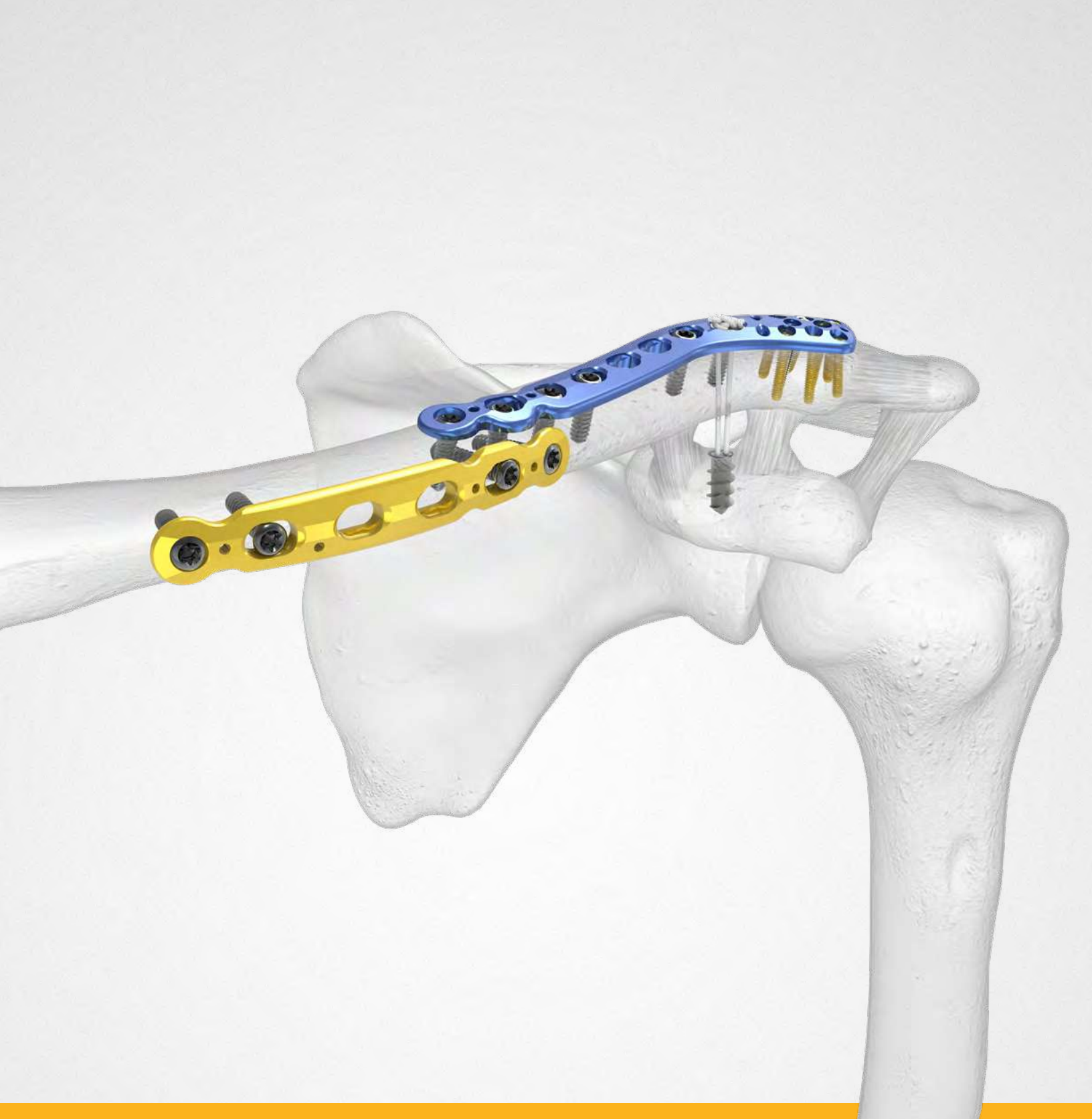
acumed®

Clavicle Plating System

Acu-Sinch® Repair System

Surgical Technique



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

Acu-Sinch® Repair System

The Acumed Clavicle Plating System is designed to treat simple and complex fractures, malunions, and nonunions. The system offers an array of low- and narrow-profile plate solutions, precontoured to match the natural S-shape of the clavicle. This design could help reduce surgery time spent contouring a plate and may aid in minimizing soft tissue irritation for the patient.

The system can be used with either Acumed hex or hexalobe screws.

The Acumed 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.

Indications for Use:

The Acumed Clavicle Plating System is intended to provide fixation for fractures, malunions, and nonunions of the clavicle.

The Acu-Sinch Repair System is intended to be used in conjunction with the Clavicle Plating System to provide fixation during the healing of clavicle fractures.

	Definition
Warning	Indicates critical information about a potential serious outcome to the patient or the user.
Caution	Indicates instructions that must be followed in order to ensure the proper use of the device.
Note	Indicates information requiring special attention.

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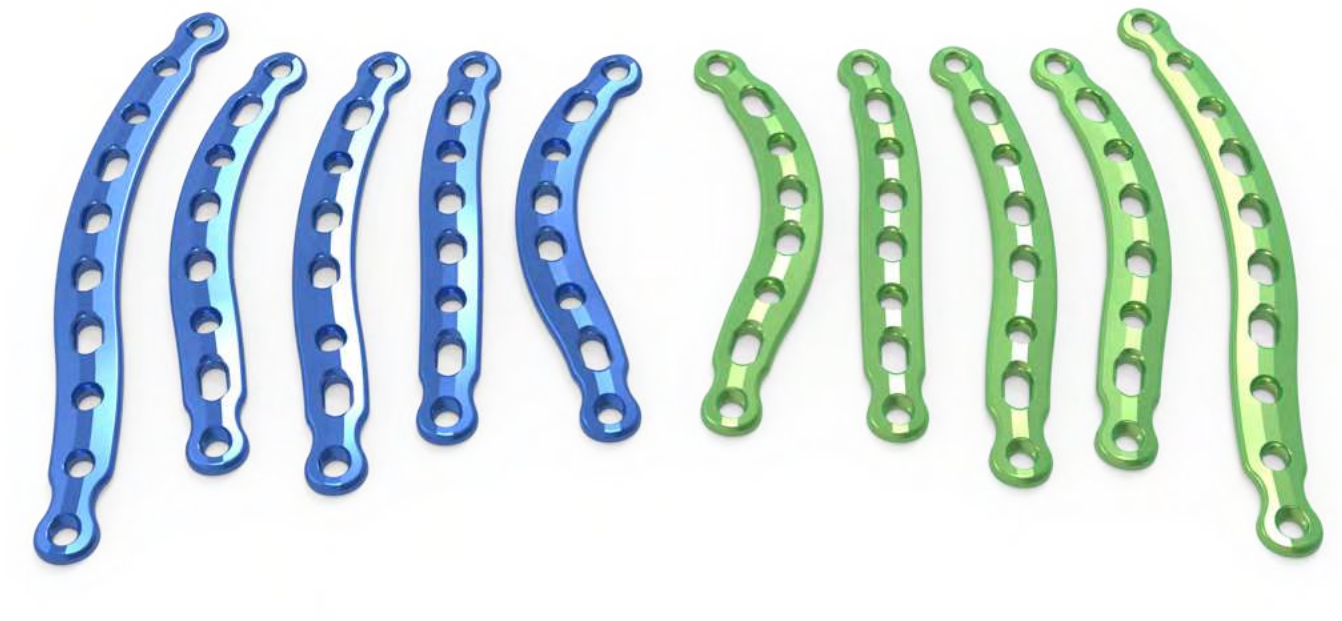
System Features

