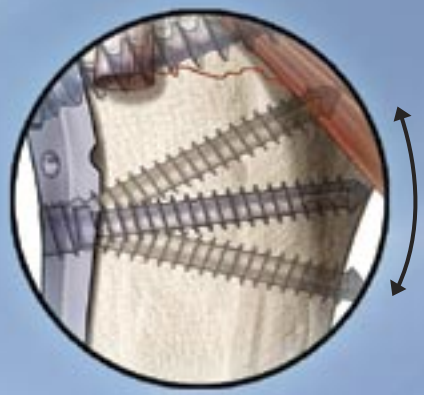
The Arthrex Humeral SuturePlate™

Proximal Humeral Fracture Management System

Arthrex®



Polyaxial bushings allow variable angle locking stabilization

Slotted suture eyelet holes allow suture passage after plate is fixed to bone

The Arthrex Humeral SuturePlate

Proximal Humeral Fracture Management System

Fractures of the proximal humerus are a common fracture type. These fractures are classified based on anatomic location, mechanism of injury, displacement of the fracture fragments and vascular supply. While some fractures of the proximal humerus are treated nonoperatively, Neer Type 3 & 4 are often comminuted and require surgical intervention. Type 3 & 4 fractures commonly occur in the elderly who typically have very poor bone quality. Locking plates provide improved stability, even in patients with poor bone quality, while nearly eliminating the issue of screw-loosening. Loss of screw purchase in the bone can result in loss of fracture reduction. Locking plates and screws may also help to reduce the risk of avascular necrosis because the locking plate does not need compressive contact with the bone in order to maintain fracture reduction.

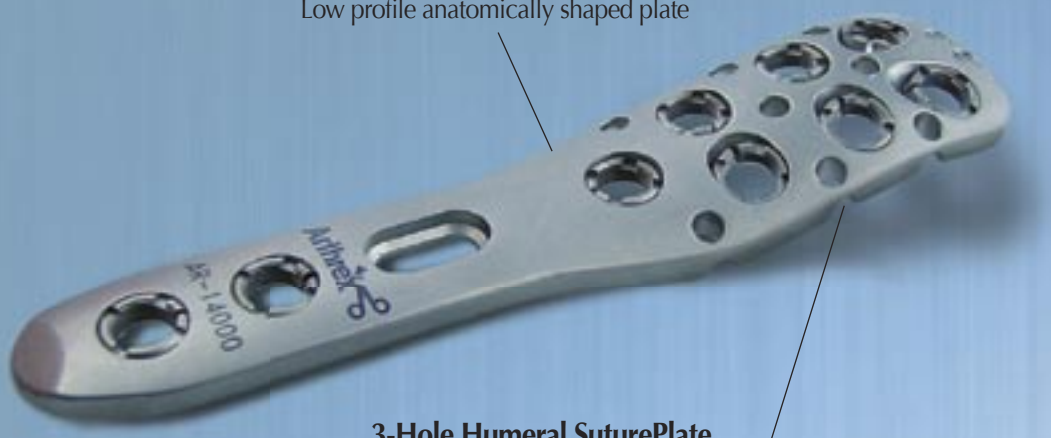
The Arthrex Humeral SuturePlate is an anatomically designed, low profile, titanium locking plate and screw system. The plate is available in two lengths and features polyaxial bushings with locking screws. The polyaxial bushings offer the surgeon the freedom to direct the screws for better bone fragment fixation, based on the fracture pattern and bone quality, to maximize stability in the humeral head. Multiple chamfered suture eyelets along the margin of the plate allow the surgeon to pass FiberWire® suture after the plate is fixed to bone. The system features 4 mm diameter cancellous and 3.5 mm diameter cortical screws.

FiberWire Suture Kits containing either color-coded #2 or #5 FiberWire sutures with needles swedged-on each end are available to facilitate suturing the soft tissue to the plate after it is in place.

