OR Set-Up

Team of 3
- Surgeon
- First assistant
- Scrub Tech (opposite side of the bed)
Patient Positioning

Positioning
• Modified beach chair position
• Back of the patient at ~45 degrees relative to the floor

2 Main Principles
• Edge of bed so arm can achieve full extension
• Folded sheet or bean bag to support medial scapula & provide retraction resistance
Mayo Stand Set-up
Incision

Key Steps

1. Tip of the coracoid along approx. path of the Deltopectoral interval (aiming toward deltoid insertion on humerus)

2. Approximately 10-15cm incision

3. Skin incision with scalpel
Cephalic Vein

**Arm Position:** Neutral position with elbow flexed

**Key Steps**

1. Dissect using electrocautery
2. Identify D-P interval by fat stripe overlying the cephalic vein

Retractors
Develop Deltopectoral Interval

Arm Position: Neutral position with elbow flexed

Key Steps
1. Dissect Cephalic Vein using Metz & Forceps
2. Bluntly dissect between muscles to develop interval
3. Remove Rakes & retract Deltoid & Cephalic Vein lateral & Pec medial with Army-Navys

Retractors
**Coracoid Identification**

**Arm Position:** Adduct, External Rotation

**Key Steps**
For larger patients, it may be necessary to place a Hohmann superior to create adequate exposure

1. Place Curved Mayo scissors over the top of the Coracoid and spread to create space

2. Place **Hohmann** retractor above the Coracoid (may be clamped/taped to the draping)
Conjoined Tendon Mobilization

**Arm Position:** Adduction, External Rotation

**Key Step:**

- Release Clavipectoral Fascia with scissors or electrocautery along lateral aspect of conjoined tendon
Conjoined Tendon Retraction

**Arm Position:** Forward Flex Arm

**Key Steps:**
1. Forward flex arm to remove tension from conjoined
2. Replace medial Army-Navy with Richardson under conjoined tendon

**Arm Position:** Return arm to neutral rotation after placing retractor

**NOTE:** Be careful not to place excessive retraction on the musculocutaneous nerve underlying the conjoined tendon!

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**Retractors**
- Medial Army-Navy
- Richardson
Release Sub-Deltoid Adhesions

Arm Position: Abduction

Key Steps:
1. Abduct the arm to remove tension from Deltoid to perform releases
2. Using your finger or blunt retractor (ie Darrach), release adhesions under Deltoid
3. Reposition Army-Navy under Deltoid
Pec Release

**Arm Position:** Neutral position with elbow flexed

**Key Steps**

1. Locate superior aspect of the pectorals major insertion
2. Release upper 1 cm with electrocautery or scalpel
Biceps Tenodesis

Arm Position: Neutral position with elbow flexed

Key Steps

1. Locate biceps tendon

2. Perform tenodesis of Biceps into superior border of released Pec Major (#2 non-absorbable)
Locating the Rotator Interval

**Key Steps:**

1. Use the Biceps tendon to locate the Rotator Interval

2. Using Mayo scissors, follow the path of the Biceps tendon through the Bicipital Groove, medial across the superior border of the Subscapularis, and push the tip of the scissors into the Rotator Interval

3. The Biceps tendon can then be cut at Rotator Interval and above Pectoralis Major for removal
Ligation of Anterior Humeral Circumflex Vessels

**Arm Position:** Neutral position

**Key Steps:**
1. Move the Richardson retractor more distally along the conjoined tendon to better expose Anterior Humeral Circumflex Vessels
2. Approximate the location of the anatomic neck
3. Place 2 ligation stitches around the Anterior Humeral Circumflex Vessels (1 medial and 1 lateral to anatomic neck projection)
4. Cut suture leaving a 1cm tag
Place Tag Sutures in Subscapularis

Arm Position: Adducted and slightly externally rotated

Key Steps:

1. Move the Richardson retractor slightly proximal to fully identify the subscapularis

2. You may place scissors under the Subscap (just medial to insertion on LT) to aid in visualization of Subscap incision line

3. Place 2 tag sutures in Subscap tendon medial to planned path of incision

4. Use a hemostat to grasp all 4 suture limbs and cut them at equal length
Subscapularis Tenotomy

**Arm Position:** Adducted and slightly externally rotated

**Key Steps:**

1. Using a scalpel, release Subscap along anatomic neck, medial to the Lesser Tuberosity (aiming between ligation sutures)

2. Switch to cautery for the remaining 1/3 (through circumflex vessels)

3. Assistant should externally rotate arm as the release continues inferior
Humeral Capsule Release

**Arm Position:** Starting from slight external rotation, progressively externally rotate during Subscap/Capsular release.