Plating System

Low-profile Superior Midshaft

Ten Low-profile Superior Midshaft Plates offered in five lengths designed 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

System Features [continued]

Anterior Medial and Lateral

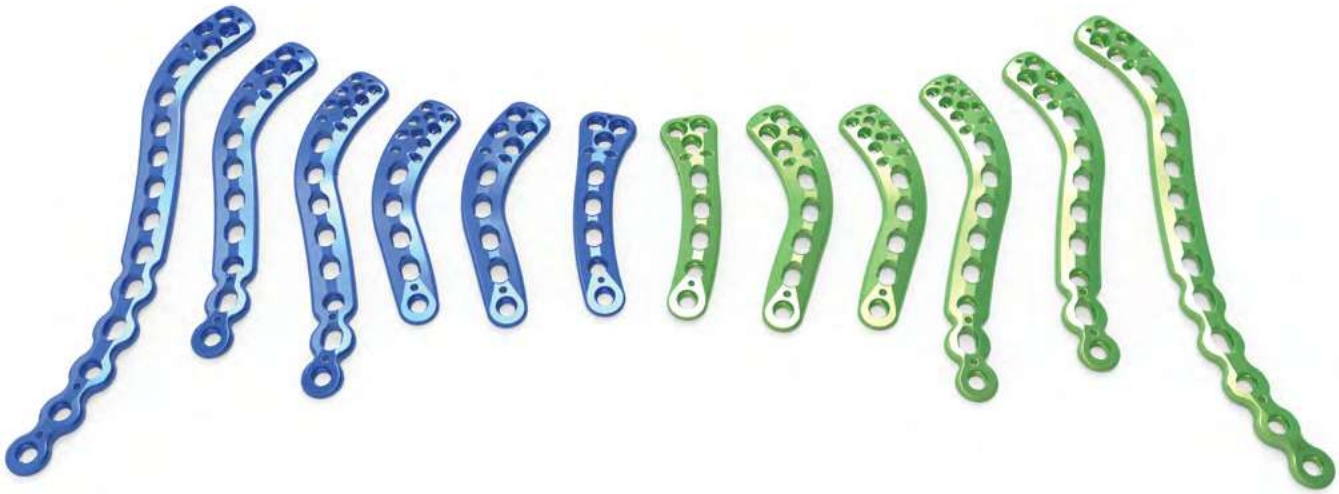
Five Anterior Plates designed for complex oblique fracture patterns as well as for surgeons who prefer an anterior approach.

Shortest Plate: 75 mm
Longest Plate: 115 mm

Superior Distal

Twelve 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.

System Features [continued]

Plate Design

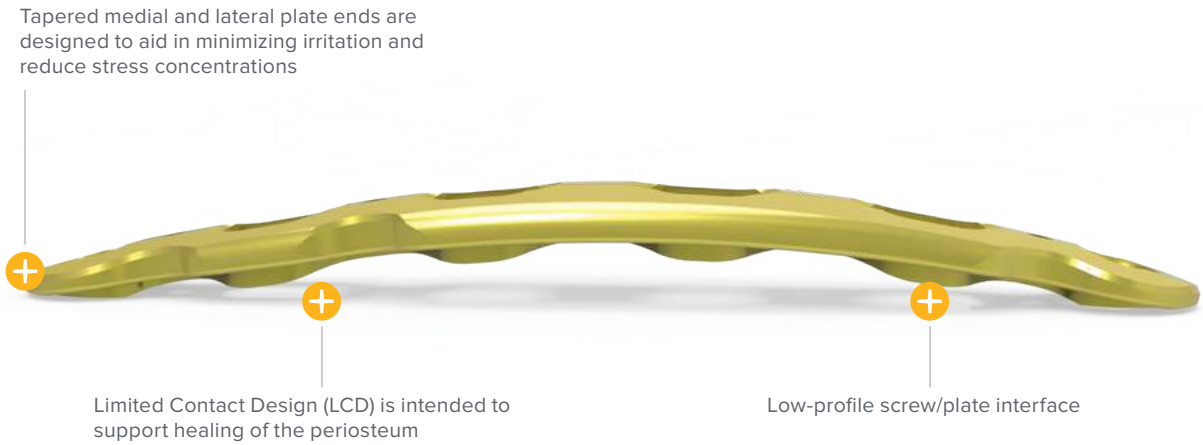
Superior Distal Clavicle Plates

Low-profile Superior Midshaft Plates

Narrow-profile Superior Midshaft Plates

System Features [continued]

Anterior Clavicle Plates—Side



Anterior Clavicle Plates—Top

System Features [continued]

Screw Options

Superior Midshaft, Anterior, and Superior Distal Clavicle Plates

Hexalobe Screws

3.0 mm Locking Hexalobe Screw
8 mm–26 mm
(30-02XX)

3.5 mm Locking Hexalobe Screw
8 mm–26 mm
(30-02XX)

3.0 mm Nonlocking Hexalobe Screw
8 mm–26 mm
(30-03XX)

3.5 mm Nonlocking Hexalobe Screw
8 mm–26 mm
(30-02XX)

Optional Cortical (Hex) Screws*

2.7 mm Locking Cortical (Hex)
Screw 8 mm–65 mm
(COL-2XX0)

3.5 mm Locking Cortical (Hex)
Screw 6 mm–65 mm
(COL-3XX0)

2.7 mm (Nonlocking) Cortical (Hex)
Screw 8 mm–65 mm
(CO-27XX)

3.5 mm (Nonlocking) Cortical (Hex)
Screw 6 mm–65 mm
(CO-3XX0)

4.0 mm Cancellous Screw
12 mm–60 mm
(CA-4XX0)

*The 2.7 mm Cortical Screw and 3.5 mm Cortical Screw lengths of 28–65 mm are intended for use with the Scapula Plating System.