Preoperative

Postoperative

Low profile anatomically shaped plate



3-Hole Humeral SuturePlate

Titanium

Eight notched suture holes surround the proximal aspect of the plate

Two K-wire plate positioning holes

Seven proximal polyaxial locking bushings accept 4 mm cancellous bone screws

Elongated slot aids in plate positioning

Distal polyaxial locking bushings accept 3.5 mm cortical bone screws

Cortical and Cancellous Screws

4 mm Cancellous Screw
(28-52 mm in 2 mm increments)

3.5 mm Cortical Screw
(22-36 mm in 2 mm increments)

5-Hole Humeral SuturePlate

Surgical Technique

Indications

The SuturePlate is indicated for fractures of the proximal humerus.

Patient Positioning

The patient is placed on the OR table. The beach chair position is recommended. The affected extremity is prepped and draped free in the normal sterile fashion.

Surgical Approach

A deltopectoral approach is recommended.

1.
Reduce the fracture

Reduce the fracture and use image intensification to confirm reduction. The fracture fragments can be provisionally fixed and manipulated with K-wires. Place the K-wires in a manner that will not interfere with the placement of the plate.

Note: Care must be taken not to damage the vascularity of the fracture fragments.

2.
Positioning the plate

Resting the elbow on the arm board with the upper extremity in 60 degrees of internal rotation and slight abduction relaxes the deltoid to aid in insertion of the plate.

Position of the plate from the A-P view

The plate is placed 5 - 8 mm distal to the upper edge of the greater tuberosity at the rotator cuff insertion.

Note: Care must be taken to avoid placing the plate too high because this will increase the risk of subacromial impingement. Conversely, care must be taken not to place the plate too low. Placing the plate too low could prevent optimal screw placement in the proximal fracture fragment(s).

Position of the plate from the lateral view

The plate is centered against the lateral aspect of the greater tuberosity, immediately lateral to the bicipital groove.

A SuturePlate Handle that may be threaded into the K-wire holes in the plate is provided to aid in positioning.

SuturePlate Handle
(AR-14023)

A-P view

Lateral view

3.
Checking plate placement

Temporarily fix the plate with 1.6 mm K-wires. Insert the K-wires until increased resistance is felt while entering the subchondral bone. Take care not to violate the articular surface. Image intensification is used to check for proper plate position.

4.
Initial screw placement

There are two methods available for initial screw placement depending on the fracture type and the reduction obtained. Most commonly, the distal aspect of the plate is fixed to the distal shaft fragment. The proximal aspect of the plate can be secured to the plate first if the fracture pattern dictates. The use of image intensification is recommended to control plate height and screw placement.

Initial distal screw insertion method

Fix the plate to the distal shaft of the humerus by placing a 3.5 mm cortical screw into the elongated slot on the distal aspect of the plate. Prepare the hole with the drill guide and 2.5 mm drill. The screw depth gauge is used to determine the correct length of the screw.

The screw is installed with the Torque Driver and 2.5 mm hex screw driver shaft. Torque should be limited to 1.5 Nm.

SuturePlate Drill Guide
(AR-14010)

2.5 mm Drill for
3.5 mm Cortical Screw
(AR-14125D)

Screw Depth Gauge
(AR-14100G)

