Surgical Technique

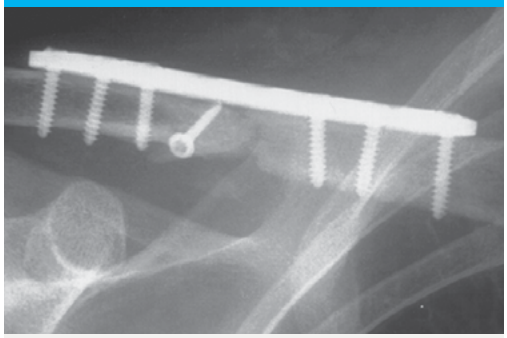
acumed®

Clavicle Plating System

Acu-Sinch® Repair System

Acumed® is a global leader of innovative orthopaedic and medical solutions.

We are dedicated to developing products, service methods, and approaches that improve patient care.



Acumed® Clavicle Plating System

Since its introduction as the orthopaedic industry's first precontoured resource for clavicle fixation, surgeons have utilized the versatility of the Acumed Clavicle Plating System to treat simple and complex fractures, malunions, and nonunions.

Our objective at Acumed is to provide a comprehensive solution for repairing clavicular fractures.

Designed in conjunction with William B. Geissler, M.D., the Clavicle Plating System is distinct and recognized for offering an array of low and narrow-profile plate solutions, precontoured to match the natural S-shape of the clavicle. This achievement affords surgeons the opportunity to choose the most appropriate option for the patient, could help reduce surgery time spent contouring a plate, and may aid in minimizing soft tissue irritation for the patient; all of which may reduce the need for additional surgical procedures.

This system also features either hex or hexalobe screws. The Hexalobe Screw System is designed to have increased strength when compared to Acumed Hex Screws.

The Acu-Sinch Repair System was designed to complement the Clavicle Plating System by treating Coracoclavicular (CC) ligament injuries associated with clavicle fractures. The Acu-Sinch Repair System is used in conjunction with an Acumed Superior Midshaft or Distal Clavicle Plate to aid in the repair of clavicle fractures.

Cleared Indications for the Clavicle Plating System:

Fractures of the clavicle
Clavicle malunions
Clavicle nonunions

Cleared Indications for the Acu-Sinch® Repair System:

Provides fixation during the healing of clavicle fractures

Clavicle Plating System
Design Surgeon
William B. Geissler, M.D.

Acu-Sinch® Repair System
Surgical Technique
Ilya Voloshin, M.D.

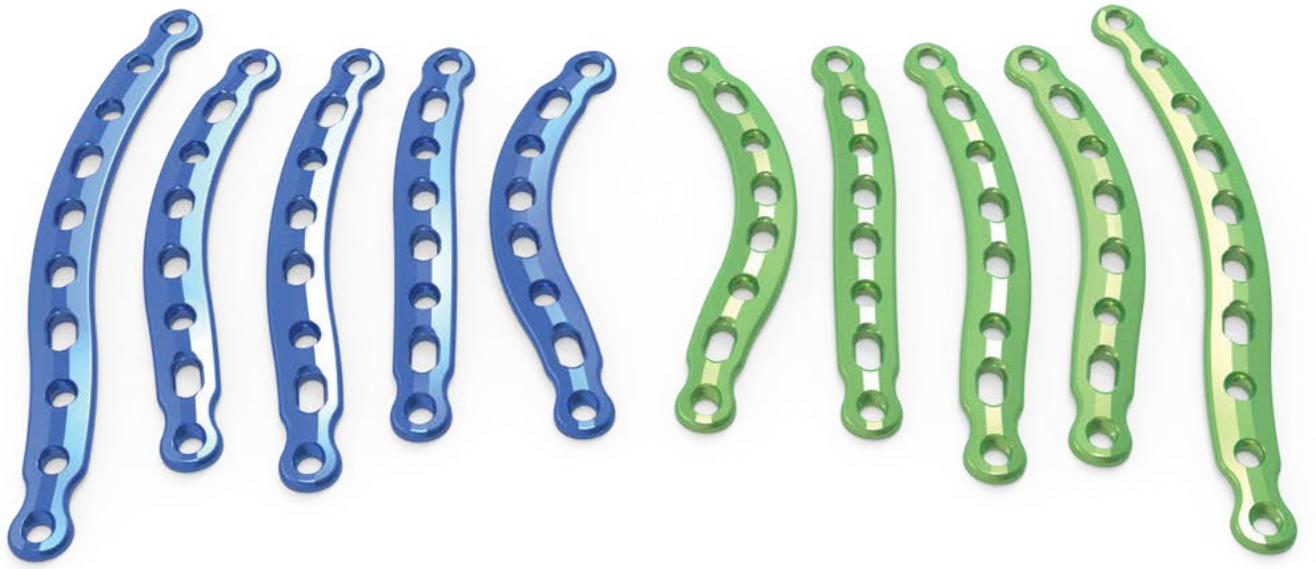
Contents

Plating System

Low-profile Superior Midshaft

Ten Low-profile Superior Midshaft Plates offered in five lengths to address central-third clavicle fractures.

Shortest Plate: 87 mm
Longest Plate: 121 mm



Narrow-profile Superior Midshaft

Six Narrow-profile Superior Midshaft Plates offered to accommodate patients with a small bone structure.

Shortest Plate: 74 mm
Longest Plate: 96 mm

Anterior Medial and Lateral

Five Anterior Plates designed for complex oblique fracture patterns as well as surgeons who prefer an anterior approach.

Shortest Plate: 75 mm
Longest Plate: 115 mm

Superior Distal

12 Superior Distal Plates (including two **optional** 3.5 mm 16-hole Superior Distal Plates) for complex clavicle fractures featuring a cluster of 2.3 mm or 3.5 mm screws designed to provide fracture fixation and stability for comminuted fractures.

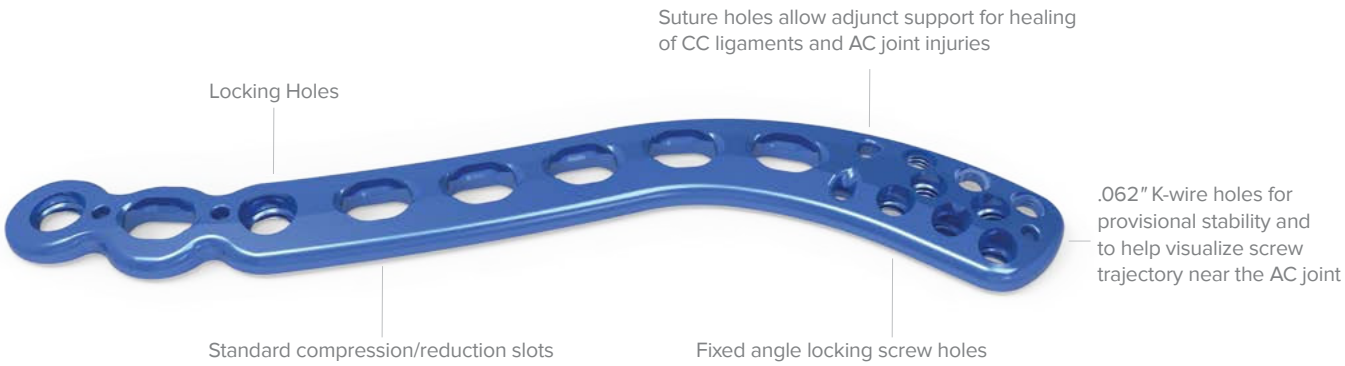
Shortest Plate: 64 mm
Longest Plate: 140 mm

Optional Optional

Note: The optional 3.5 mm 16-hole Superior Distal Clavicle Plates are available sterile packed only.

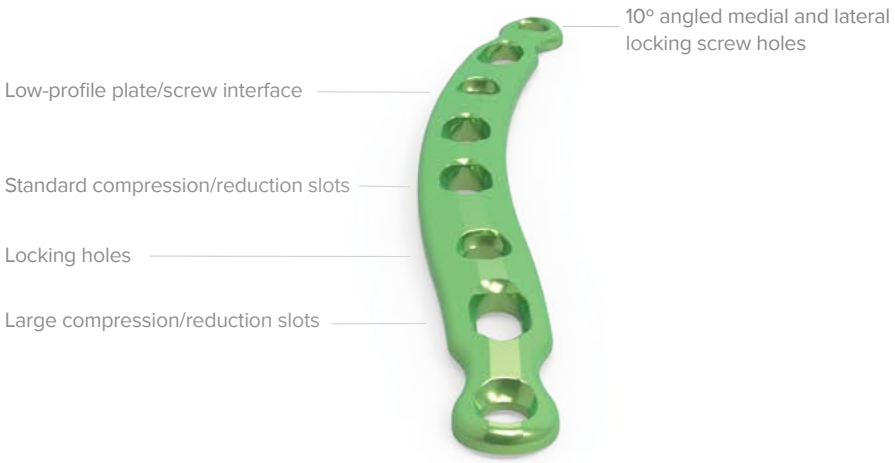
Plate Design

Superior Distal Clavicle Plates

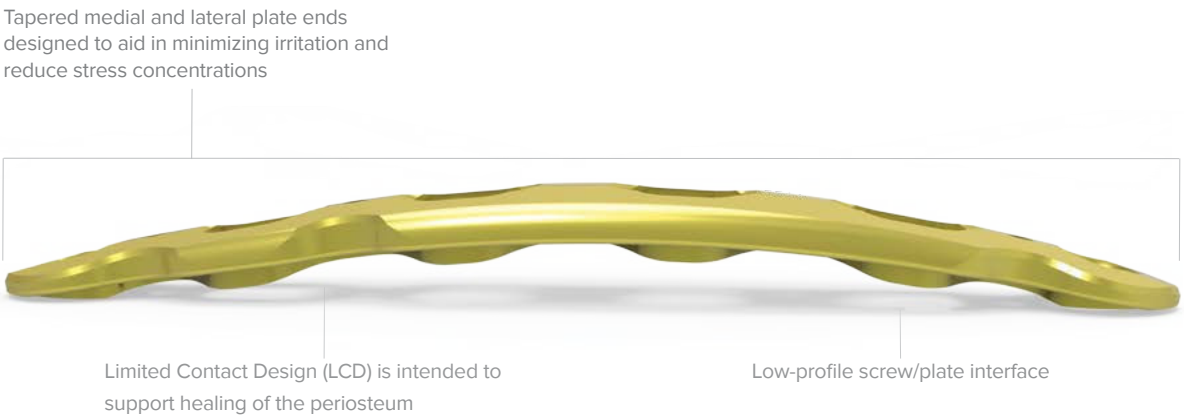


Low-profile Superior Midshaft Plates

Narrow-profile Superior Midshaft Plates



Anterior Clavicle Plates - Side



Anterior Clavicle Plates - Top

Screw Options

Superior Midshaft, Anterior, and Superior Distal Clavicle Plates

Hex Screws

2.7 mm Locking Cortical Screws
8 mm–65 mm

3.5 mm Locking Cortical Screws
6 mm–65 mm

2.7 mm Cortical Screws
8 mm–65 mm

3.5 mm Cortical Screws
6 mm–65 mm

4.0 mm Cancellous Screws
12 mm–60 mm

Optional Hexalobe Screws

3.0 mm Locking Hexalobe Screws
8 mm–26 mm

3.5 mm Locking Hexalobe Screws
8 mm–26 mm

3.0 mm Nonlocking Hexalobe Screws
8 mm–26 mm

3.5 mm Nonlocking Hexalobe Screws
8 mm–26 mm

Superior Distal Clavicle Plates Only

Hex Screws

2.3 mm Locking Cortical Screws
8 mm–26 mm

2.3 mm Non-Toggling
(Nonlocking) Cortical Screws
8 mm–26 mm

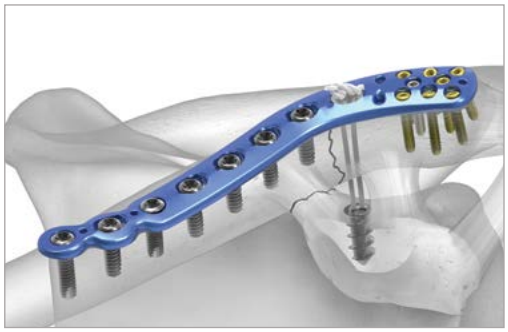
Acu-Sinch® Repair System

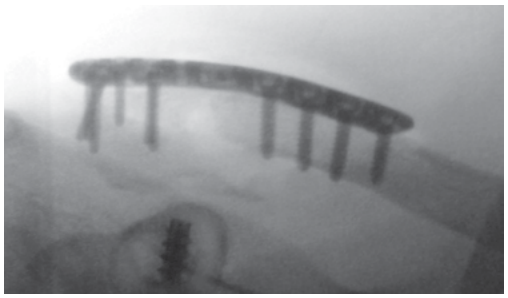
Coracoclavicular (CC) Ligament Support

Disruption of the CC ligaments is a common incident associated with displaced distal clavicle fractures.

