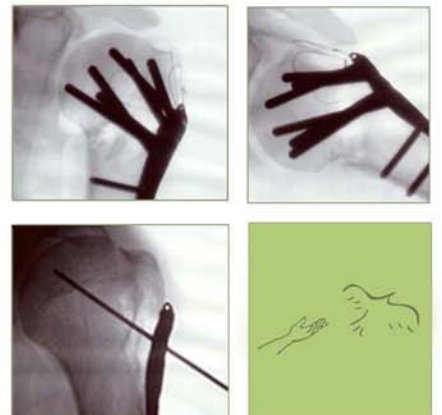


SURGICAL TECHNIQUE



Procedure mapping



Exposure:
Deltopectoral

Identify:
Coracoid, Acromium &
Deltoid insertion

Develop the interval
between the pectoralis
and deltoid

Extend incision line
distal from coracoid

Patient positioning



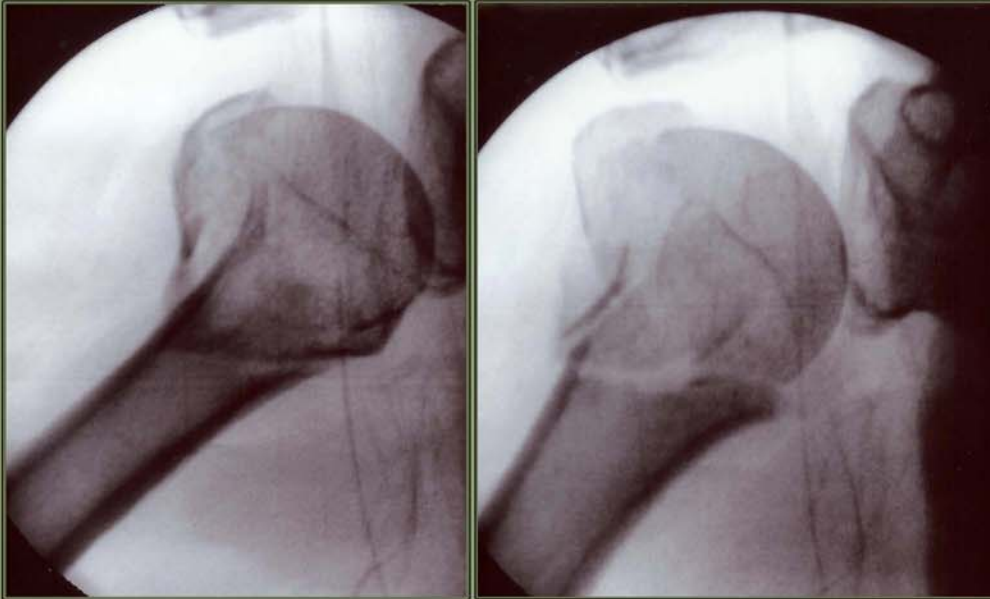
Sterile Mayo stand
assists during dissection

Tips:

The procedure can be performed in the beach chair position or supine, per surgeon's discretion.



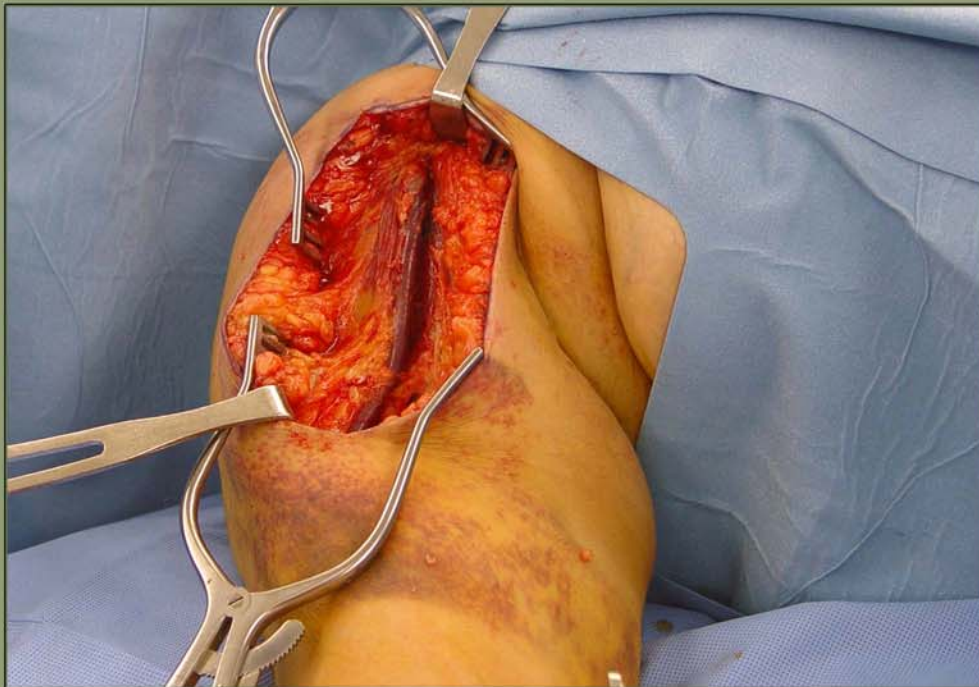
Acquire initial images



Examine the fracture under flouroscope.