Superior Distal Clavicle Plates Only

Cortical (Hex) Screws

2.3 mm Locking Cortical (Hex) Screw
8 mm–26 mm
(CO-T23XX)

2.3 mm Nontoggling
(Nonlocking) Cortical (Hex) Screw
8 mm–26 mm
(CO-N23XX)

System Features [continued]

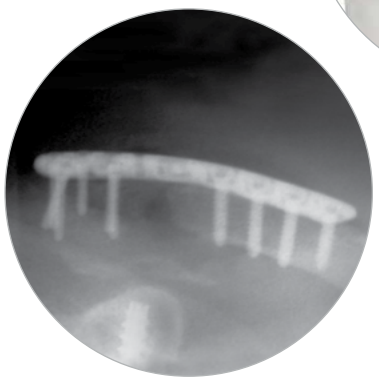
Acu-Sinch® Repair System

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.



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

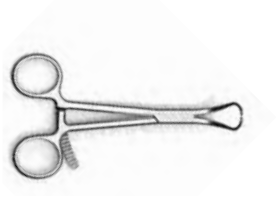
Suture Retainer
Fits into any slot in the Acumed Midshaft Superior or Distal Clavicle Plates

Concave design may minimize the potential for soft tissue irritation

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

Instrument Overview

Reduction Forceps With Serrated Jaw
(PL-CL04)



Small Pointed Reduction Forceps
(OW-1200)

Plate Clamp
(80-0223)

15 mm Hohmann Retractor
(MS-46827)

Periosteal Elevator
(MS-46212)

Freer Elevator, 7.5
(MS-57614)

Quick Release Handle
(MS-1210)

Large Cannulated Quick Release Driver Handle
(MS-3200)

Plate Bender
(PL-2040)

Plate Bender, Large
(PL-2045)

Offset Drill Guide
(PL-2095)

2.0 mm/2.8 mm Thin Drill Guide
(PL-2118)

2.8 mm/3.5 mm Thin Drill Guide
(PL-2196)

Plate Tack
(PL-PTACK)

2.5 mm Quick Release Hex Driver
(HPC-0025)

3.5 mm Cortical Screw Bone Tap
(MS-LTT35)

2.7 mm Cortical Screw Bone Tap
(MS-LTT27)

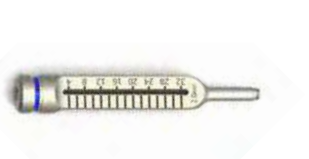
3.5 mm x 5" Quick Release Drill
(MS-DC35)

2.8 mm x 5" Quick Release Drill
(MS-DC28)

2.0 mm x 5" Quick Release Drill
(MS-DC5020)

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

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



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

Instrument Overview [continued]

6 mm–70 mm Depth Gauge, 2 mm Increments
(MS-9022)

2.7 mm Locking Drill Guide
(MS-LDG27)

3.5 mm Locking Drill Guide
(MS-LDG35)

3.5 mm Screw Driver Sleeve
(MS-SS35)

Clavicle Retractor
(PL-CL03)

CO/CA Countersink
(PL-2080)

2.5 mm Solid, Quick Release, Driver Tip
(HT-2502)

2.5 mm Flexible Hex Driver
(80-0302)

2.8 mm/3.5 mm Lag Guide
(MS-DS2835)

Sharp Hook
(PL-CL06)

3.5 mm Tap Sleeve Assembly
(PL-2190)

2.3 mm Screw Sleeve
(MS-SS23)

2.8 mm Quick Release Drill
(80-0387)

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

T15 Stick Fit Hexalobe Driver
(80-0760)

Depth Gauge 6–65 mm
(80-0623)

Cruciform Driver Handle
(MS-2210)

2.0 mm Quick Release Drill
(80-0318)

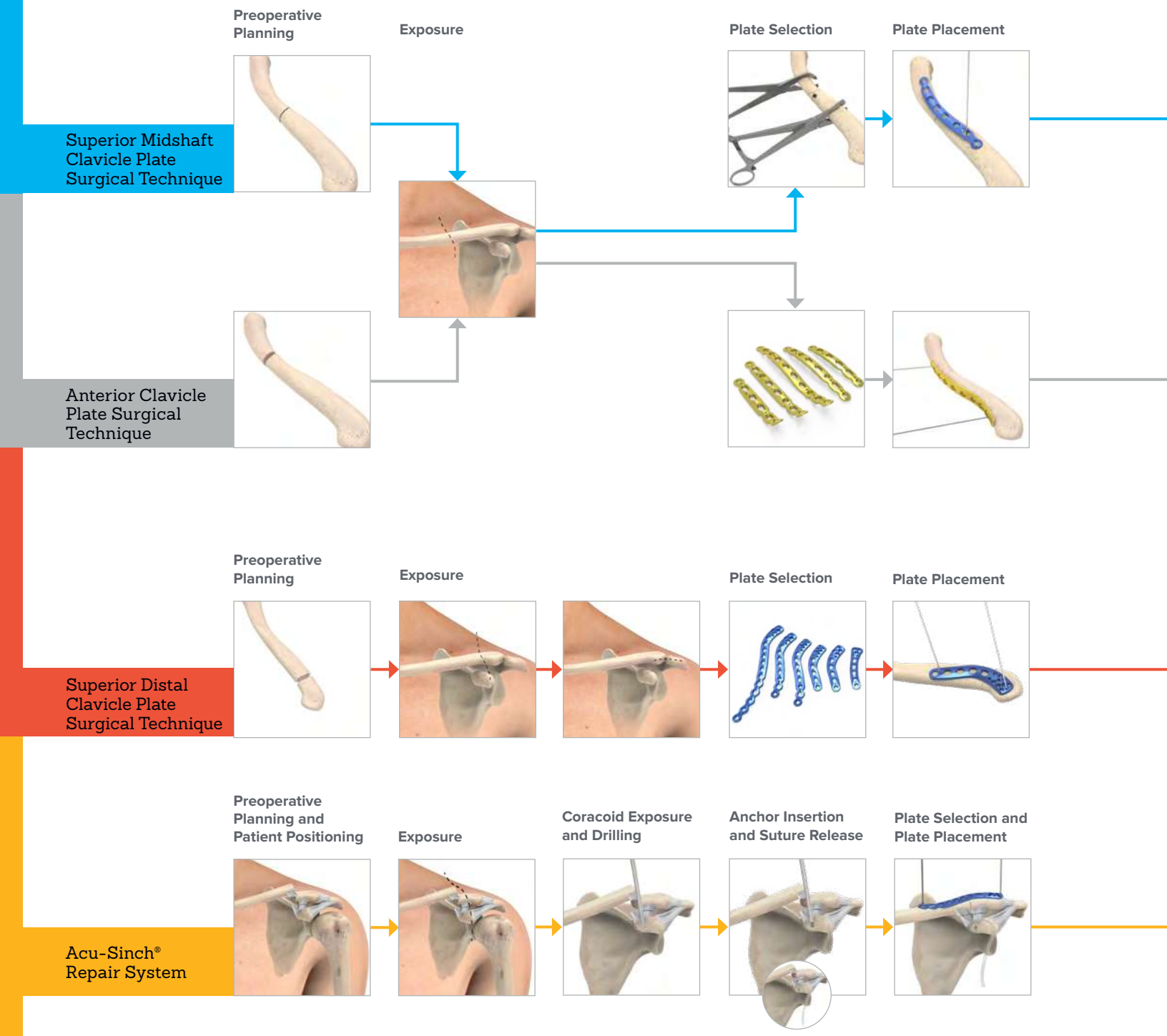
Drill Guide for Distal Screws
(MS-LDG23)