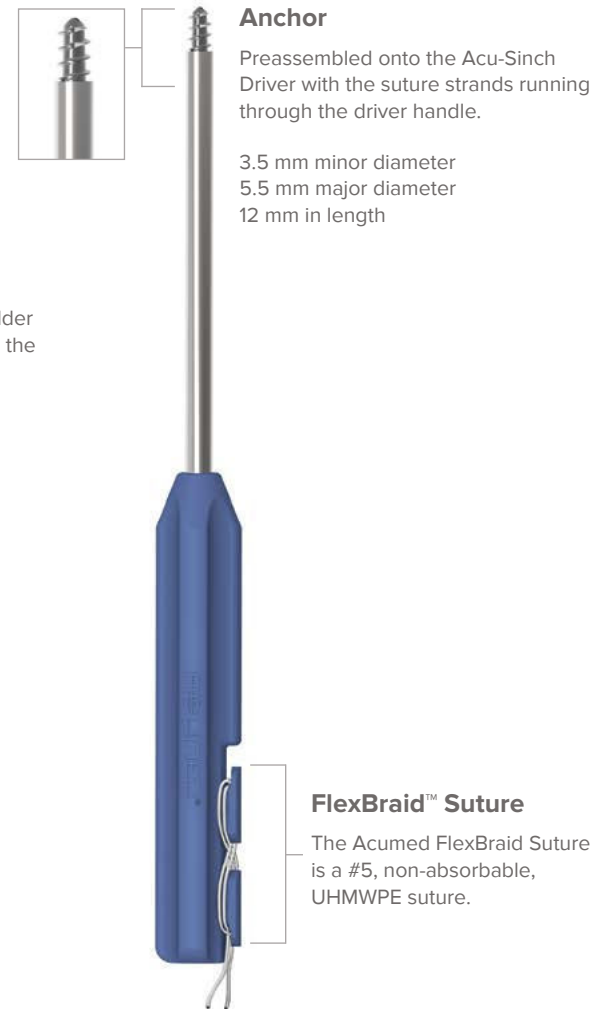
The Acu-Sinch Repair System is designed to support healing of the CC ligaments and is used in conjunction with an Acumed Superior Midshaft or Distal Clavicle Plate to provide fixation during the healing of clavicle fractures. This suture-and-anchor soft tissue repair system offers the surgeon the ability to penetrate only the superior cortex of the coracoid, preserving the integrity of the inferior cortex, and protecting the neurovascular structures below.

The Acu-Sinch Repair System is supplied in a sterile procedure pack which includes an Acu-Sinch Drill, an Acu-Sinch Driver with a preassembled Anchor and Acumed® FlexBraid™ Suture, and two Suture Retainers. The Acumed FlexBraid Suture is a #5, non-absorbable, UHMWPE (Ultra high molecular weight polyethylene) suture.





Acu-Sinch® Instrumentation



Anchor

Preassembled onto the Acu-Sinch Driver with the suture strands running through the driver handle.

3.5 mm minor diameter
5.5 mm major diameter
12 mm in length

Drill

3.5 mm Acu-Sinch Drill with a shoulder to help ensure drilling only through the superior cortex of the coracoid.

Suture Retainer

Fits into any slot in the Acumed Midshaft Superior or Distal Clavicle Plates.

Concave design may minimize the potential for soft tissue irritation.

FlexBraid™ Suture

The Acumed FlexBraid Suture is a #5, non-absorbable, UHMWPE suture.

Instrumentation

Superior Midshaft and Anterior Clavicle Plate Instrument Reference Chart

2.8 mm Hexalobe Locking Drill Guide 6–65 mm (80-0668)

2.8 mm x 5″ Quick Release Surgibit® Drill (MS-DC28)

2.8 mm Quick Release Surgibit® Drill (80-0387)

T15 Stick Fit Hexalobe Driver (80-0760)

2.5 mm Quick Release Hex Driver (HPC-0025)

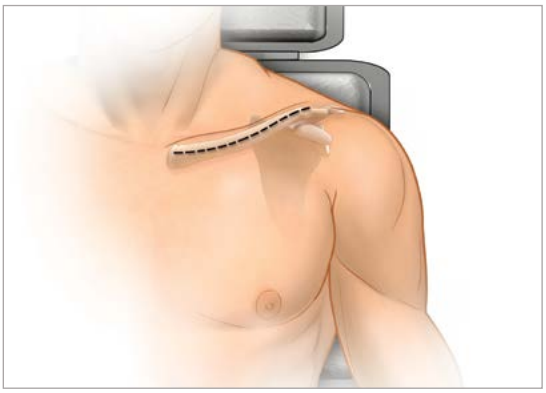
Clavicle Reactor (PL-CL03)

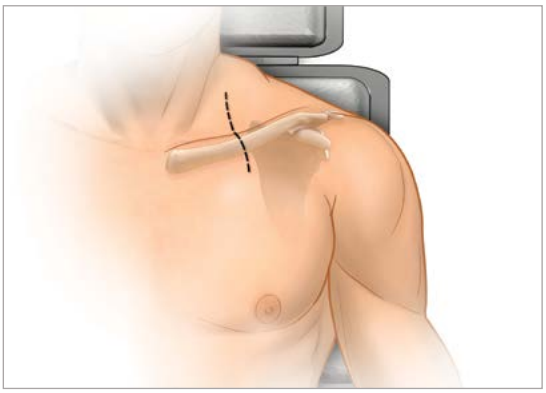
Additional Instruments (Not Pictured)

Depth Gauge 6–65 mm (80-0623)
Large Cannulated Quick Release Driver Handle (MS-3200)
3.5 mm x 5″ Quick Release Surgibit® Drill (MS-DC35)
3.0 mm x 5″ Quick Release Surgibit® Drill (80-1088)

Superior Midshaft Clavicle Plate Surgical Technique

WILLIAM B. GEISSLER, M.D.





1 RADIOGRAPHIC OPTIONS FOR MIDSHAFT CLAVICLE FRACTURES

Radiographic evaluation begins with an anteroposterior (AP) view to evaluate the acromioclavicular (AC) and sternoclavicular (SC) joints as well as the coracoclavicular (CC) ligaments. If thoracic structures obstruct the image, a 20° to 60° cephalad-tilted view may be utilized. For displaced fracture fragments, especially in the event of a vertically oriented butterfly fragment, a 45° AP oblique view may be helpful. If subluxation or dislocation of the medial clavicle or the SC joint is suspected, a 40° cephalic tilt view (serendipity view) of the SC joint or CT Scan is recommended.[1] If the decision on operative treatment is influenced by shortening of the clavicle, a Posterioranterior (PA) 15° caudal X-ray is suggested to assess the difference compared to the non-injured side.[2]

PREOPERATIVE PLANNING AND PATIENT POSITIONING

After completion of a thorough radiographic evaluation, the patient is placed in a beach chair position with the head rotated and tilted 5° to 10° away from the operative side. A bolster is placed between the shoulder blades and head allowing the injured shoulder girdle to retract posteriorly. This will facilitate reduction by bringing the clavicle anterior to restore length and improve exposure. The patient's involved upper extremity is prepped and draped in a sterile fashion allowing the arm to be manipulated to help further reduce the fracture if required.

2 EXPOSURE

Surgeons may choose one of two incisions: option one, a 4 cm transverse (medial to lateral) intraclavicular incision is made parallel to the long axis and inferior to the clavicle so that the scar does not lie over the plate. This approach may provide convenient access to the entire length of the bone. Option two, an incision along Langer's Lines running perpendicular to the long axis may provide better cosmetic results and less damage to the supraclavicular cutaneous nerves.

The subcutaneous fat is incised together with any fibers of the platysma. Identifying and protecting branches of the supraclavicular nerves preserves cutaneous sensation inferior to the incision. The pectoralis fascia is divided in line with the incision and elevated with electrocautery to create thick flaps that can be closed over the plate at the end of the procedure.

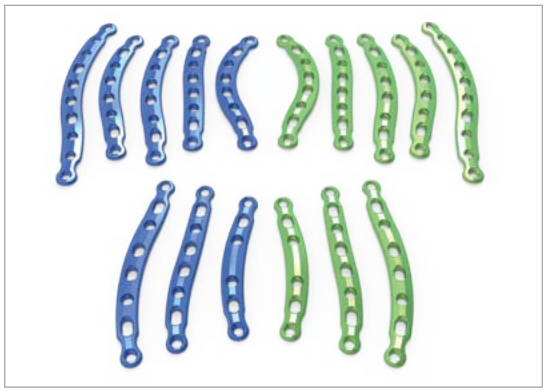
Tip: It is important to keep soft tissue attachments to the butterfly fragments to maintain vascularity.

[1] Bishai, S, Plancher, K, and Areson, D. "Operative Treatment for Comminuted Midshaft Fractures and Type II Distal Clavicle Fractures with Plating Techniques." Fractures of the Upper Extremity. American Society for Surgery of the Hand. Chicago. Sep 2008. Speech.

[2] Renner et al. Scapula and Clavicle. AO Principles of Fracture Management. AO Publishing (Theime). 2007. 557-571.

3 PLATE SELECTION

Reduce the fracture by placing reduction forceps on both the medial and lateral fragments. Distract, elevate, and rotate the lateral fragment to obtain reduction. An appropriately sized left or right Superior Midshaft Clavicle Plate is selected from the different lengths and curvatures in the system. Place the two middle screw slots or holes on either side of the fracture line, ideally leaving three locking and/or nonlocking holes both medial and lateral to the fracture fragments. The plate may be slid medially or laterally to achieve the best fit. In cases of nonunion or malunion, the curve of the plate may assist in anatomic reduction of the clavicle, reducing strain on the SC and AC joints.



Tips: For a more anatomical fit, the plate may be rotated 180° or a plate of the opposite dexterity may be used if the patient's anatomy requires a different curvature than that provided by the designated plate.

Prior to placement of the plate, lag screw fixation across the major fracture fragments may be performed. Reduction forceps or K-wires may be used to reduce and stabilize butterfly fragments to the main medial and lateral clavicle fragments.

To lag a 2.7 mm nonlocking hex screw, drill the fragments utilizing a 2.8 mm drill for the near cortex, followed by a 2.0 mm drill for the far cortex. Insert the appropriate length 2.7 mm nonlocking hex screw across the fracture to lag.

To lag a 3.0 mm nonlocking hexalobe screw, drill the fragments utilizing a 3.0 mm drill for the near cortex, followed by a 2.3 mm drill for the far cortex then insert the appropriate length 3.0 mm nonlocking hexalobe screw across the fracture to lag.

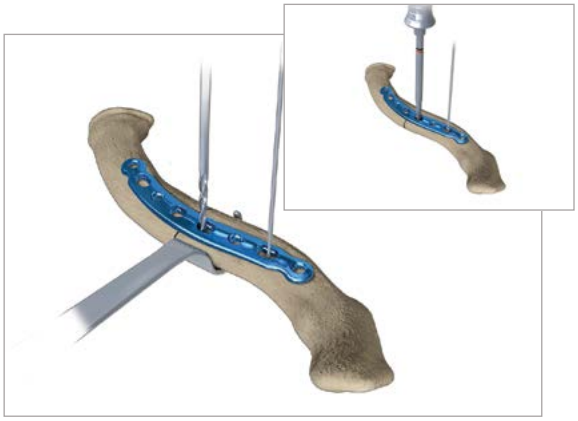
Note: The reduction forceps should only be used for plate placement and is not designed to be used to reduce the plate to the bone or to hold the plate while attempting to bend or contour it to match the patient's anatomy. Plate benders are available in the event that plate contouring is required to achieve an exact fit to the clavicle.

If bending of the plate is necessary, please observe the following:

- Do not bend plates more than 30°
- Bend radii should be greater than 1 inch
- Do not bend more than once
- Avoid bending across locking holes

4 PLATE PLACEMENT

Once the plate's ideal position has been selected, it is provisionally stabilized to the clavicle with .045″ or .059″ K-wires. To reduce the risk of delayed union or nonunion, the plate should be applied in compression mode using the drill guide. The plate may be applied to one of the major fracture fragments and used as a tool to reduce other major fragments to this bone-plate construct. Take care to ensure that the intervening fragments are not stripped. Preservation of soft tissue attachments helps ensure that the length and rotation of the clavicle are correct.



5 NONLOCKING SCREW INSERTION

For early stability, the first two screws should be placed medial and lateral to the fracture site. If bicortical screws are used, precautions should be taken to avoid over-penetration of the inferior cortex. The clavicle retractor should be placed under the inferior surface of the clavicle to protect the neurovascular structures from over-penetration when drilling.

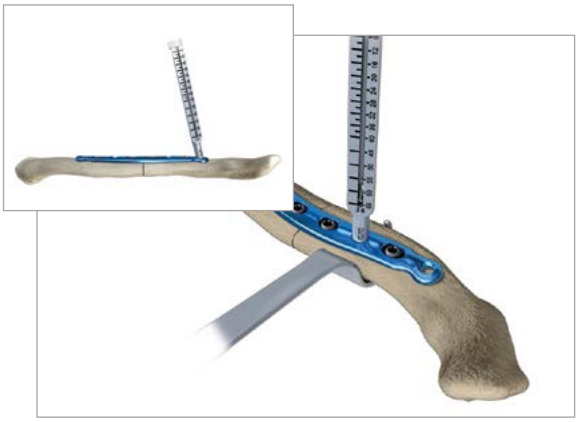
Assemble the driver to the driver handle. Using the 2.8 mm drill and drill guide, drill then measure for depth and place a 3.5 mm nonlocking screw through the slots. Once at least two screws are installed, the K-wires holding the plate to the clavicle may be removed.