Internal rotation, external rotation and sometimes axillary views are necessary.

Exposure



The exposure is through a 12 - 14cm incision.

Identify and retract the Cephalic Vein.

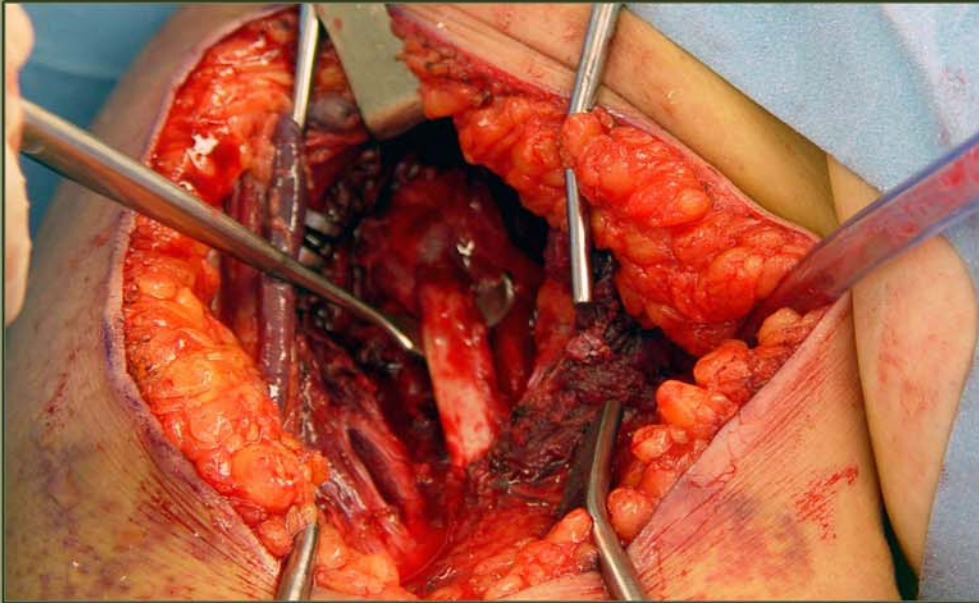
Self retaining retractors are useful for exposure.

Tips:

During the exposure, the 2.8mm drill bit can be loaded in preparation for plate application.



Pectoralis incision and identification of the Biceps Tendon

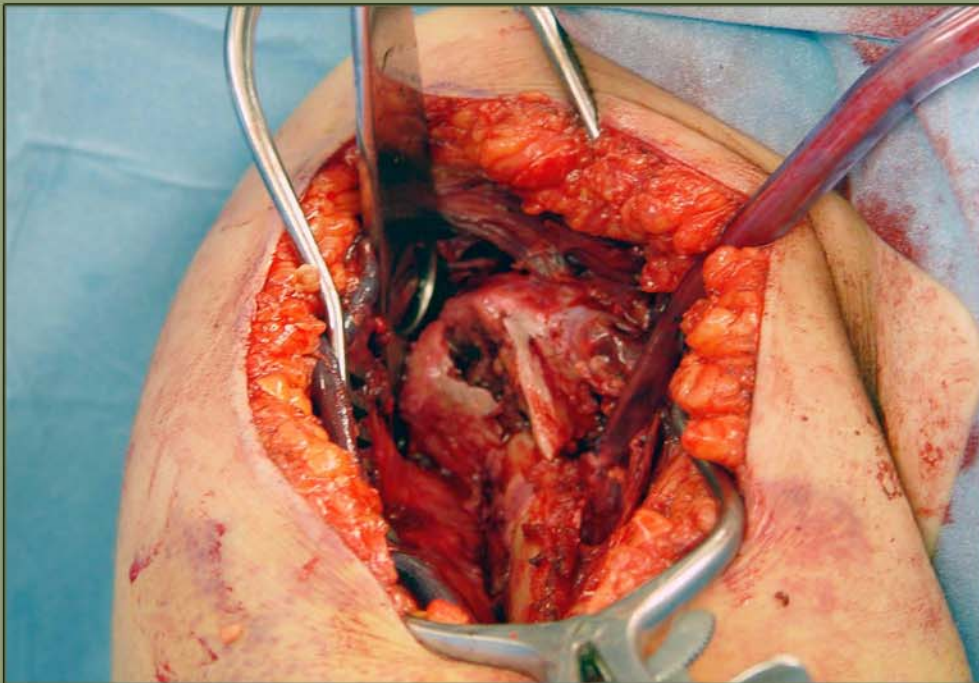


Gently retract the Coracobrachialis medially.

Find the pectoralis insertion at the floor of the deltoid pectoralis interval.