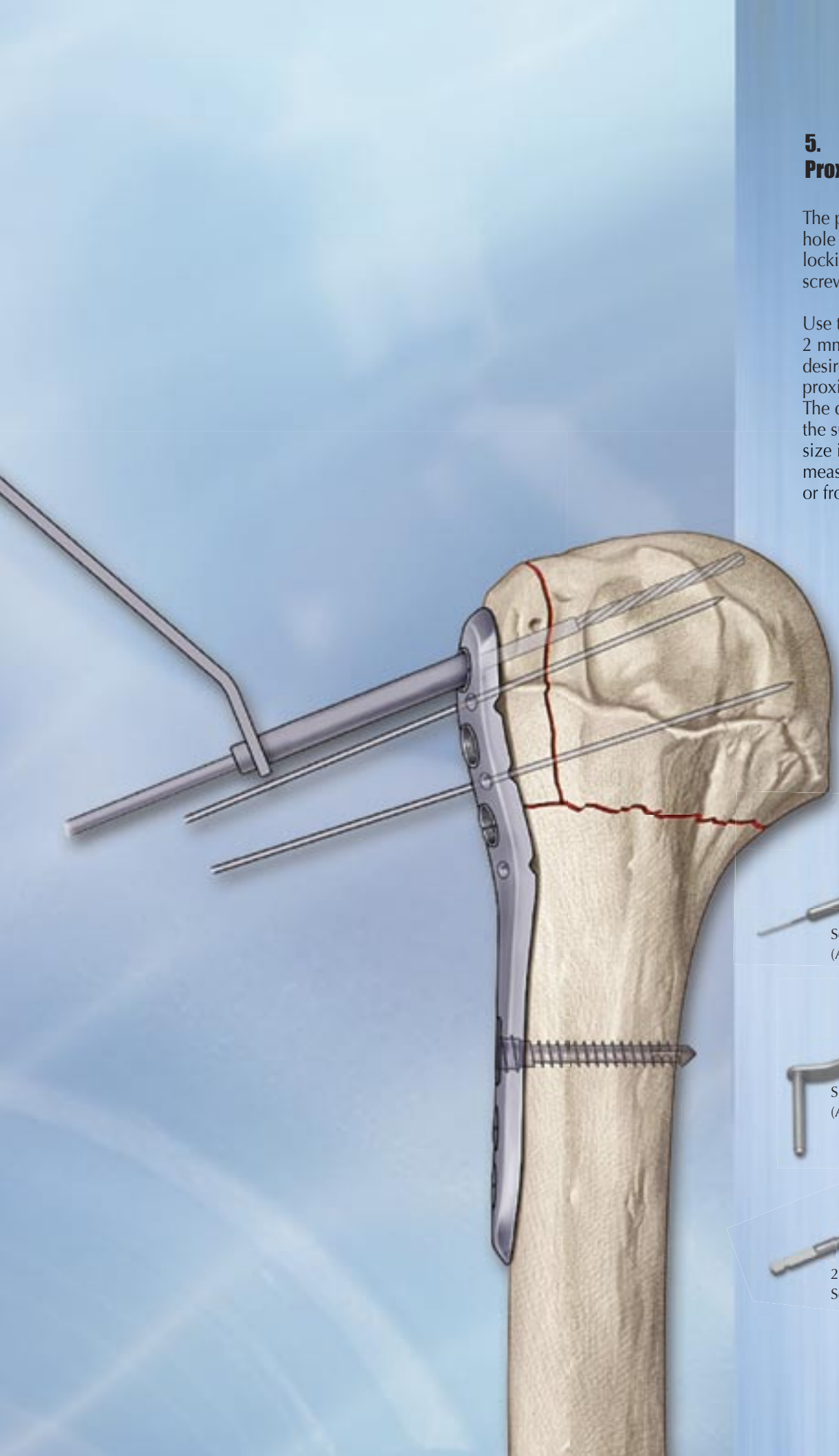
Hex Screw Driver Shaft
(AR-14025)

Torque Driver
(AR-14025AO)

5.
Proximal screw preparation

The polyaxial bushings in each hole provide multi-directional locking capability of the plate/screw construct to the fracture.

Use the drill guide with the 2 mm drill to determine the desired position of the 4 mm proximal cancellous screws. The drill tip should not violate the subchondral bone. Screw size is determined from the measuring marks on the drill or from the screw depth gauge.



Screw Depth Gauge
(AR-14100G)

SuturePlate Drill Guide
(AR-14010)

2 mm Drill for 4 mm Cancellous Screw (AR-14220D)

6.
Proximal screw insertion

Using the Torque Driver with the 2.5 mm Hex Screw Driver Shaft, insert a 4 mm Cancellous Screw into the prepared drill hole in the proximal aspect of the plate. If desired, the bushing guide may be used to prevent rotation of the bushing during screw insertion.

Place the remaining proximal cancellous screws in the same manner. It is recommended that the four most proximal plate holes are secured to the fracture with 4 mm cancellous screws first.