Tip: Replace the drill if it comes in contact with the clavicle retractor.

Note: 3.5 mm nonlocking hex or hexalobe screws can be used in the slot.

6 LOCKING SCREW INSERTION

To drill all locking holes, place the locking drill guide into the desired hole until the guide fully threads into the plate. Insert the 2.8 mm drill to the desired depth. When between sizes, it is recommended to choose the shorter screw option. Remove the locking drill guide and insert the proper length screw. To place the 3.5 mm locking screw into the threaded holes, use the driver with the driver handle. Advance the screw until the head fully engages the plate.



Tips: The outer most medial and lateral holes are angled 10° and the locking drill guides must be inserted appropriately to account for these angles.

Tapping (80-0659 or 80-0661) is recommended for patients with dense bone. The locking drill guide must be removed prior to tapping.

Depending on the degree of comminution, demineralized bone matrix, iliac crest autograft, or allograft bone chips may be used to fill areas devoid of bone.[3] In hypertrophic nonunions, callus from the nonunion site may be sufficient to provide graft material.

Note: 3.5 mm locking hex or hexalobe screws can be used in the locking holes.

[3] Bishai et al.

7 RADIOGRAPHIC OPTIONS FOR SUPERIOR MIDSHAFT CLAVICLE FRACTURES

An intraoperative radiograph is recommended to check the final reduction of the fracture and the position of the screws. If the surgeon feels the bone quality of the lateral fragment is poor, sutures may be passed from medial to lateral around the coracoid and the plate to take stress off of the lateral fixation. After radiographic evaluation and thorough irrigation, the clavipectoral fascia is closed over the clavicle and the plate, followed by closure of the subcutaneous tissue and musculature in separate layers. Finally, the skin is closed by using interrupted absorbable sutures with a subcuticular stitch and dress the wound.

Post-Op Protocol

For the first four weeks, the patient is placed in either an arm sling or an abduction pillow to bring the arm up and the clavicle down, unloading the AC joint.[4] Passive range of motion exercises are initiated during the first four weeks. Exercises may include pendulum, Codman, isometric bicep, and elbow and wrist motion. It should be emphasized to patients that they must avoid any activity involving heavy lifting, pushing or pulling. Depending on the amount of comminution and the stability of fixation, active assisted exercise is started from four to six weeks, and active strengthening is initiated at six to eight weeks postoperatively, once healing is seen radiographically. A full return to activities is permitted once healing has occurred.

[4] Bishai et al.

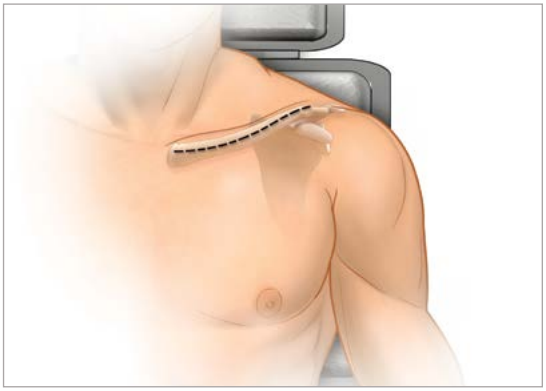
Anterior Clavicle Plate Surgical Technique

William B. Geissler, M.D.

1 RADIOGRAPHIC OPTIONS FOR ANTERIOR CLAVICLE FRACTURES

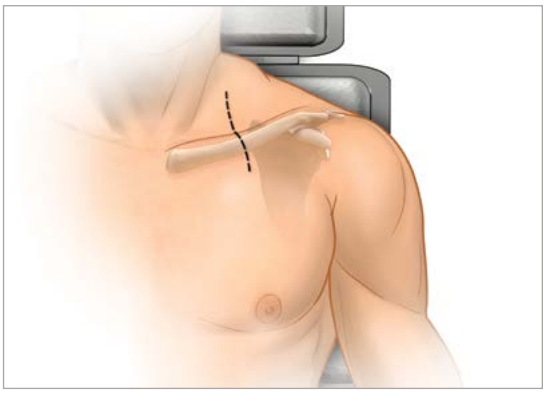
Radiographic evaluation begins with an anteroposterior (AP) view to evaluate the acromioclavicular (AC) and sternoclavicular (SC) joints as well as the coracoclavicular (CC) ligaments. If thoracic structures obstruct the image, a 20° to 60° cephalad-tilted view may be utilized. For displaced fracture fragments, especially in the event of a vertically oriented butterfly fragment, a 45° AP oblique view may be helpful. If subluxation or dislocation of the medial clavicle or the SC joint is suspected, a 40° cephalic tilt view (serendipity view) of the SC joint or CT scan is recommended.[1] If the decision on operative treatment is influenced by shortening of the clavicle, a posterioranterior (PA) 15° caudal X-ray is suggested to assess the difference compared to the non-injured side.[2]

Preoperative Planning and Patient Positioning



After completion of a thorough radiographic evaluation, the patient is placed in a beach chair position with the head rotated and tilted 5° to 10° away from the operative side. A bolster is placed between the shoulder blades and head allowing the injured shoulder girdle to retract posteriorly. This will facilitate reduction by bringing the clavicle anterior to restore length and improve exposure. The patient's involved upper extremity is prepped and draped in a sterile fashion allowing the arm to be manipulated to help further reduce the fracture if required.

2 EXPOSURE



Surgeons may choose one of two incisions: option one, a 4 cm transverse (medial to lateral) intraclavicular incision is made parallel to the long axis and inferior to the clavicle so that the scar does not lie over the plate. This approach may provide convenient access to the entire length of the bone. Option two, an incision along Langer's Lines running perpendicular to the long axis may provide better cosmetic results and less damage to the supraclavicular cutaneous nerves.

The subcutaneous fat is incised together with any fibers of the platysma. Identifying and protecting branches of the supraclavicular nerves preserves cutaneous sensation inferior to the incision. The pectoralis fascia is divided in line with the incision and elevated with electrocautery to create thick flaps that can be closed over the plate at the end of the procedure.

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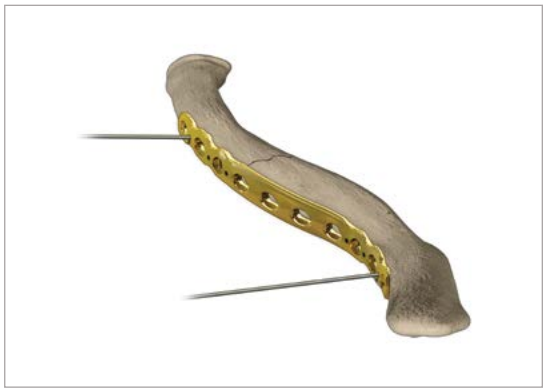

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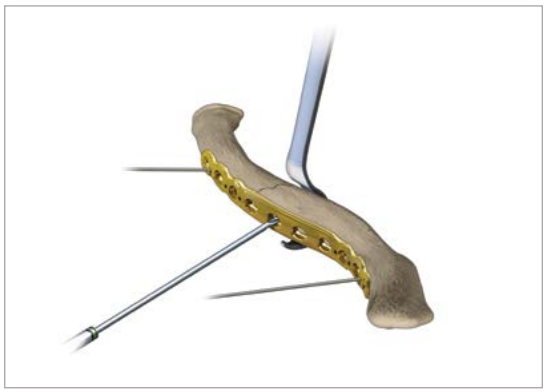

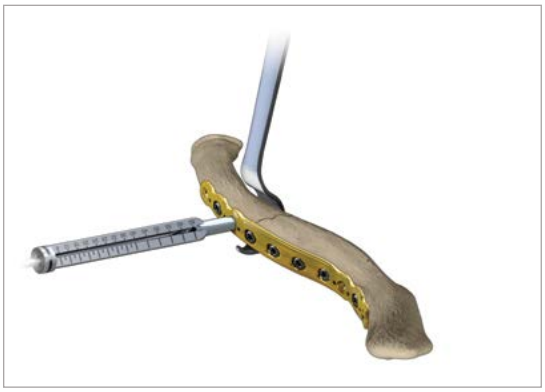

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Post-Op Protocol

For the first four weeks, the patient is placed in either an arm sling or an abduction pillow to bring the arm up and the clavicle down, unloading the AC joint.[4] Passive range of motion exercises are initiated during the first four weeks. Exercises may include pendulum, Codman, isometric bicep, and elbow and wrist motion. It should be emphasized to patients that they must avoid any activity involving heavy lifting, pushing or pulling. Depending on the amount of comminution and the stability of fixation, active assisted exercise is started from four to six weeks, and active strengthening is initiated at six to eight weeks postoperatively, once healing is seen radiographically. A full return to activities is permitted once healing has occurred.

[3, 4] Bishai et al.

Instrumentation

Superior Distal Clavicle Plate Instrument Reference Chart

Clavicle Reactor
(PL-CL03)

T15 Stick Fit
Hexalobe Driver
(80-0760)

2.0 mm
Quick Release
Surgibit® Drill
(80-0318)

2.8 mm
Quick Release
Surgibit® Drill
(80-0387)

1.5 mm Hex
Driver Tip
(HPC-0015)

2.0 mm Locking
Drill Guide 4-32 mm
(80-0249)

Additional Instruments (Not Pictured)

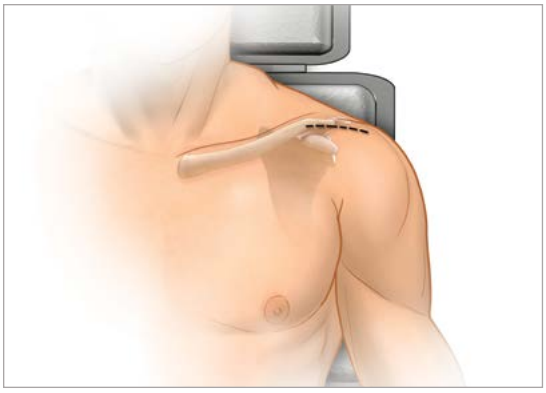
2.3 mm Quick Release Surgibit® Drill (80-0627)
3.0 mm x 5″ Quick Release Surgibit® Drill (80-1088)
2.3 mm Screw Sleeve (MS-SS23)
Cruciform Driver Handle (MS-2210)
3.5 mm x 5″ Quick Release Surgibit® Drill (MS-DC35)
Depth Gauge 6-65 mm (80-0623)
2.5 mm Quick Release Hex Driver (HPC-0025)
Large Cannulated Quick Release Driver Handle (MS-3200)

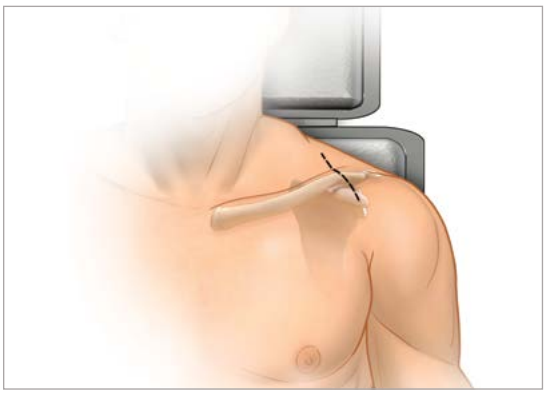
Targeting Guide,
Distal Clavicle Plate,
Left
(80-0451)

Targeting Guide,
Distal Clavicle Plate,
Right
(80-0450)

Superior Distal Clavicle Plate Surgical Technique

WILLIAM B. GEISSLER, M.D.





1 PREOPERATIVE PLANNING AND PATIENT POSITIONING

After a thorough radiographic evaluation has been completed, the patient is placed in a beach chair position with the head rotated and tilted 5° to 10° away from the operative side. A bolster is placed between the shoulder blades allowing the injured shoulder girdle to retract posteriorly. This helps facilitate reduction by bringing the clavicle anterior to restore length and improve exposure. The patient's involved upper extremity is prepped and draped in a sterile fashion allowing the arm to be manipulated to help further reduce the fracture if required.

Tip: After axial trauma to the shoulder, it is important to complete a full clinical workup as this injury is not only a bony injury, but usually a soft tissue event involving the disruption of the coracoclavicular (CC) ligaments and acromioclavicular (AC) joint.[1] Thus, examination of the AC joint and CC ligaments is important in the success of the repair.

Note: Step 1 of the Superior Midshaft Plate surgical technique provides a complete profile of options for radiographic evaluation. It is important to note that an AP radiograph can underestimate the displacement of the distal clavicle. If AC joint widening is visualized on the AP view, an axillary radiograph should be taken to determine the anteroposterior position of the clavicle in relation to the acromion.[2]

2 EXPOSURE

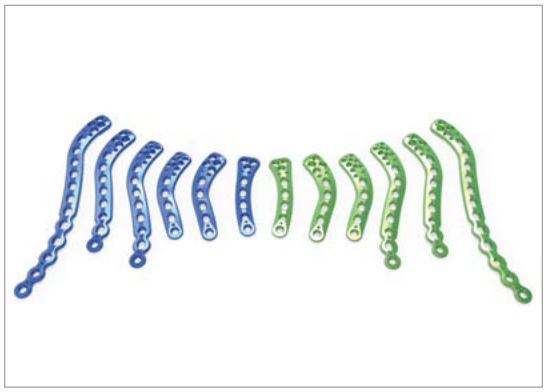
Surgeons may choose one of two incisions: option one, a 4 cm transverse incision is made inferior to the distal clavicle and AC Joint. The incision is usually placed midway between the medial and lateral migrations of the proximal fragment. Option two, an incision along Langer's Lines running perpendicular to the long axis may provide better cosmetic results and less damage to the supraclavicular cutaneous nerves.