1.5 mm Hex Driver Tip
(HPC-0015)

.059" x 5" ST Guide Wire
(WS-1505ST)

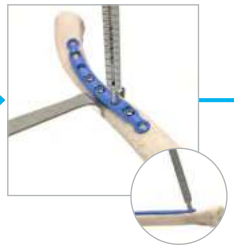
.045" x 6" ST Guide Wire
(WS-1106ST)

Surgical Technique Overview



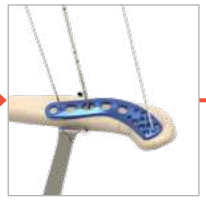
Nonlocking Screw Insertion

Locking Screw Insertion

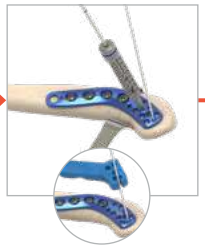


Final Plate and Screw Position

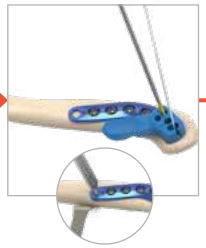
Nonlocking Screw Insertion



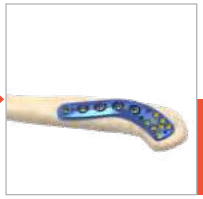
Nonlocking Distal Screw Insertion



Locking Screw Insertion



Final Plate and Screw Position



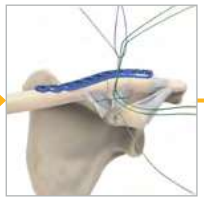
Nonlocking Screw Insertion

Locking Screw Insertion

Drill

Suture Passing

Suture Retainer Assembly, Reduction and Knot Tying



Wound Closure and Post-op

Superior Midshaft Clavicle Plate Surgical Technique

By William B. Geissler, MD

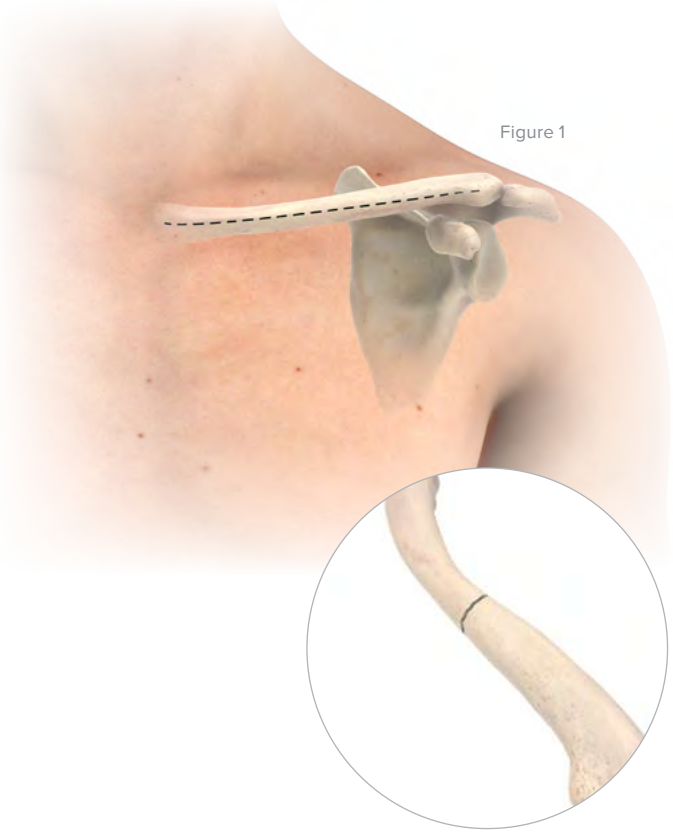


Figure 1

Figure 2

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 posteroanterior (PA) 15° caudal X-ray is suggested to assess the difference compared to the non-injured side.[2]

Preoperative Planning and Patient Positioning

After a thorough radiographic evaluation, place the patient in a beach chair position with the head rotated and tilted 5 to 10 degrees away from the operative side. Place a bolster 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. Prep the patient's involved upper extremity and drape in a sterile fashion, allowing the arm to be manipulated to help further reduce the fracture if required.

Superior Midshaft Clavicle Plate Surgical Technique [continued]

2 Exposure

Surgeons may choose one of two incisions. Option one, make a 4 cm transverse (medial to lateral) intraclavicular incision 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.

Incise the subcutaneous fat together with any fibers of the platysma. Identify and protect branches of the supraclavicular nerves to preserve cutaneous sensation inferior to the incision. Divide the pectoralis fascia in line with the incision and elevate with electrocautery to create thick flaps that can be closed over the plate at the end of the procedure.

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

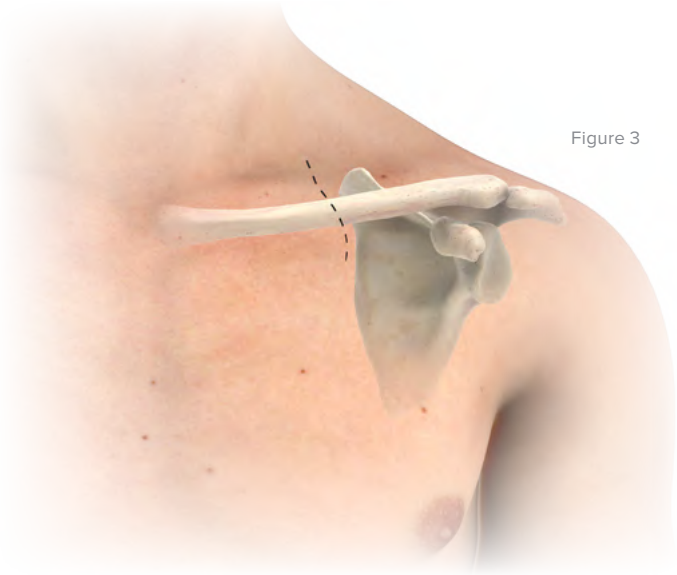


Figure 3

Superior Midshaft Clavicle Plate Surgical Technique [continued]

Figure 4

3 Plate Selection

Reduce the fracture by placing the Reduction Forceps With Serrated Jaw (PL-CL04) on both the medial and lateral fragments. Distract, elevate, and rotate the lateral fragment to obtain reduction. Select an appropriately sized left or right Superior Midshaft Clavicle Plate (70-02XX) 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.