Release the proximal third of the pectoralis tendon to expose the biceps.

Completed exposure



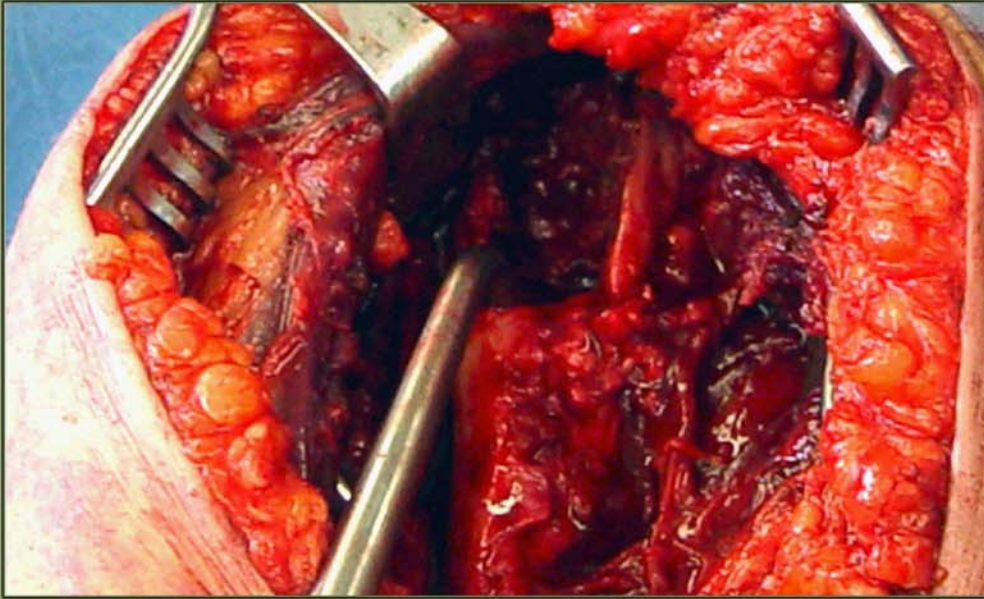
Develop the subacromial space and mobilize the proximal deltoid.

Tips:

Use of a large, blunt humeral head depressor can facilitate exposure.

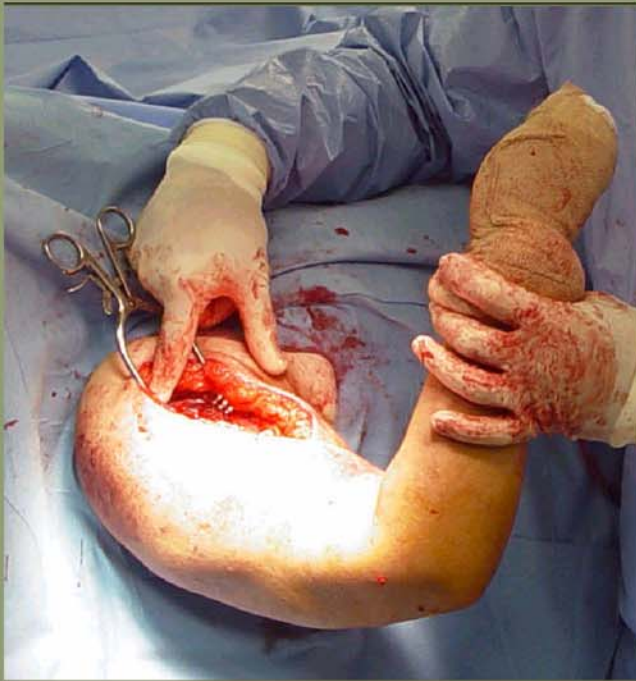


Fracture debridement



Debride the fracture in order to reduce the fracture.

Fracture reduction



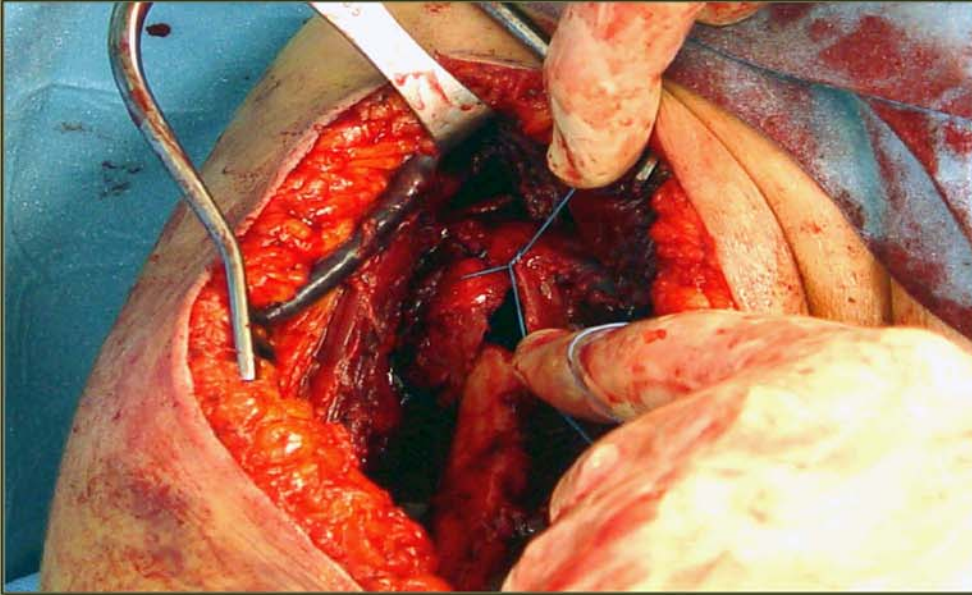
After debridement, the fracture is reduced by traction and indirect manipulation.