Dissection is carried down to the fascia and the skin flaps are elevated. The cutaneous nerves are protected. The trapezial deltoid musculature is then subperiosteally elevated off the bone fragments avoiding the infraclavicular nerve branches below the clavicle.

Tip: It is important to keep soft tissue attachments to the butterfly fragments to maintain vascularity. The fracture is then reduced.

[1] Yeh, et al. Midshaft clavicle fracture and acromioclavicular dislocation: A case report of a rare injury. Journal of Shoulder and Elbow Surgery, 2008 December; Article in Press: 1–4.
[2] Yeh, et al.

3 PLATE SELECTION



Select the appropriately sized Superior Distal Clavicle Plate from the different lengths and curvatures in the system. The curve of the plate may assist in anatomic reduction of the clavicle, reducing strain on the SC and AC joints.

Tips: Prior to placement of the plate, lag screw fixation across the major fracture fragments may be performed. Many Type IIB clavicle fractures have a horizontal cleavage fracture that extends into the AC joint, which may be fixed in this manner. Reduction forceps or K-wires may be used to reduce and stabilize butterfly fragments to the main medial and lateral clavicle fragments.

To lag a 2.7 mm nonlocking hex screw, drill the fragments utilizing a 2.8 mm drill for the near cortex, followed by a 2.0 mm drill for the far cortex. Insert the appropriate length 2.7 mm nonlocking hex screw across the fracture to lag.

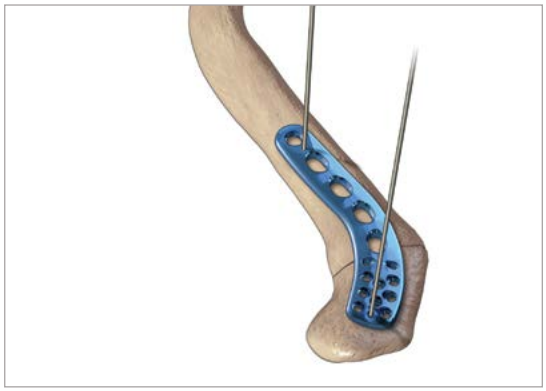
To lag a 3.0 mm nonlocking hexalobe screw, drill the fragments utilizing a 3.0 mm drill for the near cortex, followed by a 2.3 mm drill for the far cortex then insert the appropriate length 3.0 mm nonlocking hexalobe screw across the fracture to lag.

* Surgical technique from this point forward will highlight a Superior Distal Clavicle Plate utilizing 2.3 mm screws.

If bending of the plate is necessary, please observe the following:

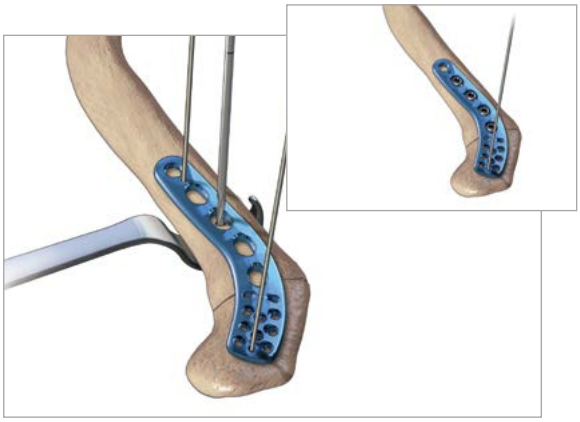
- Do not bend plates more than 30°
- Bend radii should be greater than 1 inch
- Do not bend more than once
- Avoid bending across locking holes

4 PLATE PLACEMENT



Once the plate's ideal positioning has been selected, it is provisionally stabilized to the clavicle with K-wires. Under radiographic evaluation, the most lateral K-wire hole of each Superior Distal Clavicle Plate affords the opportunity to verify that the placement of the screws will not protrude into the AC joint by inserting a K-wire to confirm plate placement.

Note: The reduction forceps should be used for plate placement and are not designed to be used to reduce the plate to the bone or to hold the plate while attempting to bend or contour it to match the patient's anatomy.



5 NONLOCKING SCREW INSERTION

For early stability, the first two screws should be placed medial and lateral to the fracture site. If bicortical screws are used, precautions should be taken to avoid over-penetration of the inferior cortex. The clavicle retractor should be placed under the inferior surface of the clavicle to protect the neurovascular structures from over-penetration when drilling.

Assemble the driver to the driver handle. Using the 2.8 mm drill and drill guide, drill then measure for depth and place a 3.5 mm nonlocking screw through the slots. Once at least two screws are installed, the K-wires holding the plate to the clavicle may be removed.

Tip: Replace the drill if it comes in contact with the clavicle retractor.

Note: 3.5 mm nonlocking hex or hexalobe screws can be used in the slot.

6 NONLOCKING SCREW INSERTION IN DISTAL PORTION OF PLATE

Secure the plate to a distal fragment by inserting a 2.3 mm nonlocking screw through the medial most center hole. Place the 2.0 mm locking drill guide into the center hole and turn clockwise so that the guide fully threads into the plate. Insert the 2.0 mm drill and advance to the desired depth. Drill depth is determined by referencing where the laser mark on the drill aligns with the measurement on the 2.0 mm locking drill guide. Remove the drill guide and use the 1.5 mm hex driver tip with the cruciform driver handle to advance the 2.3 mm nonlocking screw until the screw head fully engages the plate.

The targeting guides are color coded (blue and green) to match the corresponding left (blue) and right (green) plates. Slide the targeting guide over the most lateral K-wire and down to the plate. The correct positioning of the targeting guide is achieved when the two pins on the bottom surface of the targeting guide engage the two suture holes just proximal to the distal screw holes. The targeting guide must sit flush against the plate for proper functionality.

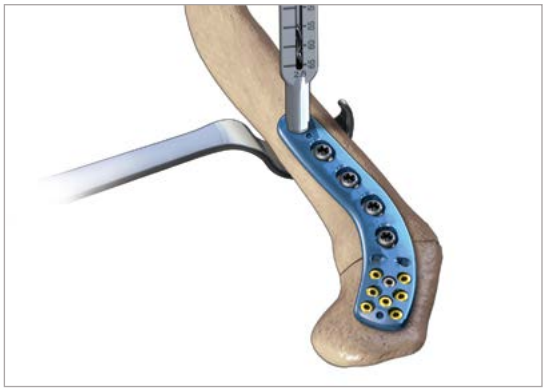
7 LOCKING SCREW INSERTION

For the remaining distal locking holes, place the 2.0 mm locking drill guide through the targeting guide and into the desired hole then turn clockwise so that the guide fully threads into the plate. This will hold the targeting guide flush to the plate. Insert the 2.0 mm drill and advance to the desired depth. Drill depth is determined by referencing where the laser mark on the drill aligns with the measurement on the 2.0 mm locking drill guide. When between sizes, choose the shorter screw option. Remove the locking drill guide and insert the proper length of screw through the targeting guide. To place the 2.3 mm locking screws into the threaded holes, use the 1.5 mm hex driver tip with the cruciform driver handle. Advance the screw until the screw head fully engages the plate. Repeat these steps until a minimum of six screws have been fully inserted into the plate and bone.

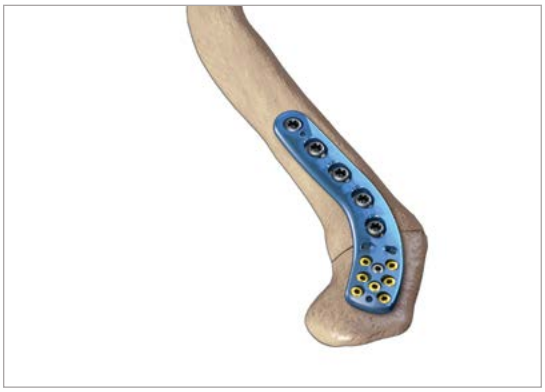
To drill all locking shaft holes, place the 2.8 mm locking drill guide into the desired hole until the guide fully threads into the plate. Insert the 2.8 mm drill to the desired depth. When between sizes, it is recommended to choose the shorter screw option. Remove the locking drill guide and insert the proper length screw. To place the 3.5 mm locking screws into the threaded holes, use the driver with the driver handle. Advance the screw until the head fully engages the plate.

Tip: Depending on the degree of comminution, demineralized bone matrix, iliac crest autograft, or allograft bone chips may be used to fill areas devoid of bone.[3] In hypertrophic nonunions, callus from the nonunion site may be sufficient to provide graft material.

Note: 3.5 mm locking hex or hexalobe screws can be used in the locking holes in the shaft of the plate.



[3] Altamimi et al. Nonoperative Treatment Compared with Plate Fixation of Displaced Midshaft Clavicular Fractures. Surgical Technique. Journal of Bone and Joint Surgery. 2008, 90, 1–8.



8 FINAL PLATE AND SCREW POSITION

An intraoperative radiograph is recommended to check the final reduction of the fracture and the position of the screws. If the surgeon feels the bone quality of the lateral fragment is poor or there is injury to the coracoclavicular ligaments, sutures may be passed from medial to lateral around the coracoid and through the suture holes in the distal portion of the plate to take stress off of the lateral fixation. After radiographic evaluation and routine irrigation, the trapezial-deltoid fascia is closed over the clavicle and AC joint, followed by closure of the subcutaneous tissue and skin. The wound is dressed and the arm placed in an abduction pillow to bring the arm up and the clavicle down, unloading the AC joint.[4]

Post-Op Protocol

Passive range of motion exercises are initiated during the first four weeks. Exercises may include pendulum, Codman, isometric bicep, and elbow and wrist motion. It should be emphasized to patients that they must avoid any activity involving heavy lifting, pushing or pulling. Depending on the amount of comminution and the stability of fixation, active assisted exercise is started from four to six weeks, and active strengthening is initiated at six to eight weeks postoperatively, once healing is seen radiographically. Full return to activities is permitted once healing has occurred.

[4] Bishai et al.

Acu-Sinch® Repair System

Ilya Voloshin, M.D.

1 PREOPERATIVE PLANNING AND PATIENT POSITIONING

After a thorough radiographic evaluation has been completed, the patient is placed in a beach chair position. A bolster is placed between the shoulder blades allowing the injured shoulder girdle to retract posteriorly. This helps facilitate reduction by bringing the clavicle anterior to restore length and improve exposure. The patient's involved upper extremity is prepped and draped in a sterile fashion allowing the arm to be manipulated to help further reduce the fracture if required.

Distal clavicle fractures are often associated with complete or partial disruption of the CC ligaments and AC joint. Thorough radiographic preoperative and intraoperative assessment is necessary to avoid missing the soft tissue component of the injury.

Preoperative Planning and Patient Positioning

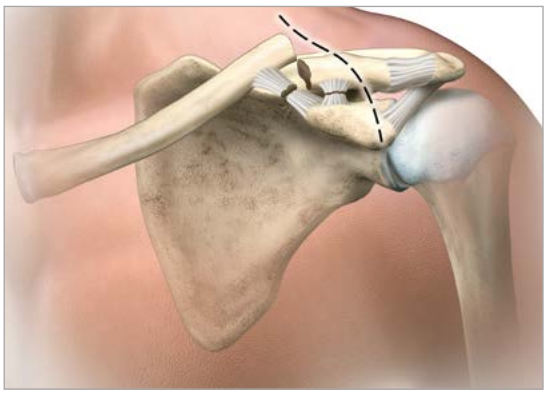
Radiographic evaluation includes an anteroposterior (AP) view to evaluate the AC, sternoclavicular (SC) joints, and CC interval. If thoracic structures obstruct the image, a 20° to 60° cephalad-tilted view may be utilized.[1] It is important to note that an AP radiograph can underestimate the displacement of the distal clavicle.

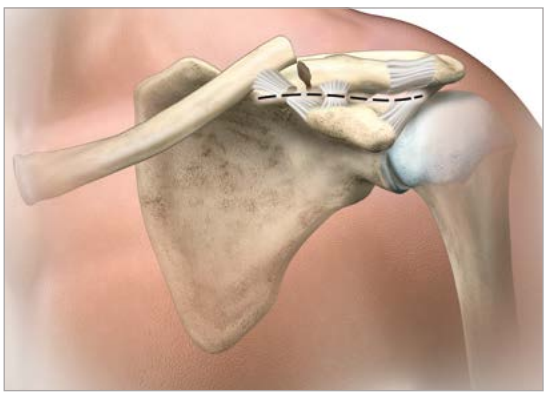
An axillary radiograph should be taken to determine if a Type IV AC joint separation is present and to assess displacement of the fracture in the axial plane.[2]

2 EXPOSURE

Surgeons may choose one of two incisions: option one, a 3 cm to 5 cm transverse incision is made inferior to the distal clavicle and AC Joint. The incision is usually placed midway between the medial/lateral migrations of the medial fragment. Option two, an incision along Langer's Lines running perpendicular to the long axis can provide better cosmetic results and potentially less damage to the supraclavicular cutaneous nerves.