Note: For a more anatomical fit, the plate may be rotated 180 degrees or a plate of the opposite dexterity may be used if the patient's anatomy requires a curvature that is different from 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 .045" or .059" K-wires (WS-1106ST or WS-1505ST) may be used to reduce and stabilize butterfly fragments to the main medial and lateral clavicle fragments.

If a lag screw technique is desired, reference the chart below for instrumentation related to each screw size option. A CO/CA Countersink (PL-2080) is also available if desired.

Reduction Forceps With Serrated Jaw
(PL-CL04)

Superior Midshaft Clavicle Plate
(70-02XX)

.045" x 6" ST Guide Wire
(WS-1106ST)
Also used as a K-wire

.059" x 5" ST Guide Wire
(WS-1505ST)
Also used as a K-wire

CO/CA Countersink
(PL-2080)

Superior Midshaft Clavicle Plate Surgical Technique [continued]

Screw Size Option	Near Cortex Drill	Far Cortex Drill	Depth Gauge
3.5 mm Nonlocking Hexalobe Screws (30-02XX)	3.5 mm x 5" Quick Release Drill (MS-DC35)	2.8 mm Quick Release Drill (80-0387)	Depth Gauge 6–65 mm (80-0623)
3.0 mm Nonlocking Hexalobe Screws (30-03XX)	3.0 mm x 5" Quick Release Drill (80-1088)	2.3 mm Quick Release Drill (80-0627)	Depth Gauge 6–65 mm (80-0623)
Optional 3.5 mm (Nonlocking) Cortical (Hex) Screws (CO-3XX0)	3.5 mm x 5" Quick Release Drill (MS-DC35)	2.8 mm x 5" Quick Release Drill (MS-DC28)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)
Optional 2.7 mm (Nonlocking) Cortical (Hex) Screws (CO-27XX)	2.8 mm x 5" Quick Release Drill (MS-DC28)	2.0 mm x 5" Quick Release Drill (MS-DC5020)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)

4 Plate Placement

Once the plate's ideal position has been selected, provisionally stabilize it to the clavicle with .045" or .059" K-wires (WS-1106ST or WS-1505ST). To reduce the risk of delayed union or nonunion, apply the plate 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.

Note: The reduction forceps should only 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. Plate Benders (PL-204X) are available in the event that plate contouring is required to achieve the desired fit to the clavicle.

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

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

Figure 5

3.5 mm Nonlocking Hexalobe Screw (30-02XX)

3.0 mm Nonlocking Hexalobe Screw (30-03XX)

Optional 3.5 mm (Nonlocking) Cortical Screw (CO-3XX0)

Optional 2.7 mm (Nonlocking) Cortical (Hex) Screw (CO-27XX)

3.5 mm x 5" Quick Release Drill (MS-DC35)

3.0 mm x 5" Quick Release Drill (80-1088)

2.8 mm x 5" Quick Release Drill (MS-DC28)

2.8 mm Quick Release Drill (80-0387)

2.3 mm Quick Release Drill (80-0627)

2.0 mm x 5" Quick Release Drill (MS-DC5020)

Depth Gauge 6–65 mm (80-0623)

6 mm–70 mm Depth Gauge (MS-9022)

.045" x 6" ST Guide Wire (WS-1106ST)
Also used as a K-wire

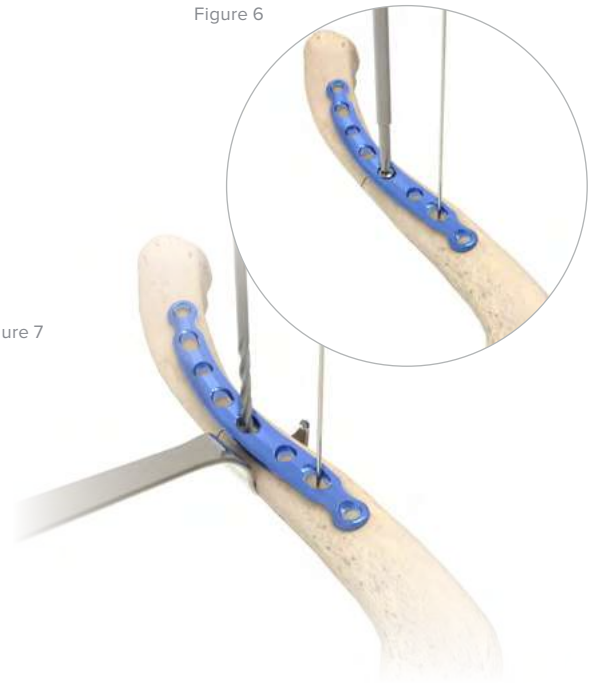
.059" x 5" ST Guide Wire (WS-1505ST)
Also used as a K-wire

Plate Bender (PL-204X)

Superior Midshaft Clavicle Plate Surgical Technique [continued]

Figure 6

Figure 7



5 Nonlocking Screw Insertion

For early stability, place the first two screws medial and lateral to the fracture site. If bicortical screws are used, precautions should be taken to avoid over-penetration of the inferior cortex. Place the Clavicle Retractor (PL-CL03) under the inferior surface of the clavicle to protect the neurovascular structures from overpenetration when drilling.

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

Reference the chart below for instrumentation related to each screw size option.

If drilling for 3.5 mm size screws, the Offset Drill Guide (PL-2095) is available to assist in providing compression. The green side of the drill guide is neutral, while the gold side will generate compression when used in a compression slot on the plate.

After installing at least two screws, remove the K-wires holding the plate to the clavicle.

Screw Size Option	Drill	Depth Gauge	Driver	Driver Handle
3.5 mm Nonlocking Hexalobe Screw (30-02XX)	2.8 mm Quick Release Drill (80-0387)	Depth Gauge 6–65 mm (80-0623)	T15 Stick Fit Hexalobe Driver (80-0760)	Large Cannulated Quick Release Driver Handle (MS-3200)
3.0 mm Nonlocking Hexalobe Screw (30-03XX)	2.3 mm Quick Release Drill (80-0627)	Depth Gauge 6–65 mm (80-0623)	T15 Stick Fit Hexalobe Driver (80-0760)	Large Cannulated Quick Release Driver Handle (MS-3200)
Optional 3.5 mm (Nonlocking) Cortical (Hex) Screw (CO-3XX0)	2.8 mm x 5" Quick Release Drill (MS-DC28)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)	2.5 mm Quick Release Hex Driver (HPC-0025)	Large Cannulated Quick Release Driver Handle (MS-3200)
Optional 2.7 mm (Nonlocking) Cortical (Hex) Screw (CO-27XX)	2.0 mm x 5" Quick Release Drill (MS-DC5020)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)	2.5 mm Quick Release Hex Driver (HPC-0025)	Large Cannulated Quick Release Driver Handle (MS-3200)

Clavicle Retractor (PL-CL03)

Offset Drill Guide (PL-2095)

3.5 mm Nonlocking Hexalobe Screw (30-02XX)

3.0 mm Nonlocking Hexalobe Screw (30-03XX)