Tips:

Remove the Mayo table to facilitate reduction.

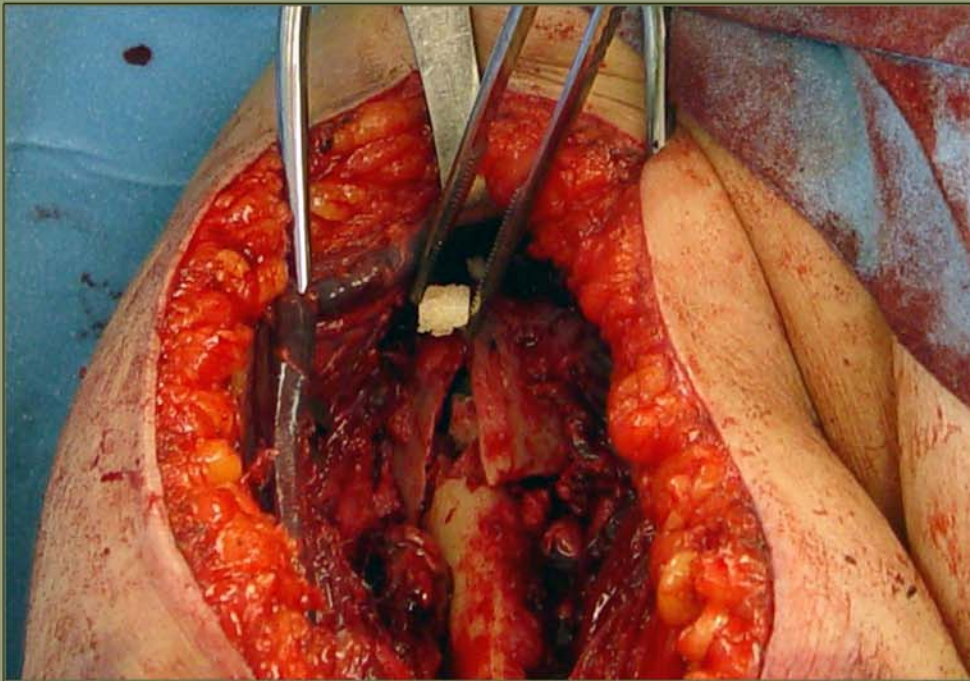


Tuberosity repair



In the case of severe cominution, suturing the rotator cuff together will help reduce the tuberosities.

Apply bone graft



To facilitate healing, bone graft should be considered.

Tips:

After plate positioning (next step) a 2.0mm guide wire will need to be loaded in the wire driver.



Determine proper plate position

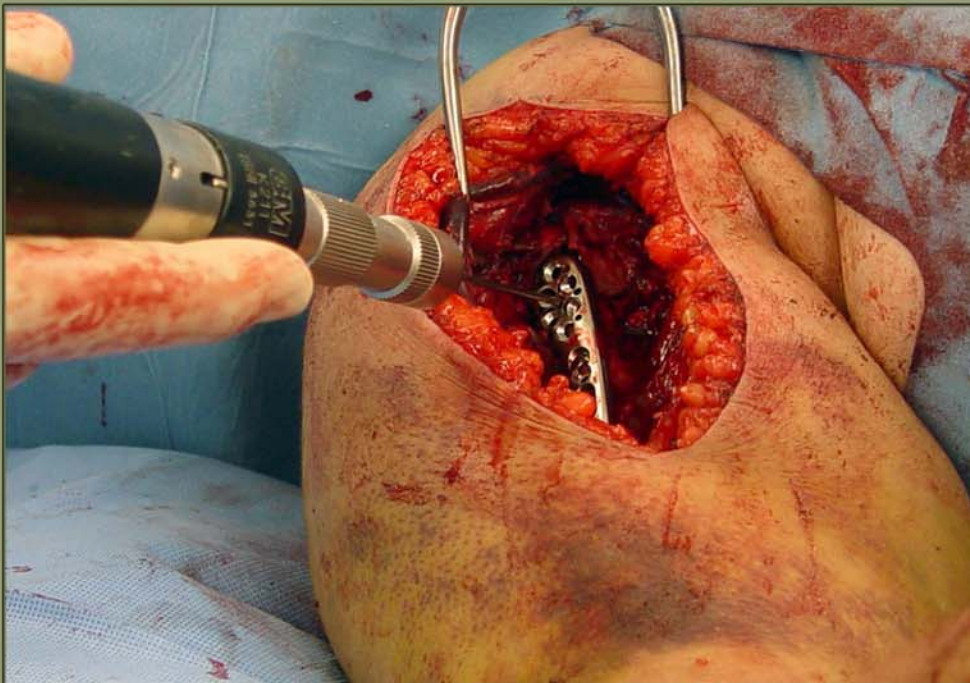


Select the appropriate side plate (left or right).