Dissection is carried down to the fascia and the skin flaps are elevated. The cutaneous nerves are protected. The trapezial deltoid musculature is then subperiosteally elevated off the bone fragments avoiding the infraclavicular nerve branches below the clavicle. It is important to keep soft tissue attachments to the butterfly fragments and lateral fragment in an attempt to maintain vascularity.





[1] Bishai, S., Plancher, K., Areson, D. Operative treatment for comminuted midshaft fractures and type II distal clavicle fractures with plating techniques. Fractures of the Upper Extremity. American Society for Surgery of the Hand. (2008).

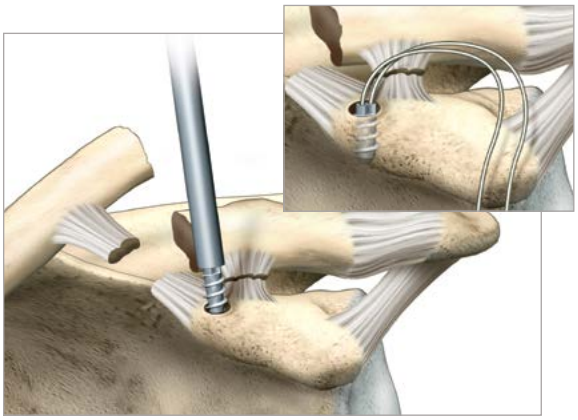
[2] Yeh, et al. Midshaft clavicle fracture and acromioclavicular dislocation: A case report of a rare injury. Journal of Shoulder and Elbow Surgery. (2008); Article in Press: 1-4.

3 CORACOID EXPOSURE AND DRILLING

The deltotrapezial fascia is sharply incised along the clavicle and the subperiosteal flaps are raised and protected for future deltotrapezial fascia repair. After the exposure to the fracture has been made, push the medial fragment of the clavicle posteriorly as far as necessary to allow exposure of the coracoid process, in particular the base of the coracoid. Bluntly dissect down to the superior bone surface of the coracoid.

Identify the center of the coracoid on the superior cortex to avoid bone cutout and drill through the first cortex using the Acu-Sinch Drill. Do not drill through the second cortex. Damage to the anatomic structures around the coracoid is possible when over drilling occurs. Precaution should be taken in cases of weak or soft bone as insufficient quantity or quality of bone is a contraindication for the device. Direct visualization or imaging should be used when drilling.

Tip: Based on coracoid size and injury pattern, the surgeon has the ability to choose between one or two anchors at their discretion.

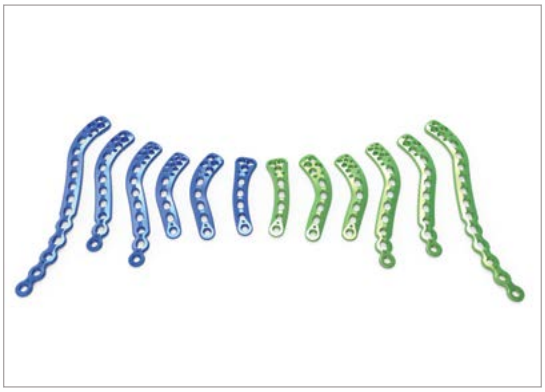


4 ANCHOR INSERTION AND SUTURE RELEASE

Insert the anchor(s) (preassembled with the suture on the Acu-Sinch Driver) into the drill hole(s) to a depth with the driver interface barely sticking out. The shoulder on the Acu-Sinch Driver is intended to prevent inserting the anchor(s) too deep.

Release the suture from the handle and position the suture strands anteriorly for use after plate installation has been completed.

Tip: Direct visualization of the coracoid or imaging should be used when inserting the anchor to ensure that the anchor isn't inserted too far into the coracoid.



5 PLATE SELECTION

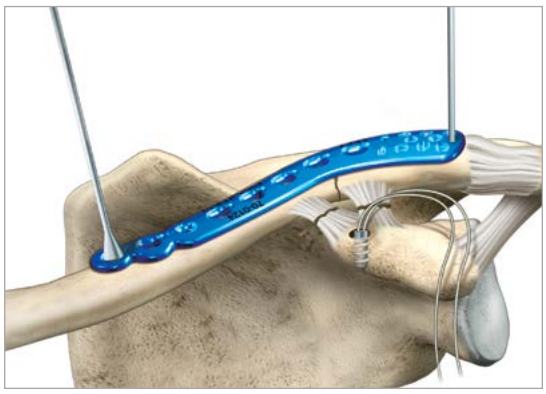
Select the appropriately sized Superior Clavicle Plate from the different lengths and curvatures in the system. The curve of the plate may assist in anatomic reduction of the clavicle, reducing strain on the SC and AC joints.

Tip: Lifting the arm superiorly helps reduce the fracture. Reduction of the fracture can be achieved provisionally by K-wires placed through the acromion or posterior scapula spine. This allows easier placement of the superior plate on the clavicle without losing the reduction.

*Surgical technique from this point forward will highlight a Superior Distal Clavicle Plate utilizing eight 2.3 mm screws.

6 PLATE PLACEMENT

Once the plate's ideal positioning has been selected, it is provisionally stabilized to the clavicle with plate tacks or plate clamps. Under radiographic evaluation, place a .059″ K-wire through the designated K-wire hole at the far distal end of the plate to ensure that the plate does not infringe upon the AC joint.

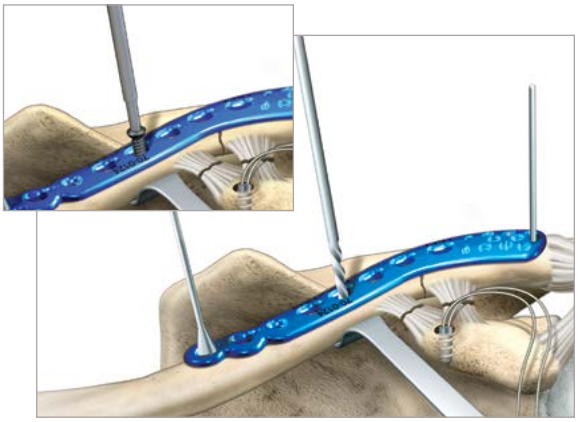


Tip: Avoid using the plate clamp in securing the plate to the bone as the serrated jaws may scratch the plate surface.

Lag screws may be used for interfragmentary fixation. Many Type IIB clavicle fractures have a horizontal cleavage fracture that extends into the AC joint, which may be fixed in this manner.[3] After the near cortex is drilled with the 3.5 mm drill, the 3.5 mm narrow drill guide is inserted and the far cortex is drilled with a 2.8 mm drill. A countersink is available to facilitate placement of 2.7 mm and 3.5 mm interfragmentary screws.

7 NONLOCKING SCREW INSERTION

For early stability, the first two screws placed should be medial and lateral to the fracture site. If bicortical screws are used, precautions should be taken to avoid over-penetration of the inferior cortex. The clavicle retractor should be placed under the inferior surface of the clavicle to protect the neurovascular structures from over-penetration when drilling.



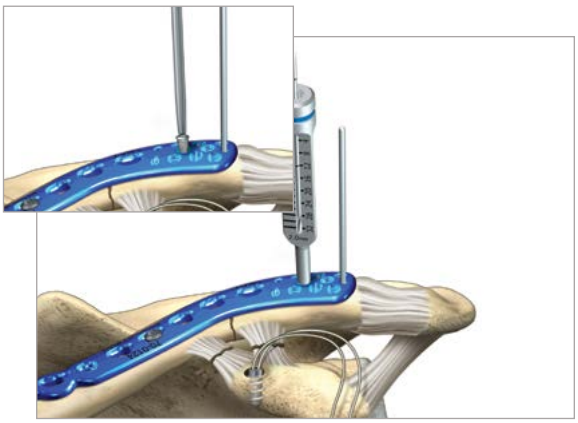
Proximal Screw Insertion

Assemble the driver to the driver handle. Using the 2.8 mm drill and drill guide, drill then measure for depth and place a 3.5 mm nonlocking screw through the slots.

Tips: Based on the number of anchors, make sure to leave one or two of the compression slots located above the coracoid empty to allow for insertion of the suture retainer(s).

When drilling the screw holes, use precaution to protect suture from the drill bit.

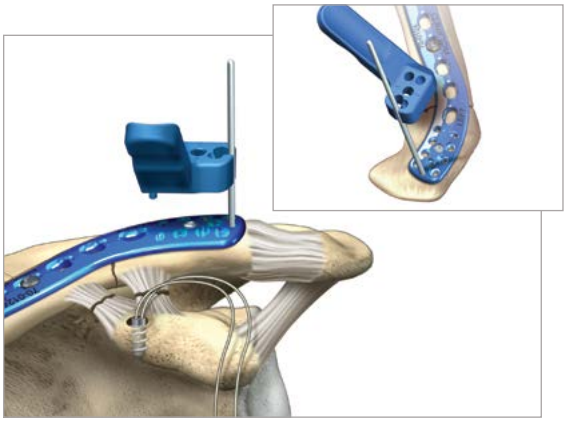
Note: 3.5 mm nonlocking hex or hexalobe screws can be used in the slot.

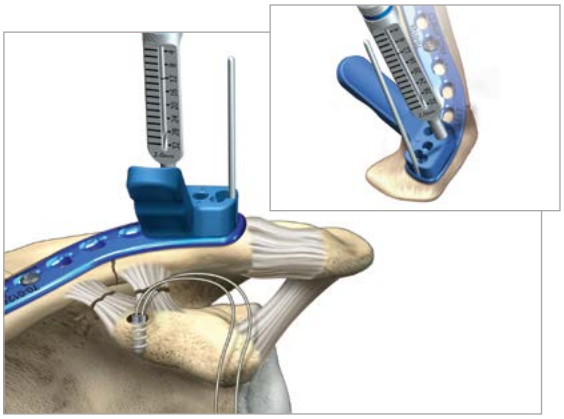


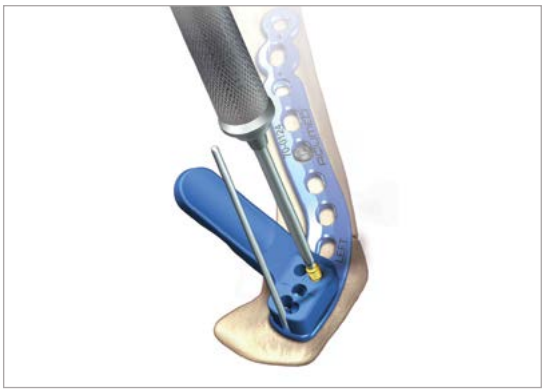
Distal Screw Insertion

Secure the plate to a distal fragment by inserting a 2.3 mm nonlocking screw through the medial most center hole. Place the 2.0 mm locking drill guide into the center hole and turn clockwise so that the guide fully threads into the plate. Insert the 2.0 mm drill and advance to the desired depth. Drill depth is determined by referencing where the laser mark on the drill aligns with the measurement on the 2.0 mm locking drill guide. Remove the drill guide and use the 1.5 mm hex driver tip with the cruciform driver handle to advance the 2.3 mm nonlocking screw until the screw head fully engages the plate.

[3] Bishai et al.







8 LOCKING SCREW INSERTION

The targeting guides are color coded (blue and green) to match the corresponding left (blue) and right (green) plates. Slide the targeting guide over the K-wire and down to the plate. The correct positioning of the targeting guide is achieved when the two pins on the bottom surface of the targeting guide engage the two suture holes just proximal to the distal screw holes. The targeting guide must sit flush against the plate for proper functionality.

Distal Screw Insertion

For the remaining distal locking holes, place the 2.0 mm locking drill guide through the targeting guide and into the desired hole then turn clockwise so that the guide fully threads into the plate. This will hold the targeting guide flush to the plate. Insert the 2.0 mm drill and advance to the desired depth. Drill depth is determined by referencing where the laser mark on the drill aligns with the measurement on the 2.0 mm locking drill guide. When between sizes, choose the shorter screw option. Remove the locking drill guide and insert the proper length of screw through the targeting guide. To place the 2.3 mm locking screws into the threaded holes, use the 1.5 mm hex driver tip with the cruciform driver handle. Advance the screw until the screw head fully engages the plate. Repeat these steps until a minimum of six screws have been fully inserted into the plate and bone.

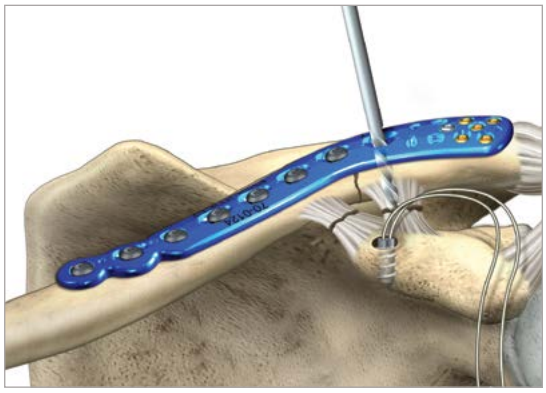
Proximal Screw Insertion

To drill all locking shaft holes, place the 2.8 mm locking drill guide into the desired hole until the guide fully threads into the plate. Insert the 2.8 mm drill to the desired depth. When between sizes, it is recommended to choose the shorter screw option. Remove the locking drill guide and insert the proper length screw. To place the 3.5 mm locking screws into the threaded holes, use the driver with the driver handle. Advance the screw until the head fully engages the plate.