Optional 3.5 mm Nonlocking Cortical (Hex) Screw (CO-3XX0)

Optional 2.7 mm Nonlocking Cortical (Hex) Screw (CO-27XX)

2.8 mm Quick Release Drill (80-0387)

2.3 mm Quick Release Drill (80-0627)

2.8 mm x 5" Quick Release Drill (MS-DC28)

2.0 mm x 5" Quick Release Drill (MS-DC5020)

Depth Gauge 6–65 mm (80-0623)

6 mm–70 mm Depth Gauge, 2 mm Increments (MS-9022)

T15 Stick Fit Hexalobe Driver (80-0760)

2.5 mm Quick Release Hex Driver (HPC-0025)

Large Cannulated Quick Release Driver Handle (MS-3200)

Superior Midshaft Clavicle Plate Surgical Technique [continued]

6 Locking Screw Insertion

For locking screw insertion, reference the chart below for instrumentation related to each screw size option. Note that when utilizing either the 2.8 mm Hexalobe Locking Drill Guide 6–65 mm (80-0668), or the 2.3 mm Locking Drill Guide 6–65 mm (80-0622), the screw length can be estimated by matching the laser line on the drill with the markings on the drill guide. When in between sizes, it is recommended to choose the shorter screw option. Advance screws until the head fully engages the plate.

Note: The outermost medial and lateral holes are angled 10 degrees and the locking drill guides must be inserted appropriately to accommodate these angles.

Figure 8

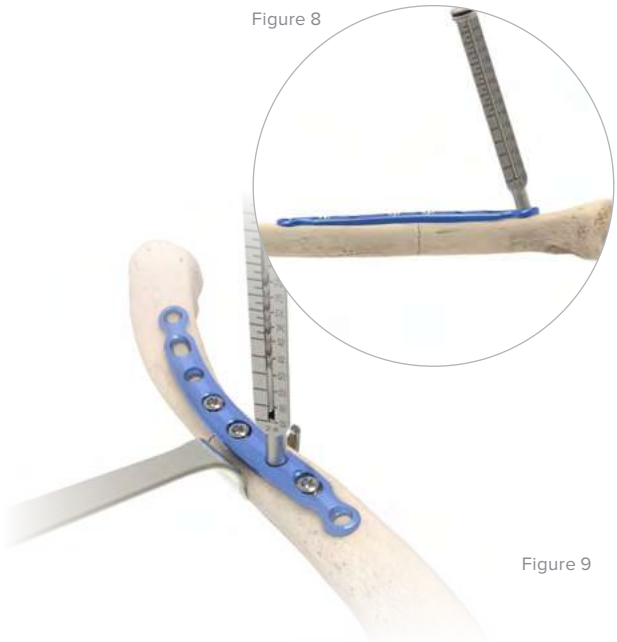


Figure 9

Screw Size Option	Locking Drill Guide	Drill	Depth Gauge	Driver	Driver Handle
3.5 mm Locking Hexalobe Screw (30-02XX)	2.8 mm Hexalobe Locking Drill Guide 6–65 mm (80-0668)	2.8 mm Quick Release Drill (80-0387)	Depth Gauge 6–65 mm (80-0623)	T15 Stick Fit Hexalobe Driver (80-0760)	Large Cannulated Quick Release Driver Handle (MS-3200)
3.0 mm Locking Hexalobe Screw (30-02XX)	2.3 mm Locking Drill Guide 6–65 mm (80-0622)	2.3 mm Quick Release Drill (80-0627)	Depth Gauge 6–65 mm (80-0623)	T15 Stick Fit Hexalobe Driver (80-0760)	Large Cannulated Quick Release Driver Handle (MS-3200)
Optional 3.5 mm Locking Cortical (Hex) Screw (COL-3XX0)	3.5 mm Locking Drill Guide (MS-LDG35)	2.8 mm x 5" Quick Release Drill (MS-DC28)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)	2.5 mm Quick Release Hex Driver (HPC-0025)	Large Cannulated Quick Release Driver Handle (MS-3200)
Optional 2.7 mm Locking Cortical (Hex) Screw (COL-2XX0)	2.7 mm Locking Drill Guide (MS-LDG27)	2.0 mm x 5" Quick Release Drill (MS-DC5020)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)	2.5 mm Quick Release Hex Driver (HPC-0025)	Large Cannulated Quick Release Driver Handle (MS-3200)

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

2.3 mm Locking Drill Guide 6–65 mm (80-0622)

3.5 mm Locking Hexalobe Screw (30-02XX)

3.0 mm Locking Hexalobe Screw (30-02XX)

Optional 3.5 mm Locking Cortical (Hex) Screw (COL-3XX0)

Optional 2.7 mm Locking Cortical (Hex) Screw (COL-2XX0)

3.5 mm Locking Drill Guide (MS-LDG35)

2.7 mm Locking Drill Guide (MS-LDG27)

2.8 mm Quick Release Drill (80-0387)

2.3 mm Quick Release Drill (80-0627)

2.8 mm x 5" Quick Release Drill (MS-DC28)

2.0 mm x 5" Quick Release Drill (MS-DC5020)

Depth Gauge 6–65 mm (80-0623)

6 mm–70 mm Depth Gauge (MS-9022)

T15 Stick Fit Hexalobe Driver (80-0760)

2.5 mm Quick Release Hex Driver (HPC-0025)

Large Cannulated Quick Release Driver Handle (MS-3200)

Superior Midshaft Clavicle Plate Surgical Technique [continued]

Note: Tapping with the 2.7 mm Cortical Screw Bone Tap (MS-LTT27) or 3.5 mm Cortical Screw Bone Tap (MS-LTT35) 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.[1] In hypertrophic nonunions, callus from the nonunion site may be sufficient to provide graft material.

2.7 mm Cortical Screw Bone Tap
(MS-LTT27)

3.5 mm Cortical Screw Bone Tap
(MS-LTT35)

Superior Midshaft Clavicle Plate Surgical Technique [continued]

7 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, sutures may be passed from medial to lateral around the coracoid and the plate to take stress off the lateral fixation. After radiographic evaluation and thorough irrigation, close the clavipectoral fascia over the clavicle and the plate. Follow by closing the subcutaneous tissue and musculature in separate layers. Finally, close the skin by using interrupted absorbable sutures with a subcuticular stitch, and dress the wound.

Figure 10

Postoperative Protocol

Postoperative care is at the discretion of the surgeon. The following protocol is provided as an example:

For the first four weeks, place the patient in either an arm sling or an abduction pillow to bring the arm up and the clavicle down, unloading the AC joint.[1] Initiate passive range of motion exercises during the first four weeks. Exercises may include pendulum, Codman, isometric bicep, and elbow and wrist motion. Emphasize 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, start active assisted exercise from four to six weeks, and initiate active strengthening at six to eight weeks postoperatively, once healing is seen radiographically. A full return to activities is permitted once healing has occurred.

