Shoulder Approach Program
Aequalis™ Retractors

surgical technique
Aequalis™ Retractors

Shoulder Approach Program
table of contents

- PREOPERATIVE PLANNING P. 4
- PATIENT POSITIONING P. 4
- SURGICAL TECHNIQUE P. 5
  1. DELTOPECTORAL APPROACH & SUBSCAPULARIS EXPOSURE
  2. SUBSCAPULARIS MANAGEMENT
  3. SUBSCAPULARIS AND CAPSULAR RELEASE
  4. HUMERAL PREPARATION
  5. GLENOID PREPARATION
- INSTRUMENTATION P. 19
PREOPERATIVE PLANNING

Pre-operative planning is performed utilizing x-ray templates on the frontal and sagittal views. Appropriate implant size and positioning is determined.

The use of a CT scan or MRI is recommended to better determine the orientation of the glenoid, the quality of glenoid bone stock and to confirm the integrity of the rotator cuff. X-rays are also used to determine the length of the humeral stem.

PATIENT POSITIONING

Place the patient in a beach chair position with the operative arm draped free. For optimal shoulder access, the patient should be positioned near the edge of the operating table such that the shoulder can be fully extended and can be brought into adduction. A bump can be placed under the operative shoulder to stabilize the scapula.
1. DELTOPECTORAL APPROACH & SUBSCAPULARIS EXPOSURE

Deltoperosal incision:

A line is made from the coracoid process and extended distally and slightly laterally along the deltopectoral interval for 10 to 15 cm (Fig. 1). Once the skin is incised, the pectoralis major is identified medially and the deltoid laterally. A soft tissue retractor (Gelpi retractor) is used to spread the skin (Fig. 2).

Gelpi retractor. Ref: MWE128 (optional).

Fig. 1. Incision.

Fig. 2. Gelpi retractor. Ref: MWE128 (optional).
Deltpectoral interval (Morenheim fossa superior and medial):

The “Triangle”, also called the Morenheim fossa, is located on the superior and medial aspect of the incision. There is no vein in this triangular space between the muscles (Fig. 3). It is the entry point of the deltopectoral interval between the deltoid and the pectoralis major. The cephalic vein is identified.

The interval is developed distally from this fossa, keeping the cephalic vein lateral with the deltoid (Fig. 4).

Farabeuf or Richardson retractors (standard OR retractors) are used laterally and medially. Care should be taken to identify any crossing vessels connected to the cephalic vein, the “French vessels”, which should be ligated in order to avoid any secondary bleeding.

Fig. 3. Morenheim fossa.

Fig. 4. Cephalic vein management.
**Release of the pectoralis major tendon:**

A 1 to 2cm incision is performed on the pectoralis major tendon (Fig. 5), in order to expose the inferior aspect of the subscapularis muscle, the anterior humeral circumflex vessels and the axillary nerve. The pectoralis major tendon will be repaired at the end of the surgery.

A self retaining retractor is then used to replace the Farabeuf or Richardson retractors (Fig. 6).
The coraco-acromial ligament may be incised, only if a reversed shoulder implant will be inserted.

The arm is placed in abduction and external rotation in order to identify the lateral border of the conjoined tendon. A soft tissue retractor (Hohmann retractor) is placed above the coracoid process to expose the coracoid process and the coraco-acromial ligament (Fig. 7).

Large Hohmann retractor. Ref: MWE120.

**Option**

- The Acromial retractor may be added over the acromion. Acromial retractor. Ref: MWE126.

- A Hohmann retractor may be used laterally, to retract the deltoid muscle. Large Hohmann retractor. Ref: MWE120.

**Exposure of the conjoined tendon:**

The lateral part of the conjoined tendon is released and a Farabeuf retractor (generic OR instrument) is used to retract the tendon medially (Fig. 8). Care should be taken to avoid excessive tension on the conjoined tendon.
2. SUBSCAPULARIS MANAGEMENT

Subscapularis landmarks identification:
Before incising the subscapularis tendon, the inferior, medial, lateral and superior borders of the tendon are identified.

Identification of the inferior border:
First, the anterior aspect of the subscapularis is exposed. The arm is placed in adduction, external rotation to expose the inferior aspect of the subscapularis. The “three sisters” (anterior circumflex vessels and arteries) are identified (Fig. 9). They represent the inferior landmark of the subscapularis muscle. They are then ligated with two ligatures, one lateral and the second more medial.

Inferior to the “three sisters”, the superior part of the latissimus dorsi can be identified (Fig. 10). It is an additional very good landmark of the inferior aspect of the subscapularis muscle.

Three sisters ligated with 2 ligatures

Fig. 9. Anterior circumflex vessels.