Note: 3.5 mm nonlocking hex or hexalobe screws can be used in the locking holes in the shaft of the plate.

9 DRILL

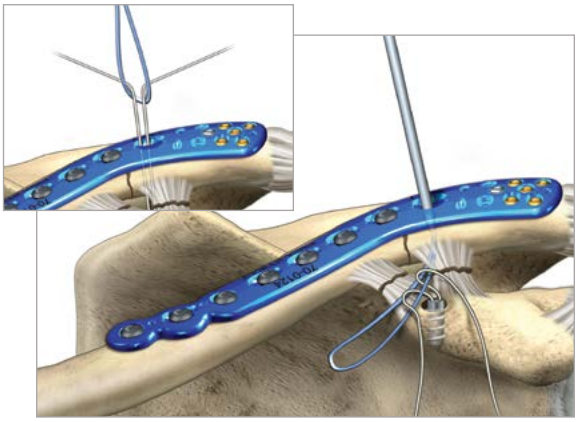
Identify the slot(s) to tie the suture above. If two anchors are used, make sure to keep these slots unfilled while inserting nonlocking screws into the remaining compression slots. Using a 2.8 mm drill under power, center the drill in a slot and drill through both cortices of the clavicle. When drilling through the slot(s), use precaution to protect the suture from the drill bit and to avoid damage of neurovascular structures.

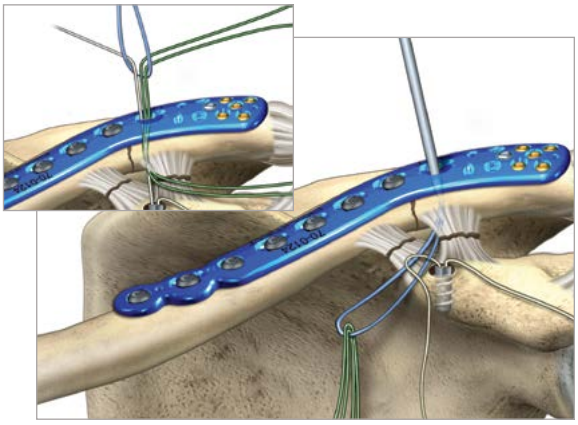


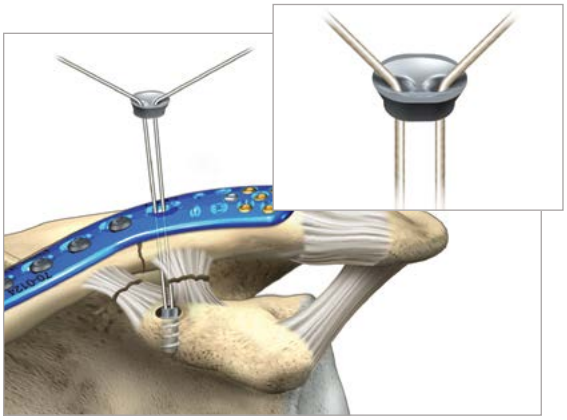
10 SUTURE PASSING

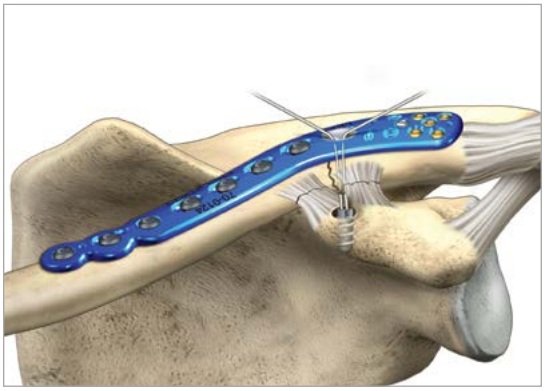
If using a standard knot tying technique, use a suture retriever to pull both suture strands superiorly from the anchor through one hole in the clavicle and one plate slot. If two anchors are used, repeat suture passing with the second strands.

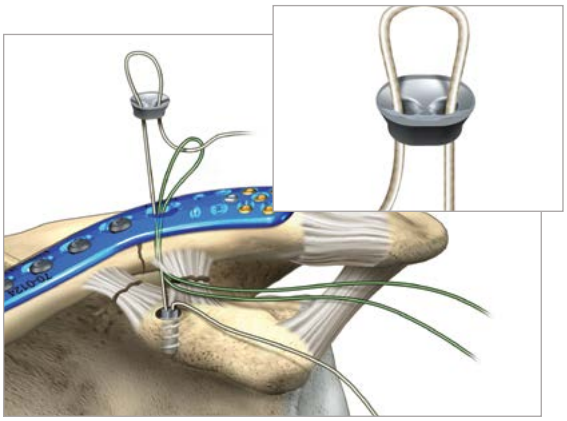
If using a subclavian knot tying technique, use a suture retriever to pull one of the suture strands superiorly from the anchor through one hole in the clavicle and plate slot. A second suture loop (#2 is recommended but is not provided as part of the Acu-Sinch Repair System) can be pulled through the clavicle at the same time to be used as a shuttle to pass the suture through the clavicle in the next step. If two anchors are used, repeat suture passing for the second location.

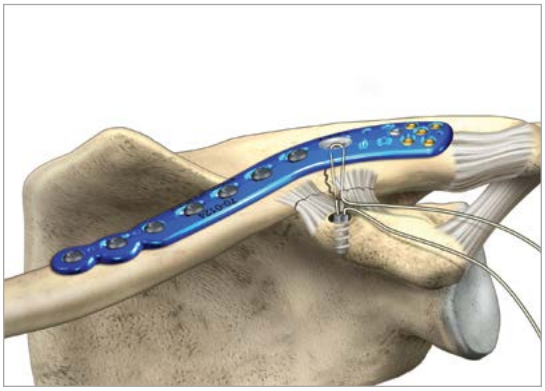












11 SUTURE RETAINER ASSEMBLY, REDUCTION, AND KNOT TYING

If using a standard knot tying technique, orient the suture retainer with the concave surface facing away from the plate. Pass the suture strand ends through the holes on the flat side of the suture retainer(s). Slide the suture retainer into the plate slot(s) to sit flush with the top surface of the plate. Make sure that the suture is not twisted prior to seating the retainer into the plate.

If using a subclavian knot tying technique, orient the suture retainer with the concave surface facing away from the plate. Pass the suture strand end from the Acu-Sinch Anchor through one hole on the flat side of the suture retainer and then back down the other hole in the retainer. Then pass the suture end through the shuttle loop of the additional #2 suture and using that loop, pull through the clavicle. Slide the suture retainer into the plate slot to sit flush with the top surface of the plate. Make sure that there is no suture slack and that the suture is not twisted prior to seating the retainer into the plate. If two anchors are used, repeat for the second location.

For either knot tying technique, pull on the suture to get the proper tension and reduction, and secure the suture with a surgeon's knot and at least three additional reversing half hitches. A knot pusher may be required to apply the proper tension to the suture and to sit the knot down to achieve good knot security. This step completes the reduction and stabilization of the clavicle.

Note: Precautions should be taken when positioning the suture knot to avoid soft tissue irritation when closing the incision with the standard knot tying technique. Meticulous deltotrapezial fascia closure over the knot will help minimize skin irritation.

12 WOUND CLOSURE AND POST-OP PROTOCOL

An intraoperative radiograph is recommended to check the position of the screws and the final reduction of the fracture. After radiographic evaluation and routine irrigation, the trapezial-deltoid fascia is closed over the clavicle and AC joint, followed by closure of the subcutaneous tissue and skin. The wound is dressed and the arm placed in an abduction pillow to bring the arm up and to decrease gravitational forces of the arm of fixation construct.

Post-op Protocol

Passive range of motion exercises are initiated during the first four weeks in a supine position. The goal is to neutralize gravitation forces as much as possible in the first six weeks after surgery. To this extent, shoulder immobilizer with 70° abduction pillow could be useful. Exercises may include pendulum, Codman, isometrics for biceps and rotator cuff, and elbow and wrist motion. It should be emphasized to patients that they must avoid any activity involving lifting, pushing or pulling in the first six weeks post-surgery. Depending on the amount of comminution and the stability of fixation, active assisted exercise is started from four to six weeks, and active strengthening is initiated at six to eight weeks postoperatively, once healing is seen radiographically. Full return to activities is permitted once healing has occurred and patient shows painless range of motion and good strength.

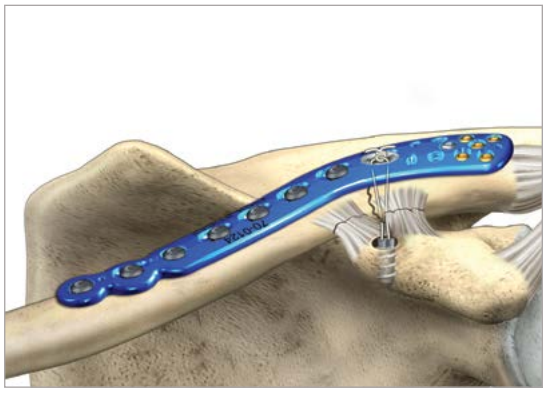
Tip: Due to risk of refracture, implant removal is generally not recommended before one year after ORIF. If plate removal is performed, please note that the suture retainer and suture must be removed. Removal of the suture anchor is generally not recommended.

Contraindications

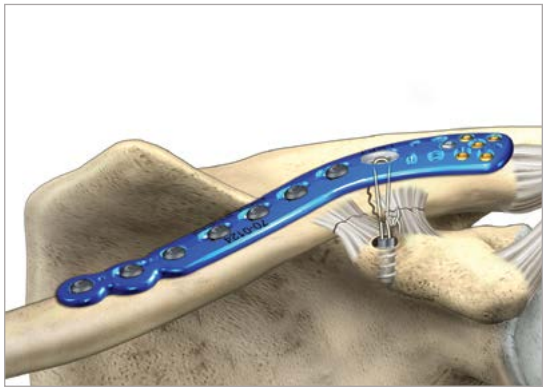
Contraindications for the system are active or latent infection; sepsis; osteoporosis; insufficient quantity or quality of bone and/ or soft tissue; and material sensitivity. If sensitivity is suspected, tests are to be performed prior to implantation. Patients who are unwilling or incapable of following postoperative care instructions are contraindicated for these devices. The system may not be suitable for skeletally immature patients and must not disturb the growth plate.

The device is not indicated as a sole treatment for chronic ligament and tendon injuries.

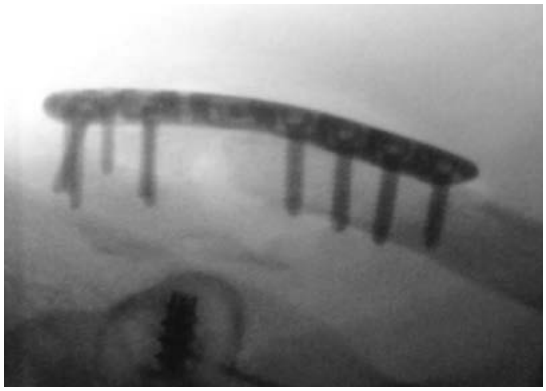
Note: Irritation above the clavicle is possible due to the little soft tissue coverage over the Superior Distal Clavicle Plate in some patients.



Standard Knot Tying Technique (knot is above the clavicle)



Subclavian Knot Tying Technique (knot is below the clavicle)



Removal

To remove the Acu-Sinch Repair System, ensure that an Acu-Sinch Removal System (15-0109) is available. Begin by first removing the Acumed FlexBraid™ Suture by cutting it with a knife or scissors. It is recommended to cut only one strand to facilitate easier removal of the complete suture. Once the suture has been pulled out, the Suture Retainer can then be removed from the plate. Next, remove the Acumed Clavicle Plate and screws using the standard instrumentation. Removal of the anchor is generally not recommended, however if it must be removed, engage the Acu-Sinch Removal Driver AO Shaft (80-1950) connected to the Quick Release Handle (MS-1210) with the anchor and turn counter clockwise.

Note: If bony ingrowth has occurred around the Acu-Sinch Anchor in the coracoid, use the provided Acutrak 2® 5.5 Trephine (80-0214) to remove bone around the anchor.