Choose the appropriate length (4 or 6 hole).

Fix the shaft of the plate to the humerus using a 3.8mm cortical screw through the slotted hole.

Drill central guide wire



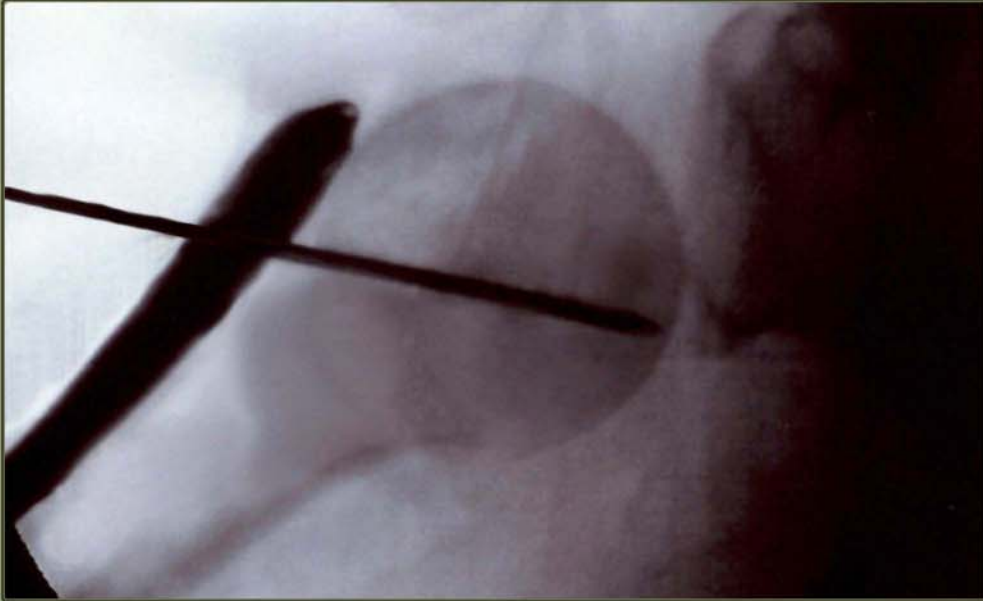
Drill the 2.0mm guide wire through the central hole on the proximal portion of the plate. Advance slowly and verify its trajectory under fluoro.

Tips:

Apply the plate 2cm to 2.5cm distal to the insertion of the supraspinatus. the anterior border of the plate should be immediately lateral to the bicipital groove.



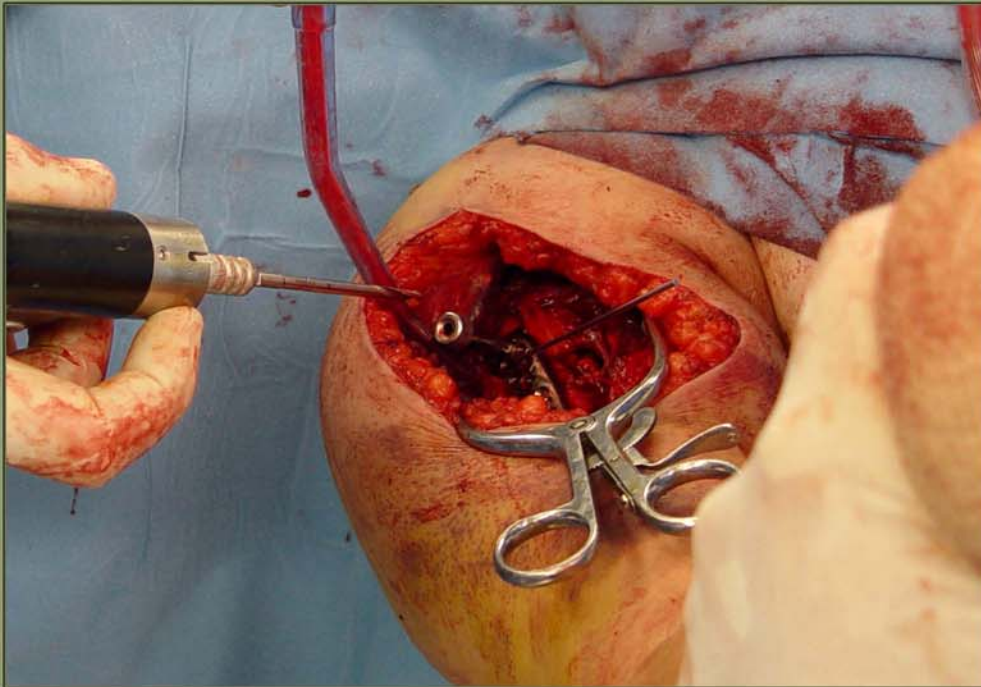
Verify central guide wire placement



Place the guide wire in the center of the humeral head.