**Key Steps:**

1. Staying on bone, continue releasing the Capsule to expose the Medial Calcar.

2. Continue to have the assistant progressively externally rotate the arm to assist in visualizing and releasing the Inferior Capsule.
Humeral Exposure

**Key Steps:**
1. Remove the Hohmann, Army-Navy & Richardson
2. Dislocate the shoulder (externally rotate and extend the arm)

**Arm Position:** Adduct & externally rotate the arm to expose the humeral head

1. Hohmann placed superior over the greater tuberosity
2. Reverse Hohmann placed medial
3. Brown Deltoid placed lateral

Retractors

<table>
<thead>
<tr>
<th>Army-Navy</th>
<th>Richardson</th>
<th>Hohmann</th>
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<tbody>
<tr>
<td>+</td>
<td>Hohmann</td>
<td>Reverse Hohmann</td>
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<tr>
<td>Brown Deltoid</td>
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</table>
Remove Osteophytes

Arm Position: Adduction & external rotation

Key Steps:

1. Outline Osteophytes with electrocautery

2. Use a ½ inch straight osteotome & mallet and/or Rongeur to remove Osteophytes
Humeral Head Resection

**Arm Position:** Adduction & external rotation

**Key Steps:**

1. Use a saw to make the anatomic cut of the Humeral Head
2. Use IM Cut Guide, if desired
3. Beware not to enter into the cuff with your resection

**NOTE:** Save humeral head to approximate head size or in case it is needed for bone grafting
Humeral Instrumentation (SIMPLICITI™)
Humeral Instrumentation
(AEQUALIS ASCEND™ FLEX)
Establish Glenoid Exposure

Key Steps
1. Posterior retractor is placed on posterior glenoid to retract the intact humeral head

Arm Position: Insert posterior retractor by first internally rotating the arm, place the posterior retractor on posterior glenoid, then externally rotate arm to retract humeral head

2. Place Large Hohmann on superior glenoid
3. Use Richardson to retract Conjoined & Pec Medial
4. Subscap is controlled by Hemostat during glenoid releases

Retractors

<table>
<thead>
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<th>Hohmann</th>
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<tr>
<td>Richardson</td>
<td>Hohmann</td>
<td>Posterior Retractor</td>
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</table>
Coracohumeral Ligament Release

**Arm Position:** External Rotation

**Key Steps:**

1. Place tension on Subscap to palpate tension band created by Coracohumeral ligament
2. Resect the Coracohumeral ligament (This will help mobilize the Subscap)
Glenohumeral Ligament Releases: SGHL & MGHL

**Arm Position:** External Rotation

**Key Steps:**

1. Place tension on Subscap to palpate tension band created by the SGHL & MGHL on the underside of the Subscap (Ligaments are confluent with capsule)

2. Use curved Mayo scissors, release the SGHL back to the level of the glenoid

3. Then resect inferior along anterior glenoid to release the MGHL
IGHL Release

Arm Position: External Rotation

Key Steps:

**NOTE:** The axillary nerve lies anterior to the subscapularis muscle and wraps posterior along the inferior glenoid. The IGHL is located posteriorly to the subscapularis (confluent w/capsule). As long as you avoid going anteriorly through the muscle, the axillary nerve should remain protected, but be aware of the nerve traversing along the inferior glenoid.

1. Start by placing the curved Mayo between the capsule and Subscapularis muscle belly to create separation of the tissues

2. Resect capsule & IGHL within separated space (Confirm axillary nerve not in path of release)
Anterior Glenoid Release

**Arm Position:** External Rotation

**Key Steps:**

1. Remove the Richardson & place Kolbel on anterior glenoid

2. Use forceps and electrocautery to remove the remaining biceps stump and anterior glenoid labrum down to 5 o'clock position (right shoulder)
Inferior Glenoid Releases

**Arm Position:** External Rotation

**Key Steps:**

1. Continue with the labrum release to the 7 o’clock position (right shoulder)
2. Release the Inferior Capsule directly off of the glenoid around to the 7 o’clock position (right shoulder)
3. The depth of the release usually will extend to insertion of the long head of the triceps

**NOTE:** Always remain directly on bone/inferior rim of the glenoid & always be mindful of the axillary nerve
Posterior Labrum & Biceps Stump Removal

Arm Position: External Rotation

Key Steps:
• Use forceps and electrocautery to remove the posterior labrum, remaining residual superior labrum

NOTE: For a reverse shoulder, you may complete the posterior Capsular release
Glenoid Instrumentation
(AEQUALIS™ PERFORM™)

1) Curvature
2) Size
3) Pin
4) Ream
5) Drill
6) Peripheral Drill
7) Enlarge
8) Trial
Glenoid Instrumentation (Reversed)

1) Pin Placement
2) Ream (Baseplate)
3) Ream (Peripheral)
4) Post Drill
Glenoid Instrumentation (Reversed)

5) Baseplate Implant

6) Peripheral Holes

7) Screw Insertion

8) Sphere Assembly
Humeral Trial & Reduction

- Re-establish humeral exposure
- Remove cut protector & assemble trial head
- Trial Reduction Mobility Testing
Humeral Trial Removal

Dislocate Shoulder

Remove humeral trial & prepare final implant on back table

Replace humeral trials with smaller stem w/Cut Protector
Final Glenoid Implantation

Re-establish Glenoid Exposure

Cement Peripheral Pegs

Impact Final Implant
Subscap Repair Suture Placement

Place Subscap Repair Sutures

1. Drill 3 bone tunnels through humerus along length of Subscap insertion, just underneath the Subscap stump

2. Pass 3 Non-absorbable sutures through Subscap and then bone tunnels
Final Humeral Implantation

Implant Final Humeral Implant

Shoulder Reduction
Subscap & Rotator Interval Repair

Superior Subscap Closure

Rotator Interval Closure
(#2 Non-absorbable)
(Figure 8 stitch)

Complete Subscap Closure
(Middle & Inferior Stitches)
Final Closures

Deltopectoral Interval Closure

Skin Closure
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