Beth Israel Lahey Health
Lahey Hospital & Medical Center

Rehabilitation Protocol:

Total Shoulder Arthroplasty / Hemiarthroplasty

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◄ Overview

Total shoulder arthroplasty (TSA) is considered for patients with osteoarthritis (OA), rheumatoid arthritis, post-traumatic arthritis, avascular necrosis, or severe fractures when conservative interventions do not provide improvement. Patients must have an intact rotator cuff to be a good candidate for this surgery. The primary goal of TSA is pain relief, however patients also report improved motion, strength and function. Patients undergoing TSA secondary to OA, who have an intact rotator cuff, can expect up to 140º of forward elevation postoperatively.

Understanding the underlying shoulder pathology pre-operatively is key to the rehabilitation course. The pre-operative quality of the soft tissue and bone stock will impact the functional outcome. Wilcox et al[6] also discuss the importance of understanding and attending to the subscapularis following TSA. They report that aggressive external rotation stretching and/or too vigorous internal rotation strengthening should be avoided.

The primary goals of early rehabilitation are to promote soft tissue healing and preserve glenohumeral mobility. The post-operative course emphasizes early range of motion and gradual progression of strength and restoration of function.

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◄ Phase I **Immediate Post Surgical Phase**

Goals

- Allow soft tissue healing
- Maintain integrity of replaced joint
- Gradually increase passive range of motion (PROM) of shoulder; restore active range of motion (AROM) of elbow/wrist/hand
- Reduce pain and inflammation
- Prevent muscular inhibition
- Independent with activities of daily living (ADLs) with modifications while maintaining the integrity of the replaced joint.

Precautions

- Sling should be worn continuously for 3-4 weeks
- While lying supine, a small pillow or towel roll should be placed behind the elbow to avoid shoulder hyperextension / anterior capsule stretch / subscapularis stretch..
- Avoid shoulder AROM.
- No lifting of objects
- No excessive shoulder motion behind back, especially into internal rotation (IR)
- No excessive stretching or sudden movements (particularly external rotation (ER))
- No supporting of body weight by hand on involved side
- Keep incision clean and dry (no soaking for 2 weeks)
- No driving for 3 weeks

Post-Operative Day (POD) #1 (in hospital):

Therapeutic Exercise

- Passive forward flexion in supine to tolerance
- Gentle ER in scapular plane to available PROM (as documented in operative note) – usually around 30° (Attention: DO NOT produce undue stress on the anterior joint capsule, particularly with shoulder in extension)
- Passive IR to chest
- Active distal extremity exercise (elbow, wrist, hand)
- Pendulum exercises
- Frequent cryotherapy for pain, swelling, and inflammation management
- Patient education regarding proper positioning and joint protection techniques

Early Phase I: (out of hospital)
Post-op day #2-10

Therapeutic Exercise

- Continue above exercises
- Begin scapula musculature isometrics / sets (primarily retraction)
- Continue active elbow ROM
- Continue cryotherapy as much as able for pain and inflammation management

Late Phase I
Post op days #10-21

Therapeutic Exercise

- Continue previous exercises
- Continue to progress PROM as motion allows
- Begin assisted flexion, scaption, ER, IR in the scapular plane
- Progress active distal extremity exercise to strengthening as appropriate

Criteria for progression to the next phase (II):

If the patient has not reached the below ROM, forceful stretching and mobilization/manipulation is not indicated. Continue gradual ROM and gentle mobilization (i.e. Grade I oscillations), while respecting soft tissue constraints.