Fig. 10. Superior part of the latissimus dorsi tendon.
Identification of the medial border:
The axillary nerve is identified with the arm in adduction, neutral rotation, and anterior flexion in order to relax the conjoined tendon. The axillary nerve is located in front of the subscapularis muscle, behind the conjoined tendon (Fig. 11). Cautious dissection is performed to locate and identify the nerve. This will help during the capsule dissection and to define the inferior structure of the joint.

Identification of the lateral border:
The arm is placed in abduction and internal rotation. Laterally the long head of the biceps tendon is identified. It is medial to the pectoralis major insertion and defines the lateral border of the subscapularis muscle.

Fig. 11. Medial aspect of the subscapularis muscle.
Identification of the superior border:

The superior border of the subscapularis muscle is just behind the tip of the coracoid process while the arm is in extension, and external rotation (Fig. 12).

The subscapularis bursa, filled with synovial fluid, is located just underneath the coracoid process. This bursa is opened and the synovial fluid is aspirated, which confirms the opening of the joint.

Through this incision, it is possible to see the anatomical neck of the humeral head.

Once the subscapularis tendon is adequately visualized, two stay sutures are double-passed through the tendon approximately 15 mm lateral to the musculotendinous junction, one on the superior half and one on the inferior half of the tendon (Fig. 13). The sutures should stay superficial to prevent suturing the middle (MGHL) and/or inferior glenohumeral ligaments (IGHL) at the same time, which would make the capsular release difficult.
Tenotomy of the subscapularis along the anatomical neck:

With a scalpel, incise the first 3cm of both the tendon and the capsule (at the same time). One centimeter of the tendon is left attached on the lesser tuberosity. The incision is made from proximal to distal in an oblique line following the anatomical neck (Fig. 14).

At the inferior third of the subscapularis, electrocautery is used to complete the incision inferiorly. The incision should pass between the previously placed “three sisters” ligation sutures ending at the superior border of the latissimus dorsi tendon.

*Note: Keep in contact with the bone when incising the subscapularis.*

With electrocautery, the inferior part of the subscapularis (called the subscapularis minor) and the inferior part of the capsule are detached from the bone in order to clear all the way to the surgical neck of the humerus (Fig. 15).
3. SUBSCAPULARIS AND CAPSULAR RELEASE

**Humeral head retractor inside the joint:**
A humeral head retractor (Fukada or Trillat retractor) is placed between the glenoid and the humeral head in order to release the subscapularis tendon from the glenoid. Small or Large Fukuda retractor. Ref: 9000379 or 9000380; Trillat retractor. Ref: MWE127 (Fig. 16 & 17).

**Subscapularis tendon release:**
To release the subscapularis from the glenoid, first the subcoracoid adhesions of the superior tendon are cut with scissors (Fig. 18). The same process is performed by cutting the MGHL and IGHL, which are located behind the subscapularis muscle. Before cutting the IGHL, a dissection is made between the muscle and the ligament to stay away from the axillary nerve.

After these incisions, the released subscapularis muscle allows for good external rotation. Then, the muscle is buried in the subscapularis fossa with the stay sutures and protected with a sponge. The sponge is also placed to avoid any damages to the axillary nerve.

A large or small Kolbel retractor is placed in the subscapularis fossa in order to achieve a good exposure of the anterior border of the glenoid (Fig. 19).

Narrow or wide Kolbel retractor. Ref: MWA681 or MWD046.

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Fig. 16. Trillat retractor. Ref: MWE127.

Fig. 17. Small or large Fukuda retractor. Ref: 9000379 or 9000380.

Fig. 18. Superior subscapularis tendon release.

Fig. 19. Narrow or wide Kolbel retractor. Ref: MWA681 or MWD046.
Resection of the labrum (superior and anterior) and subcoracoid bursa from 12 until 5 o’clock (left shoulder) or 7 o’clock (right shoulder):

The labrum is released from the glenoid by starting to remove the labrum and the capsule in contact with the bone superiorly.

Between 7 and 5 o’clock (left shoulder) or between 5 and 7 o’clock (right shoulder), the inferior capsule, inferior labrum and a bit of the triceps tendon are released with an electrocautery, from the inferior glenoid, keeping contact with the bone to avoid any nerve damage (Fig. 20).

4. HUMERAL PREPARATION

Humeral head dislocation:

The intra-articular retractor is removed.

With adequate releases, the humeral head is then dislocated into the deltopectoral interval by abduction of the arm and progressive external rotation and extension (Fig. 21).