This plate position will reduce the risk of subacromial impingement.

Attach drill guide then drill cortex



Thread the drill guide into the desired peg hole.

With the short, cortical drill, perforate the cortex.

THIS DRILL HAS A STOP THAT WILL ONLY ALLOW IT TO PENETRATE THE NEAR CORTEX.

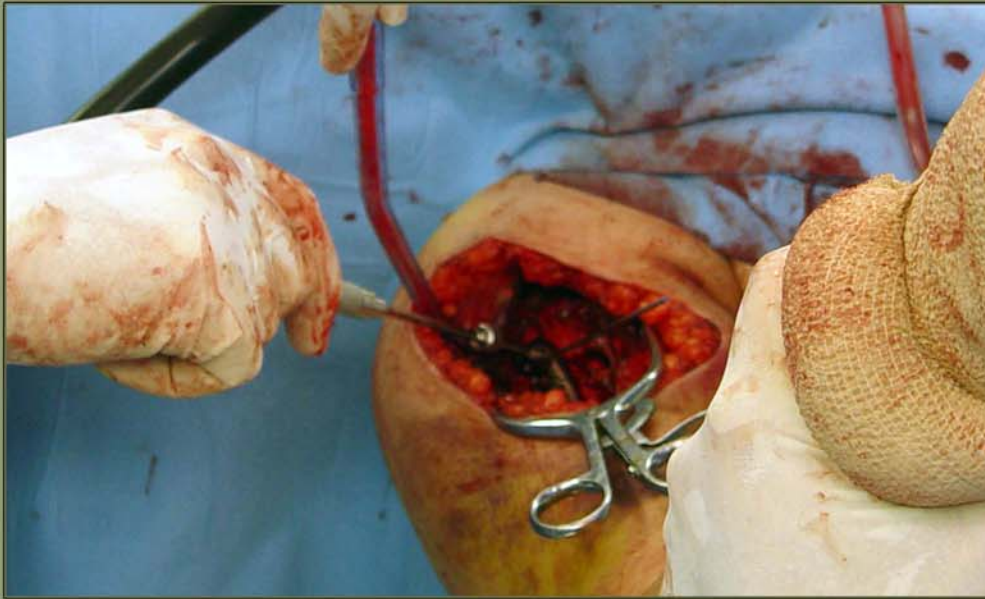
Tips:

Bending the central guide wire and rotating it out of the way will ease the attachment of the drill guide to the plate.

Other K-Wire holes can be used to provisionally fix the plate to the bone. They will also predict final peg position prior to drilling.



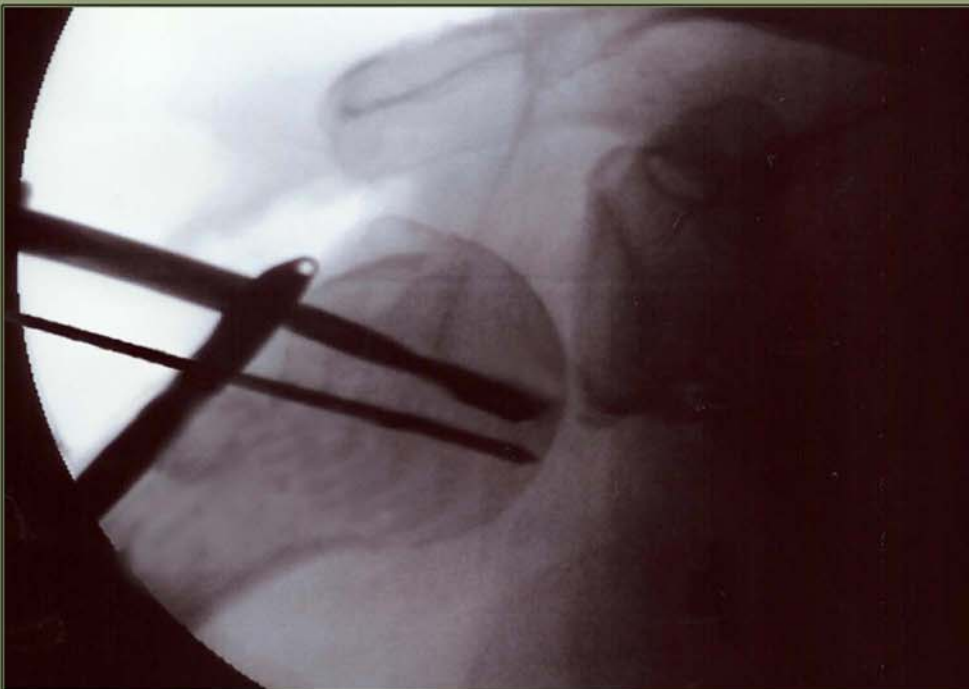
Manually drill for subchondral support pegs



With the 4.0mm drill attached to the driver handle, advance the drill, through the drill guide until resistance from subchondral bone is felt.