Ordering Information

Superior Midshaft Clavicle Plates

Low-Profile Clavicle Plate, 8-Hole, Left, 88 mm	70-0286
Low-Profile Clavicle Plate, 8-Hole, Right, 88 mm	70-0287
Low-Profile Clavicle Plate, 8-Hole, Large, Left, 98 mm	70-0288
Low-Profile Clavicle Plate, 8-Hole, Large, Right, 98 mm	70-0289
Low-Profile Clavicle Plate, 8-Hole, Medium, Left, 94 mm	70-0290
Low-Profile Clavicle Plate, 8-Hole, Medium, Right, 94 mm	70-0291
Low-Profile Clavicle Plate, 8-Hole, Small, Left, 87 mm	70-0292
Low-Profile Clavicle Plate, 8-Hole, Small, Right, 87 mm	70-0293
Low-Profile Clavicle Plate, 10-Hole, Left, 121 mm	70-0294
Low-Profile Clavicle Plate, 10-Hole, Right, 121 mm	70-0295
Narrow-Profile Clavicle Plate, 6-Hole, Left, 74 mm	70-0296
Narrow-Profile Clavicle Plate, 6-Hole, Right, 74 mm	70-0297
Narrow-Profile Clavicle Plate, 8-Hole, Straight, Left, 87 mm	70-0298
Narrow-Profile Clavicle Plate, 8-Hole, Straight, Right, 87 mm	70-0299
Narrow-Profile Clavicle Plate, 8-Hole, Large, Left, 96 mm	70-0300
Narrow-Profile Clavicle Plate, 8-Hole, Large, Right, 96 mm	70-0301

4.0 mm Cancellous Screws

4.0 mm x 12 mm Cancellous Screw	CA-4120
4.0 mm x 14 mm Cancellous Screw	CA-4140
4.0 mm x 16 mm Cancellous Screw	CA-4160
4.0 mm x 18 mm Cancellous Screw	CA-4180
4.0 mm x 20 mm Cancellous Screw	CA-4200
4.0 mm x 22 mm Cancellous Screw	CA-4220
4.0 mm x 24 mm Cancellous Screw	CA-4240
4.0 mm x 26 mm Cancellous Screw	CA-4260
4.0 mm x 28 mm Cancellous Screw	CA-4280
4.0 mm x 30 mm Cancellous Screw	CA-4300
4.0 mm x 35 mm Cancellous Screw	CA-4350
4.0 mm x 40 mm Cancellous Screw	CA-4400
4.0 mm x 45 mm Cancellous Screw	CA-4450
4.0 mm x 50 mm Cancellous Screw	CA-4500
4.0 mm x 55 mm Cancellous Screw	CA-4550
4.0 mm x 60 mm Cancellous Screw	CA-4600

Anterior Clavicle Plates

Lateral Anterior Clavicle Plate, 8-Hole, 95 mm	70-0118
Medial Anterior Clavicle Plate, 8-Hole, 95 mm	70-0119
Medial Anterior Clavicle Plate, 6-Hole, 76 mm	70-0120
Anterior Clavicle Plate, 10-Hole, 115 mm	70-0121
Lateral Anterior Clavicle Plate, 6-Hole, 75 mm	70-0122

Ordering Information

Superior Distal Clavicle Plates

Distal Clavicle Plate 3.5 mm, 12-Hole, Right, 101 mm	70-0111
Distal Clavicle Plate 3.5 mm, 12-Hole, Left, 101 mm	70-0112
Distal Clavicle Plate 3.5 mm, 9-Hole, Right, 68 mm	70-0116
Distal Clavicle Plate 3.5 mm, 9-Hole, Left, 68 mm	70-0117
Distal Clavicle Plate 2.3 mm, 16-Hole, Right, 101 mm	70-0123
Distal Clavicle Plate 2.3 mm, 16-Hole, Left, 101 mm	70-0124
Distal Clavicle Plate 2.3 mm, 13-Hole, Right, 68 mm	70-0125
Distal Clavicle Plate 2.3 mm, 13-Hole, Left, 68 mm	70-0126
Low-Profile Clavicle J-Plate, 8-Hole, Left, 64 mm	70-0319
Low Profile Clavicle J-Plate, 8-Hole, Right, 64 mm	70-0320

Optional Superior Distal Clavicle Plates—Sterile Only

Distal Clavicle Plate 3.5 mm, 16-Hole, Left, 140 mm	7002-0416L-S
Distal Clavicle Plate 3.5 mm, 16-Hole, Right, 140 mm	7002-0416R-S

Acu-Sinch® Repair System

Acu-Sinch® Kit	46-0001-S

3.5 mm Cortical (Hex) Screw Instrumentation

2.8 mm Quick Release Surgibit® Drill	80-0387
3.5 mm x 5″ Quick Release Surgibit® Drill	MS-DC35
3.5 mm Locking Drill Guide	MS-LDG35
2.5 mm Quick Release Hex Driver	HPC-0025
3.5 mm Screw Driver Sleeve	MS-SS35

Ordering Information

3.5 mm Cortical Screws

3.5 mm x 6 mm Cortical Screw	CO-3060
3.5 mm x 8 mm Cortical Screw	CO-3080
3.5 mm x 10 mm Cortical Screw	CO-3100
3.5 mm x 12 mm Cortical Screw	CO-3120
3.5 mm x 14 mm Cortical Screw	CO-3140
3.5 mm x 16 mm Cortical Screw	CO-3160
3.5 mm x 18 mm Cortical Screw	CO-3180
3.5 mm x 20 mm Cortical Screw	CO-3200
3.5 mm x 22 mm Cortical Screw	CO-3220
3.5 mm x 24 mm Cortical Screw	CO-3240
3.5 mm x 26 mm Cortical Screw	CO-3260
3.5 mm x 28 mm Cortical Screw	CO-3280
3.5 mm x 30 mm Cortical Screw	CO-3300
3.5 mm x 32 mm Cortical Screw	CO-3320
3.5 mm x 34 mm Cortical Screw	CO-3340
3.5 mm x 36 mm Cortical Screw	CO-3360
3.5 mm x 38 mm Cortical Screw	CO-3380
3.5 mm x 40 mm Cortical Screw	CO-3400
3.5 mm x 45 mm Cortical Screw	CO-3450
3.5 mm x 50 mm Cortical Screw	CO-3500
3.5 mm x 55 mm Cortical Screw	CO-3550
3.5 mm x 60 mm Cortical Screw	CO-3600
3.5 mm x 65 mm Cortical Screw	CO-3650

3.5 mm Locking Cortical Screws

3.5 mm x 6 mm Locking Cortical Screw	COL-3060
3.5 mm x 8 mm Locking Cortical Screw	COL-3080
3.5 mm x 10 mm Locking Cortical Screw	COL-3100
3.5 mm x 12 mm Locking Cortical Screw	COL-3120
3.5 mm x 14 mm Locking Cortical Screw	COL-3140
3.5 mm x 16 mm Locking Cortical Screw	COL-3160
3.5 mm x 18 mm Locking Cortical Screw	COL-3180
3.5 mm x 20 mm Locking Cortical Screw	COL-3200
3.5 mm x 22 mm Locking Cortical Screw	COL-3220
3.5 mm x 24 mm Locking Cortical Screw	COL-3240
3.5 mm x 26 mm Locking Cortical Screw	COL-3260
3.5 mm x 28 mm Locking Cortical Screw	COL-3280
3.5 mm x 30 mm Locking Cortical Screw	COL-3300
3.5 mm x 32 mm Locking Cortical Screw	COL-3320
3.5 mm x 34 mm Locking Cortical Screw	COL-3340
3.5 mm x 36 mm Locking Cortical Screw	COL-3360
3.5 mm x 38 mm Locking Cortical Screw	COL-3380
3.5 mm x 40 mm Locking Cortical Screw	COL-3400
3.5 mm x 45 mm Locking Cortical Screw	COL-3450
3.5 mm x 50 mm Locking Cortical Screw	COL-3500
3.5 mm x 55 mm Locking Cortical Screw	COL-3550
3.5 mm x 60 mm Locking Cortical Screw	COL-3600
3.5 mm x 65 mm Locking Cortical Screw	COL-3650

Ordering Information

3.5 mm Hexalobe Screw Instrumentation

2.8 mm Quick Release Surgibit® Drill	80-0387
3.5 mm x 5″ Quick Release Surgibit® Drill	MS-DC35
2.8 mm Hexalobe Locking Drill Guide 6-65 mm	80-0668
T15 Stick Fit Hexalobe Driver	80-0760
T15 6 in Long Stick Fit Hexalobe Driver	80-1065

3.0 mm Hexalobe Screw Instrumentation

2.3 mm Quick Release Surgibit® Drill	80-0627
3.0 mm x 5″ Quick Release Surgibit® Drill	80-1088
2.3 mm Hexalobe Locking Drill Guide 6-65 mm	80-0622
T15 Stick Fit Hexalobe Driver	80-0760
T15 6 in Long Stick Fit Hexalobe Driver	80-1065

3.5 mm Locking Hexalobe Screws

3.5 mm x 8 mm Locking Hexalobe Screw	30-0232
3.5 mm x 10 mm Locking Hexalobe Screw	30-0233
3.5 mm x 12 mm Locking Hexalobe Screw	30-0234
3.5 mm x 14 mm Locking Hexalobe Screw	30-0235
3.5 mm x 16 mm Locking Hexalobe Screw	30-0236
3.5 mm x 18 mm Locking Hexalobe Screw	30-0237
3.5 mm x 20 mm Locking Hexalobe Screw	30-0238
3.5 mm x 22 mm Locking Hexalobe Screw	30-0239
3.5 mm x 24 mm Locking Hexalobe Screw	30-0240
3.5 mm x 26 mm Locking Hexalobe Screw	30-0241

3.0 mm Locking Hexalobe Screws

3.0 mm x 8 mm Locking Hexalobe Screw	30-0278
3.0 mm x 10 mm Locking Hexalobe Screw	30-0279
3.0 mm x 12 mm Locking Hexalobe Screw	30-0280
3.0 mm x 14 mm Locking Hexalobe Screw	30-0281
3.0 mm x 16 mm Locking Hexalobe Screw	30-0282
3.0 mm x 18 mm Locking Hexalobe Screw	30-0283
3.0 mm x 20 mm Locking Hexalobe Screw	30-0284
3.0 mm x 22 mm Locking Hexalobe Screw	30-0285
3.0 mm x 24 mm Locking Hexalobe Screw	30-0286
3.0 mm x 26 mm Locking Hexalobe Screw	30-0287

3.5 mm Nonlocking Hexalobe Screws

3.5 mm x 8 mm Nonlocking Hexalobe Screw	30-0255
3.5 mm x 10 mm Nonlocking Hexalobe Screw	30-0256
3.5 mm x 12 mm Nonlocking Hexalobe Screw	30-0257
3.5 mm x 14 mm Nonlocking Hexalobe Screw	30-0258
3.5 mm x 16 mm Nonlocking Hexalobe Screw	30-0259
3.5 mm x 18 mm Nonlocking Hexalobe Screw	30-0260
3.5 mm x 20 mm Nonlocking Hexalobe Screw	30-0261
3.5 mm x 22 mm Nonlocking Hexalobe Screw	30-0262
3.5 mm x 24 mm Nonlocking Hexalobe Screw	30-0263
3.5 mm x 26 mm Nonlocking Hexalobe Screw	30-0264

3.0 mm Nonlocking Hexalobe Screws

3.0 mm x 8 mm Nonlocking Hexalobe Screw	30-0301
3.0 mm x 10 mm Nonlocking Hexalobe Screw	30-0302
3.0 mm x 12 mm Nonlocking Hexalobe Screw	30-0303
3.0 mm x 14 mm Nonlocking Hexalobe Screw	30-0304
3.0 mm x 16 mm Nonlocking Hexalobe Screw	30-0305
3.0 mm x 18 mm Nonlocking Hexalobe Screw	30-0306
3.0 mm x 20 mm Nonlocking Hexalobe Screw	30-0307
3.0 mm x 22 mm Nonlocking Hexalobe Screw	30-0308
3.0 mm x 24 mm Nonlocking Hexalobe Screw	30-0309
3.0 mm x 26 mm Nonlocking Hexalobe Screw	30-0310

Ordering Information

2.7 mm Cortical (Hex) Screw Instrumentation

2.0 mm x 5″ Quick Release Surgibit® Drill	MS-DC5020
2.8 mm x 5″ Quick Release Surgibit® Drill	MS-DC28
2.7 Locking Drill Guide	MS-LDG27
2.5 mm Quick Release Hex Driver	HPC-0025

2.7 mm Cortical Screws

2.7 mm x 8 mm Cortical Screw	CO-2708
2.7 mm x 10 mm Cortical Screw	CO-2710
2.7 mm x 12 mm Cortical Screw	CO-2712
2.7 mm x 14 mm Cortical Screw	CO-2714
2.7 mm x 16 mm Cortical Screw	CO-2716
2.7 mm x 18 mm Cortical Screw	CO-2718
2.7 mm x 20 mm Cortical Screw	CO-2720
2.7 mm x 22 mm Cortical Screw	CO-2722
2.7 mm x 24 mm Cortical Screw	CO-2724
2.7 mm x 26 mm Cortical Screw	CO-2726
2.7 mm x 28 mm Cortical Screw	CO-2728
2.7 mm x 30 mm Cortical Screw	CO-2730
2.7 mm x 32 mm Cortical Screw	CO-2732
2.7 mm x 34 mm Cortical Screw	CO-2734
2.7 mm x 36 mm Cortical Screw	CO-2736
2.7 mm x 38 mm Cortical Screw	CO-2738
2.7 mm x 40 mm Cortical Screw	CO-2740
2.7 mm x 45 mm Cortical Screw	CO-2745
2.7 mm x 50 mm Cortical Screw	CO-2750
2.7 mm x 55 mm Cortical Screw	CO-2755
2.7 mm x 60 mm Cortical Screw	CO-2760
2.7 mm x 65 mm Cortical Screw	CO-2765