In cases of severe restriction of external rotation (0° or less), it is recommended to release more of the upper pectoralis major insertion.
**Humeral Head Resection:**

A Hohmann retractor is placed at the top of the head, underneath the supraspinatus, enhancing the exposure of the superior aspect of the anatomical neck. A Hohmann retractor is placed at the inferior aspect of the head, over the pectoralis major muscle to expose the inferior osteophytes. The osteophytes are removed with an osteotome in order to have a good view of the humeral neck.

**Small Hohmann retractor. Ref. MWA683; Large Hohmann retractor. Ref MEW120.**

**Option**

- A Crego retractor can also be used to protect the soft tissues behind the humeral head. Crego retractor. Ref: 9000384.

The head cut is performed by using a saw blade. The anatomic head resection may be made free hand or with the assistance of a cutting guide.

**Free Hand Resection:**

To facilitate the resection, the cutting plane can be defined by:

- Marking the superior point (12 o’clock position), inferior point (6 o’clock position) and the most anterior and posterior points (3 and 9 o’clock).

- Connecting these four points with a surgical pen or bovie will help identify the anatomic humeral neck prior to resection.
Guided Resection:

To utilize the guided resection, begin by placing the appropriately sized Cut Ring over the humerus. It is important that the Cut Ring is able to pass over the humerus without impingement. The top flat portion of the Cut Ring can then be aligned with the anatomic neck of the humerus (Fig. 23).

With the Cut Ring appropriately positioned, place the two 3 x 75 mm Guide Pins through the Cut Ring and into the humerus to secure the construct. It is recommended to place the lateral Pin first as it will act as a hinge and can facilitate more precise medial alignment of the Cut Ring.

With the Cut Ring aligned at the anatomic neck, place the Oscillating Saw along the top flat portion of the Cut Ring and complete the head resection.

Implantation of the humeral stem and head:

For the preparation of the humerus, please refer to the operative technique of the humeral stem and head.
5. GLENOID PREPARATION

Glenoid exposure:

Posterior retractor
To facilitate access to the glenoid, the humeral head is positioned to the side using a large Lyon retractor between the posterior glenoid edge and the humeral head. Alternatively a Kolbel, a Fukuda or a Favard retractor may be used.

Lyon retractor. Ref: MWB353; Wide Kolbel retractor. Ref: MWA681; Small or Large modified Fukuda retractor. Ref: 9000379 or 9000380; Favard retractor. Ref: MWD001.

Superior retractor
A Hohmann retractor is inserted at the top of the glenoid.

Small Hohmann retractor. Ref: MWA683.

Inferior retractor
A Forked retractor can be used inferiorly to maintain the tissues.

Forked retractor; Ref: MWD160.

Medial retractor
The Kolbel retractor is maintained.

Wide Kolbel retractor. Ref: MWA681 or MWD046.

Fig. 24. Forked retractor. Ref: MWD160, Wide Kolbel retractor. Ref: MWA681; Hohmann retractor. Ref: MWA683.
**Implant placement**

Once the glenoid access is cleared, the size and curvature of the glenoid are measured. For these steps, the same retractors as previously seen are used.

**Wide Kolbel retractor.** Ref: MWA681; **Large Hohmann retractor.** Ref: MWE120; **Forked retractor;** Ref: MWD160.

The glenoid is then reamed. To maintain the glenoid access during this step, the same retractors are used, except the posterior retractor which should be removed as it might interfere with the reamer.

The surgical technique of the glenoid implant should now be followed. For the glenoid preparation and the implant placement, the same retractors as seen previously should be used.

**Wide Kolbel retractor.** Ref: MWA681; **Large Hohmann retractor.** Ref: MWE120; **Forked retractor;** Ref: MWD160.
### Standard set of retractors

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<td>Small modified Fukuda</td>
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<td>MWD001</td>
<td>Favard Retractor (Trillat Modified)</td>
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<td>MWD169</td>
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### Optional retractors

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<td>Tapered tip</td>
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<td>MWE125</td>
<td>Resurfacing tip</td>
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<td>Narrow Lyon Retractor</td>
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<td>Resurfacing Retractor With Teeth</td>
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<td>MWE127</td>
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<tr>
<td>9000381</td>
<td>Plastic Darrach Retractor</td>
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**For Lamina Spreader**

- Trillat retractor
- Resurfacing retractor with and without teeth
- Plastic Darrach retractor
- Narrow Lyon retractor
- Crego retractor
- Gelpi retractor
- Acromial retractor
- Lamina Spreader

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*Standard Set, Ref: YKAD121*
Prior to using any Tornier device, please review the instructions for use and surgical technique for a complete listing of indications, contraindications, warnings, precautions, potential adverse events, and directions for use.

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