This will ensure that the peg engages subchondral bone for optimal fixation.

Verify drill depth



Once resistance is felt, fluoro imaging should verify that the tip of the manual drill is close to subchondral bone.

Care should be taken not to penetrate subchondral bone.

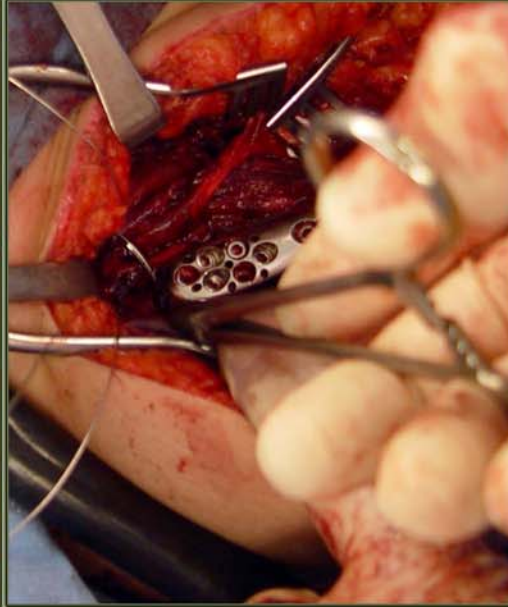
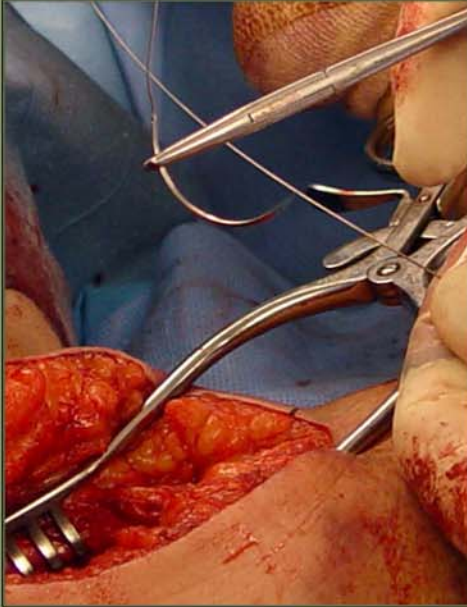
Tips:

The depth gauges have a bias built in that will reduce the measured depth by 2.5mm. If peg to subchondral bone contact is desired, add 2.5mm to the depth gauge reading.

DEPTHS CAN BE MEASURED FROM THE MANUAL DRILL OR THE BLUNT SLEEVELESS DEPTH GAUGE. BOTH SHOULD BE READ THROUGH THE ATTACHED DRILL GUIDE.



Attach tuberosities to plate

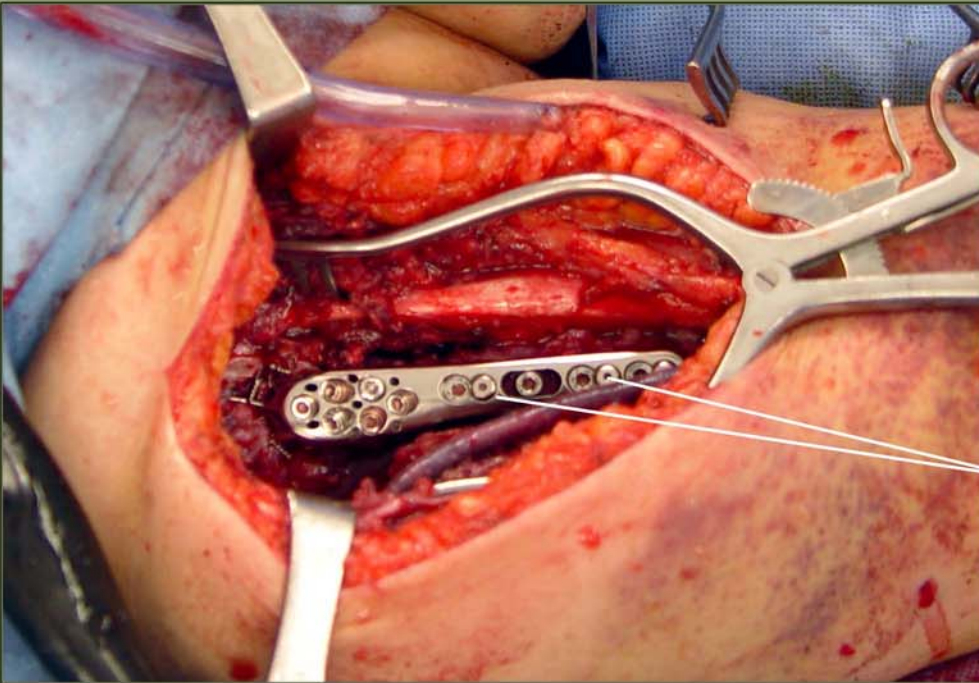


Using 20 gauge, mono-filament stainless wire, secure the tuberosities to the plate by passing the needles close to the insertion of the tendon and then through the side loading wire attachment points. (see insert)

Twist the wire until appropriate tension is reached.