2.7 mm Locking Cortical Screws

2.7 mm x 8 mm Locking Cortical Screw	COL-2080
2.7 mm x 10 mm Locking Cortical Screw	COL-2100
2.7 mm x 12 mm Locking Cortical Screw	COL-2120
2.7 mm x 14 mm Locking Cortical Screw	COL-2140
2.7 mm x 16 mm Locking Cortical Screw	COL-2160
2.7 mm x 18 mm Locking Cortical Screw	COL-2180
2.7 mm x 20 mm Locking Cortical Screw	COL-2200
2.7 mm x 22 mm Locking Cortical Screw	COL-2220
2.7 mm x 24 mm Locking Cortical Screw	COL-2240
2.7 mm x 26 mm Locking Cortical Screw	COL-2260
2.7 mm x 28 mm Locking Cortical Screw	COL-2280
2.7 mm x 30 mm Locking Cortical Screw	COL-2300
2.7 mm x 32 mm Locking Cortical Screw	COL-2320
2.7 mm x 34 mm Locking Cortical Screw	COL-2340
2.7 mm x 36 mm Locking Cortical Screw	COL-2360
2.7 mm x 38 mm Locking Cortical Screw	COL-2380
2.7 mm x 40 mm Locking Cortical Screw	COL-2400
2.7 mm x 45 mm Locking Cortical Screw	COL-2450
2.7 mm x 50 mm Locking Cortical Screw	COL-2500
2.7 mm x 55 mm Locking Cortical Screw	COL-2550
2.7 mm x 60 mm Locking Cortical Screw	COL-2600
2.7 mm x 65 mm Locking Cortical Screw	COL-2650

Optional Hexalobe Screw Caddies

3.5 mm Hexalobe Short Screw Caddy	80-0843
3.5 mm Hexalobe Short Screw Caddy Lid	80-0856
3.0 mm Hexalobe Short Screw Caddy	80-1066
3.0 mm Hexalobe Short Screw Caddy Lid	80-1067

Ordering Information

2.3 mm Screw Instrumentation

2.0 mm Quick Release Surgibit® Drill	80-0318
3.0 mm Locking Drill Guide 4 mm–32 mm	80-0249
1.5 mm Hex Driver Tip	HPC-0015
Cruciform Driver Handle	MS-2210
2.3 mm Screw Sleeve	MS-SS23
Targeting Guide, Distal Clavicle Plate, Right	80-0450
Targeting Guide, Distal Clavicle Plate, Left	80-0451
.035″ Depth Probe	80-0357

2.3 mm Locking Cortical Screws

2.3 mm x 8 mm Locking Cortical Screw	CO-T2308
2.3 mm x 10 mm Locking Cortical Screw	CO-T2310
2.3 mm x 12 mm Locking Cortical Screw	CO-T2312
2.3 mm x 14 mm Locking Cortical Screw	CO-T2314
2.3 mm x 16 mm Locking Cortical Screw	CO-T2316
2.3 mm x 18 mm Locking Cortical Screw	CO-T2318
2.3 mm x 20 mm Locking Cortical Screw	CO-T2320
2.3 mm x 22 mm Locking Cortical Screw	CO-T2322
2.3 mm x 24 mm Locking Cortical Screw	CO-T2324
2.3 mm x 26 mm Locking Cortical Screw	CO-T2326

2.3 mm Non-Toggling (Nonlocking) Cortical Screws

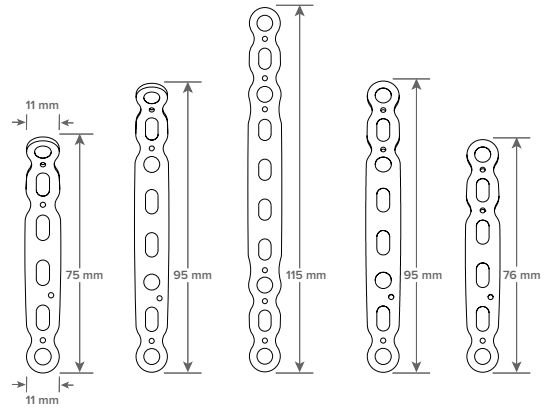
2.3 mm x 8 mm Non-Toggling Cortical Screw	CO-N2308
2.3 mm x 10 mm Non-Toggling Cortical Screw	CO-N2310
2.3 mm x 12 mm Non-Toggling Cortical Screw	CO-N2312
2.3 mm x 14 mm Non-Toggling Cortical Screw	CO-N2314
2.3 mm x 16 mm Non-Toggling Cortical Screw	CO-N2316
2.3 mm x 18 mm Non-Toggling Cortical Screw	CO-N2318
2.3 mm x 20 mm Non-Toggling Cortical Screw	CO-N2320
2.3 mm x 22 mm Non-Toggling Cortical Screw	CO-N2322
2.3 mm x 24 mm Non-Toggling Cortical Screw	CO-N2324
2.3 mm x 26 mm Non-Toggling Cortical Screw	CO-N2326

General Instrumentation

Plate Tack	PL-PTACK
.045″ x 6″ ST Guide Wire	WS-1106ST
.059″ x 5″ ST Guide Wire	WS-1505ST
Clavicle Retractor	PL-CL03
Plate Clamp	80-0223
2.0 mm x 5″ Quick Release Surgibit® Drill	MS-DC5020
2.8 mm x 5″ Quick Release Surgibit® Drill	MS-DC28
Drill Guide for Distal Screws (2.3 mm)	MS-LDG23
Depth Gauge 6-65 mm	80-0623
2.5 mm Flexible Hex Driver	80-0302
2.5 mm Solid, Quick Release, Driver Tip	80-0302
Quick Release Handle	MS-1210
Large Cannulated Quick Release Driver Handle	MS-3200
Offset Drill Guide	PL-2095
Reduction Forceps with Serrated Jaw	PL-CL04
2.8 mm/3.5 mm Lag Guide	MS-DS2835
2.0 mm/2.8 mm Thin Drill Guide	PL-2118
2.8 mm/3.5 mm Thin Drill Guide	PL-2196
Sharp Hook	PL-CL06
3.5 mm Tap Sleeve Assembly	PL-2190
CO/CA Screw Countersink	PL-2080
Periosteal Elevator	MS-46212
15 mm Hohman Retractor	MS-46827
Freer Elevator, 7.5	MS-57614
6 mm–70 mm Depth, Gauge 2 mm Increments	MS-9022
Small Pointed Reduction Forceps	OW-1200
2.7 mm Cortical Screw Bone Tap	MS-LTT27
3.5 mm Cortical Screw Bone Tap	MS-LTT35
Plate Bender	PL-2040
Plate Bender, Large	PL-2045

Clavicle Plating Diagrams

Anterior Medial and Lateral Clavicle Plates



70-0122
6-Hole Lateral
Anterior Clavicle
Plate

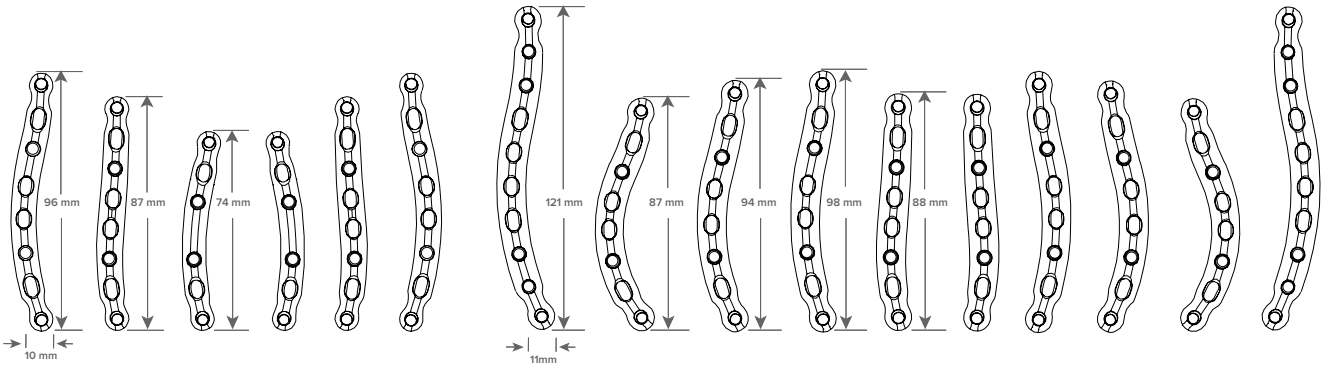
70-0118
8-Hole Lateral
Anterior Clavicle
Plate

70-0121
10-Hole Anterior
Clavicle Plate

70-0119
8-Hole Medial
Anterior Clavicle
Plate

70-0120
6-Hole Medial
Anterior Clavicle
Plate

Low and Narrow-profile Superior Midshaft Clavicle Plates



70-0300
Nrw-Prof.
8-Hole
Large
Left

70-0298
Nrw-Prof.
8-Hole
Straight
Left

70-0296
Nrw-Prof.
6-Hole
Left

70-0297
Nrw-Prof.
6-Hole
Right

70-0299
Nrw-Prof.
8-Hole
Straight
Right

70-0301
Nrw-Prof.
8-Hole
Large
Right

70-0294
Low-profile
10-Hole
Left

70-0292
Low-profile
8-Hole
Small
Left

70-0290
Low-profile
8-Hole
Medium
Left

70-0288
Low-profile
8-Hole
Large
Left

70-0286
Low-profile
8-Hole
Straight
Left

70-0287
Low-profile
8-Hole
Straight
Right

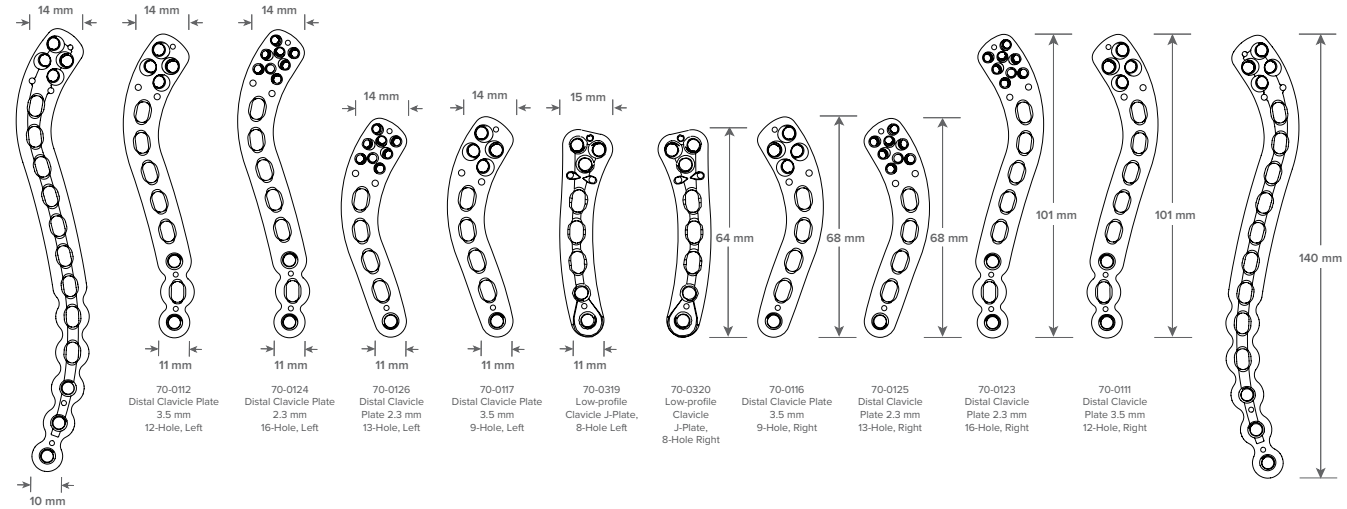
70-0289
Low-profile
8-Hole
Large
Right

70-0291
Low-profile
8-Hole
Medium
Right

70-0293
Low-profile
8-Hole
Small
Right

70-0295
Low-profile
10-Hole
Right

Superior Distal Clavicle Plates



7002-0416L-S
Distal Clavicle Plate
3.5 mm
16-Hole, Left
Sterile

70-0112
Distal Clavicle Plate
3.5 mm
12-Hole, Left

70-0124
Distal Clavicle Plate
2.3 mm
16-Hole, Left

70-0126
Distal Clavicle
Plate 2.3 mm
13-Hole, Left

70-0117
Distal Clavicle Plate
3.5 mm
9-Hole, Left

70-0319
Low-profile
Clavicle J-Plate,
8-Hole Left

70-0320
Low-profile
Clavicle
J-Plate,
8-Hole Right

70-0116
Distal Clavicle Plate
3.5 mm
9-Hole, Right

70-0125
Distal Clavicle
Plate 2.3 mm
13-Hole, Right

70-0123
Distal Clavicle
Plate 2.3 mm
16-Hole, Right

70-0111
Distal Clavicle
Plate 3.5 mm
12-Hole, Right

7002-0416R-S
Distal Clavicle Plate
3.5 mm
16-Hole, Right
Sterile

SHD10-02-D
E ective: 12/2013

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