- Tolerates PROM program
- Has achieved at least 90° PROM forward flexion and elevation in the scapular plane.
- Has achieved at least 45° PROM ER in plane of scapula
- Has achieved at least 70° PROM IR in plane of scapula measured at 30° of abduction

◄ Phase II – Early Strengthening Phase

(Not to begin before 4-6 Weeks post-surgery to allow for appropriate soft tissue healing):

Goals

- Restore full passive ROM
- Gradually restore active motion
- Control pain and inflammation
- Allow continued soft tissue healing
- Re-establish dynamic shoulder stability

Precautions

- Gradually wean from sling.
- While lying supine a small pillow or towel should be placed behind the elbow to avoid shoulder hyperextension / anterior capsule stretch.
- In the presence of poor shoulder mechanics avoid repetitive shoulder AROM exercises/activity against gravity in standing.
- No heavy lifting of objects (no heavier than coffee cup)
- No supporting of body weight by hand on involved side
- No sudden jerking motions

Therapeutic Exercise

- Continue with PROM, active assisted range of motion (AAROM)
- Begin active flexion, IR, ER, (elevation in the plane of the scaption) pain free ROM
- AAROM pulleys (flexion and elevation in the plane of the scaption) – as long as greater than 90° of PROM
- Begin shoulder sub-maximal pain-free shoulder isometrics in neutral
- Scapular strengthening exercises as appropriate
- Begin assisted horizontal adduction
- Progress distal extremity exercises with light resistance as appropriate
- Gentle glenohumeral and scapulothoracic joint mobilizations as indicated (grade I and II)
- Initiate glenohumeral and scapulothoracic rhythmic stabilization
- Continue use of cryotherapy for pain and inflammation.

Late Phase II

Progress scapular strengthening exercises

Criteria for progression to the next phase (III):

Continue gradual ROM and gentle mobilization (i.e. Grade I oscillations), while respecting soft tissue constraints.
If the patient has not reached the below ROM, forceful stretching and mobilization/manipulation is not indicated.

- Tolerates P/AAROM, isometric program
- Has achieved at least 140° PROM forward flexion and elevation in the scaption plane.
- Has achieved at least 60° PROM ER in plane of scapula
- Has achieved at least 70° PROM IR in plane of scapula measured at 30° of abduction
- Able to actively elevate shoulder against gravity with good mechanics to 100°.

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◄ Phase III Moderate strengthening

(Not to begin before 6 Weeks post-surgery to allow for appropriate soft tissue healing and to ensure adequate ROM)

Goals

- Gradual restoration of shoulder strength, power, and endurance
- Optimize neuromuscular control
- Gradual return to functional activities with involved upper extremity

Precautions

- No heavy lifting of objects (no heavier than 5 lbs.)
- No sudden lifting or pushing activities
- No sudden jerking motions

Early Phase III
6-10 weeks

Therapeutic Exercise

- Progress AROM exercise / activity as appropriate
- Advance PROM stretching as appropriate
- Initiate assisted shoulder IR behind back stretch
- Resisted shoulder IR, ER in scapular plane
- Begin light functional activities
- Begin progressive supine active elevation strengthening (anterior deltoid) with light weights (1-3 lbs.) at variable degrees of elevation (beach chair)

Late Phase III
10-12 weeks

Therapeutic Exercise

- Resisted flexion, (elevation in the plane of the scaption), extension (therabands / sport cords)
- Continue progressing IR, ER strengthening
- Progress IR stretch behind back from AAROM to AROM as ROM allows (Pay particular attention as to avoid stress on the anterior capsule.)

Criteria for progression to the next phase (IV):
If the patient has not reached the below ROM, forceful stretching and mobilization/manipulation is not indicated. Continue gradual ROM and gentle mobilization (i.e. Grade I oscillations), while respecting soft tissue constraints.

- Tolerates AA/AROM/strengthening
- Has achieved at least 140° AROM forward flexion and elevation in the scapular plane supine.
- Has achieved at least 60° AROM ER in plane of scapula supine
- Has achieved at least 70° AROM IR in plane of scapula supine in 30° of abduction
- Able to actively elevate shoulder against gravity with good mechanics to at least 120°.

Note: (If above ROM are not met, then patient is ready to progress if their ROM is consistent with outcomes for patients with the given underlying pathology).