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

8 Optional: Implant Removal Instructions

To remove a clavicle plate, use the T15 Stick Fit Hexalobe Driver (80-0760) or 2.5 mm Quick Release Hex Driver (HPC-0025) and Large Cannulated Quick Release Driver Handle (MS-3200). Referencing the Screw Removal Brochure (SPF10-00) may aid in implant extraction if difficulty is experienced.

Caution: Due to risk of refracture, implant removal is generally not recommended before one year after open reduction internal fixation (ORIF) procedures.

T15 Stick Fit Hexalobe Driver (80-0760)

2.5 mm Quick Release Hex Driver (HPC-0025)

Large Cannulated Quick Release Driver Handle (MS-3200)

Anterior Clavicle Plate Surgical Technique

William B. Geissler, MD

Figure 1

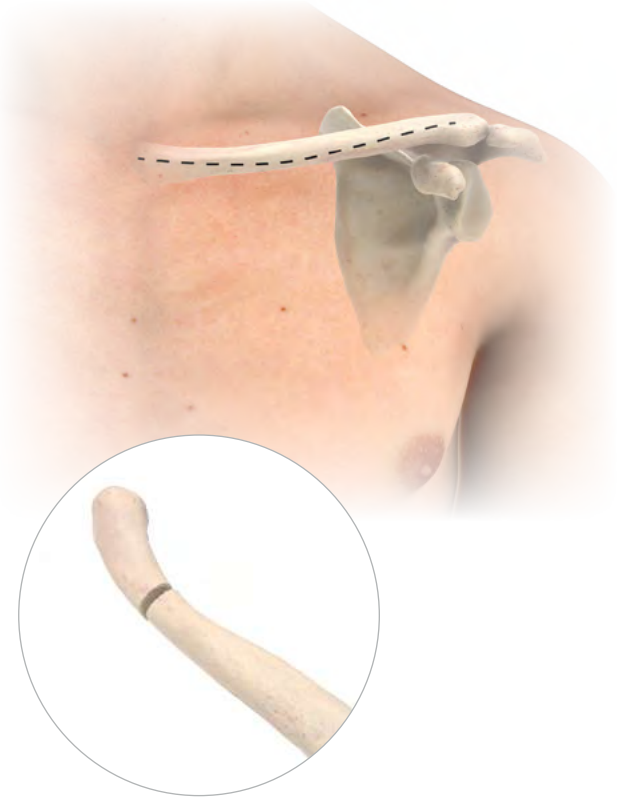


Figure 2

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 posteroanterior (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, place the patient in a beach chair position with the head rotated and tilted 5 to 10 degrees away from the operative side. Place a bolster 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. Prep the patient's involved upper extremity and drape in a sterile fashion, allowing the arm to be manipulated to help further reduce the fracture if required.

Anterior Clavicle Plate Surgical Technique [continued]

2 Exposure

Surgeons may choose one of two incisions. Option one, make a 4 cm transverse (medial to lateral) intraclavicular incision 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.

Incise the subcutaneous fat together with any fibers of the platysma. Identify and protect branches of the supraclavicular nerves to preserve cutaneous sensation inferior to the incision. Divide the pectoralis fascia in line with the incision and elevate with electrocautery to create thick flaps that can be closed over the plate at the end of the procedure.

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

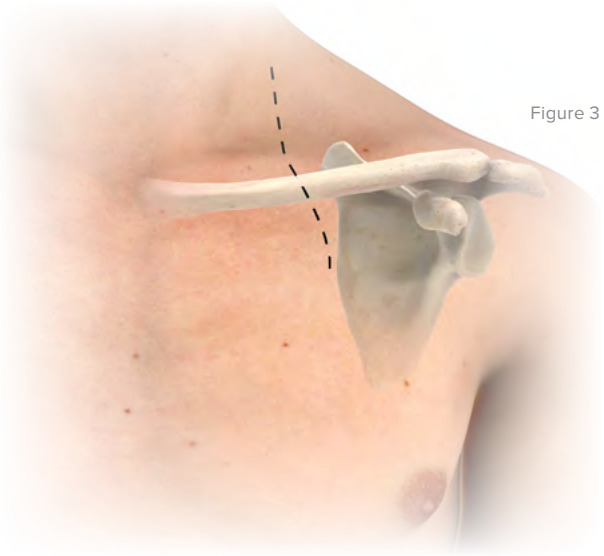


Figure 3

Anterior Clavicle Plate Surgical Technique [continued]

Figure 4

3 Plate Selection

Reduce the fracture by placing the Reduction Forceps With Serrated Jaw (PL-CL04) on both the medial and lateral fragments. Distract, elevate, and rotate the lateral fragment to obtain reduction. Select an appropriately sized Anterior Clavicle Plate (70-01XX) 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.

Note: For a more anatomical fit, the plate may be rotated 180 degrees.

Prior to placement of the plate, lag screw fixation across the major fracture fragments may be performed. Reduction forceps or .045" or .059" K-wires (WS-1106ST or WS-1505ST) may be used to reduce and stabilize butterfly fragments to the main medial and lateral clavicle fragments.

If a lag screw technique is desired, reference the chart below for instrumentation related to each screw size option. A CO/CA Countersink (PL-2080) is also available if desired.

Screw Size Option	Near Cortex Drill	Far Cortex Drill	Depth Gauge
3.5 mm Nonlocking Hexalobe Screw (30-02XX)	3.5 mm x 5" Quick Release Drill (MS-DC35)	2.8 mm Quick Release Drill (80-0387)	Depth Gauge 6–65 mm (80-0623)
3.0 mm Nonlocking Hexalobe Screw (30-03XX)	3.0 mm x 5" Quick Release Drill (80-1088)	2.3 mm Quick Release Drill (80-0627)	Depth Gauge 6–65 mm (80-0623)
Optional 3.5 mm (Nonlocking) Cortical (Hex) Screw (CO-3XX0)	3.5 mm x 5" Quick Release Drill (MS-DC35)	2.8 mm x 5" Quick Release Drill (MS-DC28)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)
Optional 2.7 mm (Nonlocking) Cortical (Hex) Screw (CO-27XX)	2.8 mm x 5" Quick Release Drill (MS-DC28)	2.0 mm x 5" Quick Release Drill (MS-DC5020)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)

Reduction Forceps With Serrated Jaw (PL-CL04)

Anterior Clavicle Plate (70-01XX)

.045" x 6" ST Guide Wire (WS-1106ST) Also used as a K-wire

.059" x 5" ST Guide Wire (WS-1505ST) Also used as a K-wire

CO/CA Countersink (PL-2080)

3.5 mm Nonlocking Hexalobe Screw (30-02XX)

3.0 mm Nonlocking Hexalobe Screw (30-03XX)

Optional 3.5mm(Nonlocking) Cortical (Hex) Screw (CO-3XX0)

Optional 2.7 mm (Nonlocking) Cortical (Hex)Screw (CO-27XX)

3.5 mm x 5" Quick Release Drill (MS-DC35)

3.0 mm x 5" Quick Release Drill (80-1088)

2.8 mm x 5" Quick Release Drill (MS-DC28)

2.8 mm Quick Release Drill (80-0387)

2.3 mm Quick Release Drill (80-0627)

2.0 mm x 5" Quick Release Drill (MS-DC5020)

Depth Gauge 6–65 mm (80-0623)

6 mm–70 mm Depth Gauge (MS-9022)

Anterior Clavicle Plate Surgical Technique [continued]

4 Plate Placement

Once the plate's ideal position has been selected, it is provisionally stabilized to the clavicle with .045" or .059" (WS-1106ST or WS-1505ST) K-wires. To reduce the risk of delayed union or nonunion, apply the plate 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.