Fix remaining screws in plate



The shaft of the plate can be fixed with either 90 degree locking screws or multidirectional cortical screws.

Using the appropriate end of the tissue protector, drill to the correct depth (far cortex) and measure with the barrel depth gauge.

Use a set screw for each 90 degree screw to lock it into place.

Do not use a set screw when using multidirectional screws.

Tips:

An alternate approach is to apply the wire tension bands to the plate prior to placing the subchondral support pegs.

This may aid in the reduction.



Final Verification



Evaluate the humerus under flouroscopy to assess the reduction and to confirm proper peg positioning.

Function



The Hand Innovations Proximal Humerus Plate is designed to provide the greatest patient function and the lowest risk of subacromial impingement.

Multiple divergent blunt pegs provide optimum subchondral support.

HAND INNOVATIONS
RAISING EXPECTATIONS



PRODUCT STEPS DURING PLATE IMPLANTATION





Proximal Humerus Plate Step Guide

Step 1.

Load 2.8mm drill bit into drill



2.8 Drill Bit

Step 2.

Using the appropriate end of the two sided drill guide, advance the 2.8 drill through the slotted hole. Position the drill in the center of the slot for future height adjustments.



Step 3.

Measure with standard depth gauge and select the appropriate length 3.8mm cortical screw. Advance screw using the BLUE HANDLE HEX DRIVER.



3.8 Cortical Screw





Proximal Humerus Plate Step Guide

Step 4.

Load 2.0mm K-Wire



Step 5.

Advance K-Wire through central K-Wire hole. **IMPORTANT:** Allow the wire to follow the predetermined path. Do not skew the wire angle or binding may occur.



Step 6.

Insert threaded drill guide into selected peg hole





Proximal Humerus Plate Step Guide

Step 7.

Load 4.0mm SHORT drill bit.



Step 8.

Advance the short drill bit through the threaded drill guide. This step is to penetrate the near cortex only. The drill will stop (bottom out) when it has reached its max. depth.



Step 9.

Insert the 4.0mm LONG drill into the BROWN HANDLE driver. Continue to advance this drill until subchondral bone is reached. **IMPORTANT:** All subchondral support pegs should be drilled by hand.



Proximal Humerus Plate Step Guide



Step 10.

Measure peg length. This measurement can be taken directly from the manual drill bit or the blunt sleeveless depth gauge. Both are calibrated to be read while through the threaded drill guide. **IMPORTANT: The SUBCHONDRAL SUPPORT PEGS ARE AVAILABLE IN 2.5mm INCREMENTS, although the calibration on the drill and depth gauge are in 5mm increments.**



Blunt, Sleeveless Depth Gauge

Step 11.

Select desired subchondral support peg. Use the BLUE HANDLE driver to advance the peg and lock into plate.



Step 12.

Select the 2 sided drill guide and using the end labeled 90 degree screw, insert into remaining shaft screw holes and complete plate attachment.

IMPORTANT: Standard cortical screws can be used when desired, however they cannot be locked into the plate.



Proximal Humerus Plate Step Guide



Step 13.

Using the small square driver, lock 90 degree screws with set screw.

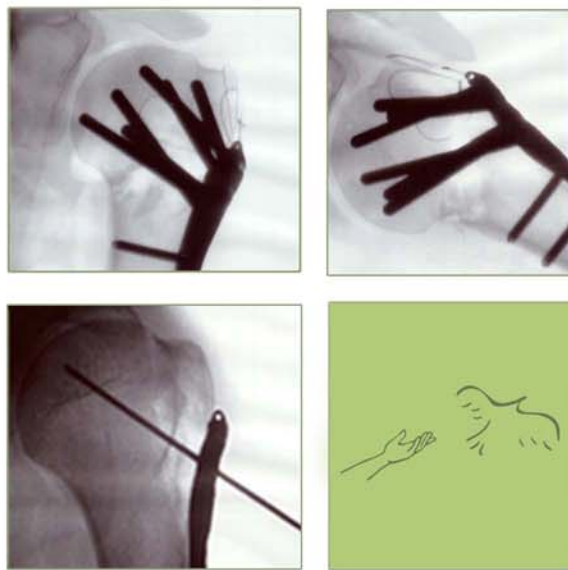


Step 14.

Pass tension band wire through plate attachment points to secure tuberosities.



HAND INNOVATIONS



RAISING EXPECTATIONS

MKT-00029-00R01 (Technique) / MKT-00030-00R01 (Step guide)