A compressive effect on the plate and the fragments can be obtained by rotating the polyaxial bushing with the bushing guide along with the screw.

Bushing Guide
(AR-14020)

Hex Screw Driver Shaft
(AR-14025)

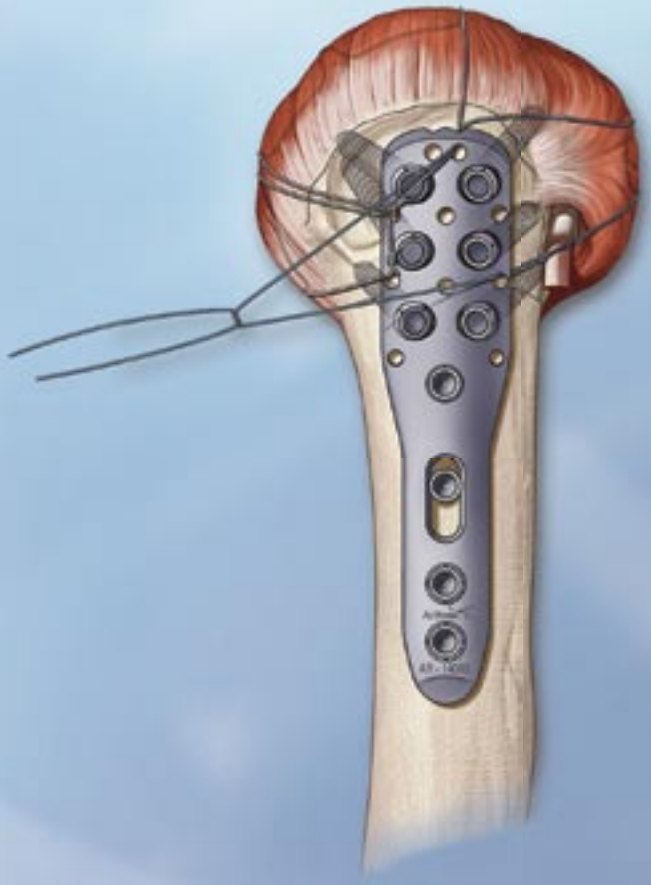
Torque Driver
(AR-14025AO)

The remaining proximal cancellous screws are placed as needed. The K-wires are removed once secure fixation of the plate is achieved. A Pin Extractor is provided to ease K-wire removal.

Pin Extractor (AR-14016PE)

7.
Distal screw insertion

Place the remaining distal cortical screws into the remaining distal plate holes using the drill guide and 2.5 mm drill in the manner previously described.



8.
Reinforce the reduction

A FiberWire Suture Kit is available for securing the soft tissue to the plate. The color-coded #2 FiberWire sutures come with needles swedged-on each end. These needles are size-matched to the multiple chamfered holes along the margin of the plate, allowing the sutures to be passed after the plate is securely fixed to the bone.

A #5 FiberWire is also available for use with the SuturePlate. It has a large cutting needle on one end for tissue passage, and a small tapered needle on the other end for passage through the plate.

For fractures of the greater tuberosity, FiberWire is passed through one of the upper lateral suture holes and then through the supra and/or infraspinatus tendons adjacent to the bone/tendon junction. The FiberWire is then passed back through one of the suture holes on the plate and tied. For fractures of the lesser tuberosity, FiberWire is passed through the subscapularis tendon in a similar fashion.

