM and strength  
Pain relief

#### **Recommendations**

AROM exercises and isometrics (31)  
Consider heat, isometrics, relaxation (31) **C**

### **Early phase (0-2 weeks)**

The aim of this phase is to start recovering ROM, start recovering or maintaining scapular stability and recruit deltoid.

#### **Goals**

Protect

#### **Recommendations**

Arm in sling as required; off for hygiene and exercises (1, 3)  
Care with GHJ extension and HBB for first few weeks (1, 3)  
Pillows or a rolled up towel may be used under the elbow to support arm from falling behind midline (4) **B C**

Increase ROM

Elbow, wrist and hand active ROM exercises (4,8,26,27)  
Active assisted GHJ exercises in supine (1, 3, 12); individual gradual progression  
Standing shoulder rolls (1)  
Pendular exercises (1) **B C**

Recruit deltoid	Static holds at 90 degrees flexion in supine (1)	C
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**Middle phase (2-6 weeks)**

The aim of this phase is to gradually increase functional ROM of the arm and increase deltoid recruitment.

<b>Goals</b>	<b>Recommendations</b>	
Protect	Sling for busy environments (1) Avoid supporting body weight with the involved limb (1, 3)	B C
Increase ROM	Allow gradual increase in GHJ active ROM at patients own pace (3) Active extension and HBB from week 4 (1)	C
Increase strength	Gradually progress active flexion from supine to sitting (1) Progress ER from supine to side lying (1) Supine isometric IR and ER with stick (1) Scapular control exercises (1)	C

**Late phase (6-26 weeks)**

The aim of this phase is to gradually increase functional use of the arm and increase deltoid recruitment.

<b>Goals</b>	<b>Recommendations</b>	
Increase ROM	Progress active ROM as able (1)	
Increase strength	Progress exercises from supine to sitting and from short lever to long lever (1) GHJ strengthening with exercise band (1,7) or free weights (7) as able Focused strengthening of periscapular muscles (1,26) and deltoid (7) Increase reps and resistance as able (1, 3)	BC
Function	Avoid weight bearing through the arm (1, 3) Avoid sudden lifting or pushing (1) Gradually progress functional use of the arm with good patterning	BC

### **Expectations of surgery**

It is clear from the evidence that patients with rotator cuff compromise do not do as well post operatively. Those with Rheumatoid arthritis may require modifications of the programme as auto assisted movements are often difficult. Following trauma, rehabilitation must take in to consideration the amount of soft tissue damage. Expectations for these patients should therefore be modified accordingly.

Pain will continue to reduce for up to 6 months (20)

IR/ER should continue to improve for up to 2 years (20)

### **Return to function**

Return to driving after 3 Months (8, 26)

4-6 months for return to golf (10); Average time 8.4 months (24)

Moderate/non-contact sports activities from 6-12 months (8, 37)



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#### **Levels of Evidence**

Evidence from large randomised controlled trials (RCTs) or systematic review

(including meta-analyses)<sup>†</sup> A1

Evidence from at least one high quality cohort A2

Evidence from at least on moderate size RCT or systematic review A3

Evidence from at least one RCT B

Expert opinions C

Laboratory Evidence\* D

<sup>†</sup> Arbitrarily, the following cut-off points have been used: large study size 50

patients per intervention group; moderate study size 30 patients per

intervention group.

*\* Arbitrarily, added by Lothian Physiotherapy Musculoskeletal Network Group*

Modified from: MacAuley D and Best TM (2007) Evidence-based Sports

Medicine. 2nd Edition. BMJ Books. Blackwell Publishing. Oxford, UK.

## **Glossary**

CASP	Critical Appraisal Skills Programme
ER	External rotation
HBB	Hand behind back
IR	Internal rotation
ROM	Range of Movement
RSA	Reverse shoulder arthroplasty
TSA	Total shoulder arthroplasty