◄ Phase IV Advanced strengthening phase

(Not to begin before 12 Weeks to allow for appropriate soft tissue healing and to ensure adequate ROM, and initial strength):

Goals
- Maintain non-painful AROM
- Enhance functional use of upper extremity

Precautions
- Avoid exercise and functional activities that put stress on the anterior capsule and surrounding structures. (Example: no combined ER and abduction above 80° of abduction.)
- Ensure gradual progression of strengthening

Early Phase IV:

Typically patient is on a home exercise program by this point to be performed 3-4 times per week
Therapeutic Exercise

- Gradually progress strengthening program
- Gradual return to moderately challenging functional activities.

Late Phase IV (Typically 4-6 months post-op):

Return to recreational hobbies, gardening, sports, golf, doubles tennis

Criteria for D/C from skilled Therapy:
- Patient able to maintain non-painful AROM
- Maximized functional use of upper extremity
- Maximized muscular strength, power, and endurance
- Patient has returned to advanced functional activities

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Post-Op Phase/Goals	Range of Motion	Therapeutic Exercise	Precautions
Phase 1 – Immediate Post Surgical Phase: **Goals**: - Allow soft tissue healing - Maintain integrity of replaced joint - Gradually increase passive range of motion (PROM) of shoulder; restore active range of motion (AROM) of elbow/wrist/hand - Reduce pain and inflammation - Prevent muscular inhibition - Independent with activities of daily living (ADLs) with modifications while maintaining the integrity of the replaced joint.	Post-Operative Day (POD) #1 (in hospital)	- Passive forward flexion in supine to tolerance - Gentle ER in scapular plane to available PROM (as documented in operative note) usually around 30° (Attention: DO NOT produce undue stress on the anterior joint capsule, particularly with shoulder in extension) - Passive IR to chest - Active distal extremity exercise (elbow, wrist, hand) - Pendulum exercises - Frequent cryotherapy for pain, swelling, and inflammation management - Patient education regarding proper positioning and joint protection techniques	**Precautions**: - Sling should be worn continuously for 3-4 weeks - While lying supine, as small pillow or towel roll should be placed behind the elbow to avoid shoulder hyperextension/anterior capsule stretch/subscapularis stretch.. - Avoid shoulder AROM. - No lifting of objects - No excessive shoulder motion behind back, especially into internal rotation (IR) - No excessive stretching or sudden movements (particularly external rotation (ER)) - No supporting of body weight by hand on involved side - Keep incision clean and dry (no soaking of 2 weeks) - No driving for 3 weeks
	Early Phase 1: (out of hospital) **Post-op days #2-10**	- Continue above exercises - Begin scapula musculature isometrics/sets (primarily retraction) - Continue active elbow ROM - Continue cryotherapy as much as able pain and inflammation management	
	Late Phase 1: **Post op days # 10-21**	- Continue previous exercises - Continue to progress PROM as motion allows - Begin assisted flexion, elevation in the plane of the scapula, ER, IR in the scapular plane - Progress active distal extremity exercise to strengthening as appropriate	