FiberWire Suture Kit
(AR-7214)

#5 FiberWire w/Needles
(AR-7213)

Humeral SuturePlate, 3-hole

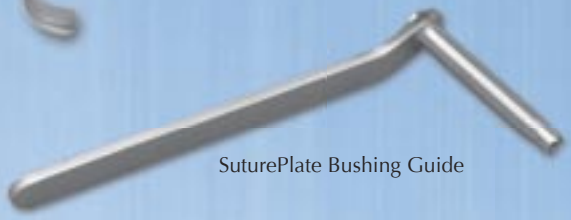
Tear Drop Handle
w/AO Connection

Humeral SuturePlate, 5-hole

Torque Driver

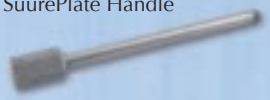
Pin Extractor

SuturePlate Drill Guide



SuturePlate Bushing Guide

Hex Screw Driver Shaft



SuurePlate Handle

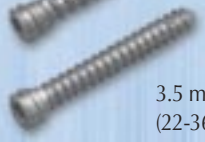
Screw Depth Gauge

K-Wires

2 mm Drill for 4 mm Cancellous Screw

2.5 mm Drill for 3.5 mm Cortical Screw

4 mm Cancellous Screw
(28-52 mm in 2 mm increments)



3.5 mm Cortical Screw
(22-36 mm in 2 mm increments)

SuturePlate Instrument Set (AR-14000S) contains:

SuturePlate Drill Guide, 2 mm/2.5 mm	AR-14010
K-Wire, 1.6 mm x 15 cm	AR-14016
Ball Wire, 1.6 mm x 15 cm	AR-14016B
Pin Extractor	AR-14016PE
SuturePlate Bushing Guide	AR-14020
Hex Screw Driver Shaft, 2.5 mm, AO Connection	AR-14025
Torque Driver	AR-14025AO
Screw Depth Gauge	AR-14100G
Drill for 3.5 mm Cortical Screw, 2.5 mm	AR-14125D
Drill for 4 mm Cancellous Screw, 2 mm	AR-14220D
Tear Drop Handle with AO Connection	AR-2001AO
SuturePlate Handle	AR-14023
Humeral SuturePlate Instrumentation Set Case	AR-14000C

Plates, Screws and Sutures:

Humeral SuturePlate, 3-hole	AR-14000
Humeral SuturePlate, 5-hole	AR-14000L
Cortical Locking Screw, 3.5 mm x 22 mm	AR-14122
Cortical Locking Screw, 3.5 mm x 24 mm	AR-14124
Cortical Locking Screw, 3.5 mm x 26 mm	AR-14126
Cortical Locking Screw, 3.5 mm x 28 mm	AR-14128
Cortical Locking Screw, 3.5 mm x 30 mm	AR-14130
Cortical Locking Screw, 3.5 mm x 32 mm	AR-14132
Cortical Locking Screw, 3.5 mm x 34 mm	AR-14134
Cortical Locking Screw, 3.5 mm x 36 mm	AR-14136
Cancellous Locking Screw, 4 mm x 28 mm	AR-14228
Cancellous Locking Screw, 4 mm x 30 mm	AR-14230
Cancellous Locking Screw, 4 mm x 32 mm	AR-14232
Cancellous Locking Screw, 4 mm x 34 mm	AR-14234
Cancellous Locking Screw, 4 mm x 36 mm	AR-14236
Cancellous Locking Screw, 4 mm x 38 mm	AR-14238
Cancellous Locking Screw, 4 mm x 40 mm	AR-14240
Cancellous Locking Screw, 4 mm x 42 mm	AR-14242
Cancellous Locking Screw, 4 mm x 44 mm	AR-14244
Cancellous Locking Screw, 4 mm x 46 mm	AR-14246
Cancellous Locking Screw, 4 mm x 48 mm	AR-14248
Cancellous Locking Screw, 4 mm x 50 mm	AR-14250
Cancellous Locking Screw, 4 mm x 52 mm	AR-14252
FiberWire Suture Kit for SuturePlate (5 color coded #2 FiberWires w/Needles)	AR-7214
#5 FiberWire w/Needles for SuturePlate	AR-7213

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This description of technique is provided as an educational tool and clinical aid to assist properly licensed medical professionals in the usage of specific Arthrex products. As part of this professional usage, the medical professional must use their professional judgment in making any final determinations in product usage and technique. In doing so, the medical professional should rely on their own training and experience and should conduct a thorough review of pertinent medical literature and the product's directions for use.

Designed in conjunction with Prof. Ernst Wiedemann, Munich, Germany.