Ctiteria for progression to the next phase (II):	If the patient has not reached the below ROM, forceful stretching and mobilization/manipulation is not indicated. Continue gradual ROM and gentle mobilization (i.e. Grade 1 oscillations), while respecting soft tissue constraints. • Tolerates PROM program • Has achieved at least 90° PROM forward flexion and elevation in the scapular plane. • Has achieved at lease 45° PROM ER in plane of scapula • Has achieved at least 70° PROM IR in plane of scapula measured at 30° of abduction		
Phase II – Early Strengthening Phase (Not to begin before 4-6 weeks post-surgery to allow for appropriate soft tissue healing) **GOALS:** - Restore full passive ROM - Gradually restore active motion - Control pain and inflammation - Allow continued soft tissue healing - Re-establish dynamic shoulder stability		- Continue with PROM, active assisted range of motion (AAROM) - Begin active flexion, IR, ER, elevation in the plane of the scapula pain free ROM - AAROM pulleys (flexion and elevation in the plane of the scapula) – as long as greater than 90° of PROM - Begin shoulder sub-maximal pain-free shoulder isometrics in neutral - Scapular strengthening exercises as appropriate - Begin assisted horizontal adduction - Progress distal extremity exercises with light resistance as appropriate - Gentle glenohumeral and scapulothoracic joint mobilizations as indicated - Initiate glenohumeral and scapulothoracicrhythmic stabilization - Continue use of cryotherapy for pain and inflammation.	- Gradually wean from sling - While lying supine a small illow or towel should be placed behind the elbow to avoid shoulder hyperextension/anterior capsule stretch. - In the presence of poor shoulder mechanics avoid repetitive shoulder AROM exercises/activity against gravity in standing. - No heavy lifting of objects (no heavier than coffee cup) - No supporting of body weight by hand on involved side - No sudden jerking motions
	Late Phase II	Progress scapular strengthening exercises	
Criteria for progression to the next phase (III):	If the patient has not reached the below ROM, forceful stretching and mobilization/manipulation is not indicated. Continue gradual ROM and gentle mobilization (i.e. Grad I oscillations), while respecting soft tissue constraints. • Tolerates P/AAROM, isometric program • Has achieved at least 140° PROM forward flexion and elevation in the scapular plane. • Has achieved at least 60° PROM ER in plane of scapula • Has achieved at lease 70° PROM IR in plane of scapula measured at 30° of abduction • Able to actively elevate shoulder against gravity with good mechanics to 100°		

Phase III – Moderate strengthening (Not to begin before 6 weeks post-surgery to allow for appropriate soft tissue healing and to ensure adequate ROM): • Gradual restoration of shoulder strength, power, and endurance • Optimize neuromuscular control • Gradual return to functional activities with involved upper extremity	**Early Phase III** **6-10 weeks**	• Progress AROM exercise/activity as appropriate. • Advance PROM to stretching as appropriate. • Continue PROM as needed to maintain ROM. • Initiate assisted shoulder IR behind back stretch. • Resisted shoulder IR, ER in scapular plane: Begin light functional activities • Begin progressive supine active elevation strengthening (anterior deltoid) with light weights (1-3 lbs.) at variable degrees of elevation.	- No heavy lifting of objects (no heavier than 5 lbs.) - No sudden lifting of pushing activities. - No sudden jerking motions.
	Late Phase III **10-12 weeks**	• Resisted flexion, elevation in the plane of the scapula, extension (therabands/sports cords) • Continue progressing IR, ER strengthening. • Progress IR stretch behind back from AAROM to AROM as ROM allows (Pay particular attention as to avoid stress on the anterior capsule.)	
Criteria for progression to the next phase (IV):	If the patient has not reached the below ROM, forceful stretching and mobilization/manipulation is not indicated. Continue gradual ROM and gentle mobilization (i.e. Grade I oscillations), while respecting soft tissue constraints. • Tolerates AA/AROM/ strengthening • Has achieved at least 140° AROM forward flexion and elevation in the <u>scapular plane supine</u>. • Has achieved at least 60° AROM ER in plane of scapula supine. • Has achieved as least 70° AROM IR in plane of scapula supine in 30° of abduction. • Able to actively elevate shoulder against gravity with good mechanics to at least 120°. <u>Note</u>: (If above ROM are not met then patient is ready to progress if their ROM is consistent with outcomes for patients with the given underlying pathology).		

Phase IV – Advanced strengthening phase (Not to begin before 12 weeks to allow for appropriate soft tissue healing and to ensure adequate ROM, and initial strength): • Maintain non-painful AROM • Enhance functional use of upper extremity	**<u>Early Phase IV</u>**: Typically patient is on a home exercise program by this point to be performed 3-4 times per week.	• Gradually progress strengthening program • Gradual return to moderately challenging functional activities.	- Avoid exercise and functional activities that put stress on the anterior capsule and surrounding structures. (Example: no combined ER and abduction above 80° of abduction.) - Ensure gradual progression of strengthening
	<u>Late Phase IV: Typically 4-6 months post-op.</u> Return to recreational hobbies, gardening, sports, golf, doubles tennis.		