Note: Plate Benders (PL-204X) are available in the event that plate contouring is required to achieve an exact fit to the clavicle.

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

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

Figure 5

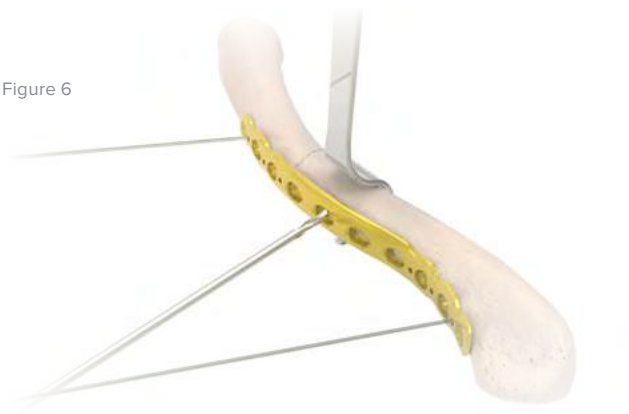
.045" x 6" ST Guide Wire
(WS-1106ST)
Also used as a K-wire

.059" x 5" ST Guide Wire
(WS-1505ST)
Also used as a K-wire

Plate Bender
(PL-204X)

Anterior Clavicle Plate Surgical Technique [continued]

Figure 6



5 Nonlocking Screw Insertion

For early stability, place the first two screws medial and lateral to the fracture site. If bicortical screws are used, take precautions to avoid over-penetration of the posterior cortex. Place the Clavicle Retractor (PL-CL03) under the posterior surface of the clavicle to protect the neurovascular structures from over-penetration when drilling.

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

If drilling for 3.5 mm size screws, the Offset Drill Guide (PL-2095) is available to assist in providing compression. The green side of the drill guide is neutral, while the gold side will generate compression when used in a compression slot on the plate. After installing at least two screws, remove the K-wires holding to the plate to the clavicle.

Screw Size Option	Drill	Depth Gauge	Driver	Driver Handle
3.5 mm Nonlocking Hexalobe Screw (30-02XX)	2.8 mm Quick Release Drill (80-0387)	Depth Gauge 6–65 mm (80-0623)	T15 Stick Fit Hexalobe Driver (80-0760)	Large Cannulated Quick Release Driver Handle (MS-3200)
3.0 mm Nonlocking Hexalobe Screw (30-03XX)	2.3 mm Quick Release Drill (80-0627)	Depth Gauge 6–65 mm (80-0623)	T15 Stick Fit Hexalobe Driver (80-0760)	Large Cannulated Quick Release Driver Handle (MS-3200)
Optional 3.5 mm (Nonlocking) Cortical (Hex) Screw (CO-3XX0)	2.8 mm x 5" Quick Release Drill (MS-DC28)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)	2.5 mm Quick Release Hex Driver (HPC-0025)	Large Cannulated Quick Release Driver Handle (MS-3200)
Optional 2.7 mm (Nonlocking) Cortical (Hex) Screw (CO-27XX)	2.0 mm x 5" Quick Release Drill (MS-DC5020)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)	2.5 mm Quick Release Hex Driver (HPC-0025)	Large Cannulated Quick Release Driver Handle (MS-3200)

Clavicle Retractor (PL-CL03)

Offset Drill Guide (PL-2095)

3.5 mm Nonlocking Hexalobe Screw (30-02XX)

3.0 mm Nonlocking Hexalobe Screw (30-03XX)

Optional 3.5 mm (Nonlocking) Cortical (Hex) Screw (CO-3XX0)

Optional 2.7 mm (Nonlocking) Cortical (Hex) Screw (CO-27XX)

2.8 mm Quick Release Drill (80-0387)

2.3 mm Quick Release Drill (80-0627)

2.8 mm x 5" Quick Release Drill (MS-DC28)

2.0 mm x 5" Quick Release Drill (MS-DC5020)

Depth Gauge 6–65 mm (80-0623)

6 mm–70 mm Depth Gauge, 2 mm Increments (MS-9022)

T15 Stick Fit Hexalobe Driver (80-0760)

2.5 mm Quick Release Hex Driver (HPC-0025)

Large Cannulated Quick Release Driver Handle (MS-3200)

Anterior Clavicle Plate Surgical Technique [continued]

6 Locking Screw Insertion

For locking screw insertion, reference the chart below for instrumentation related to each screw size option. Note that when utilizing either the 2.8 mm Hexalobe Locking Drill Guide 6–65 mm (80-0668), or the 2.3 mm Locking Drill Guide 6–65 mm (80-0622), the screw length can be estimated by matching the laser line on the drill with the markings on the drill guide. When in between sizes, it is recommended to choose the shorter screw option. Advance screws until the head fully engages the plate.

Figure 7

Screw Size Option	Locking Drill Guide	Drill	Depth Gauge	Driver	Driver Handle
3.5 mm Locking Hexalobe Screw (30-02XX)	2.8mmHexalobe Locking Drill Guide 6–65 mm (80-0668)	2.8 mm Quick Release Drill (80-0387)	Depth Gauge 6–65 mm (80-0623)	T15 Stick Fit Hexalobe Driver (80-0760)	Large Cannulated Quick Release Driver Handle (MS-3200)
3.0 mm Locking Hexalobe Screw (30-02XX)	2.3 mm Locking Drill Guide 6–65 mm (80-0622)	2.3 mm Quick Release Drill (80-0627)	Depth Gauge 6–65 mm (80-0623)	T15 Stick Fit Hexalobe Driver (80-0760)	Large Cannulated Quick Release Driver Handle (MS-3200)
Optional 3.5 mm Locking Cortical (Hex) Screw (COL-3XXO)	3.5 mm Locking Drill Guide (MS-LDG35)	2.8 mm x 5" Quick Release Drill (MS-DC28)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)	2.5 mm Quick Release Hex Driver (HPC-0025)	Large Cannulated Quick Release Driver Handle (MS-3200)
Optional 2.7 mm Locking Cortical (Hex) Screw (COL-2XXO)	2.7 mm Locking Drill Guide (MS-LDG27)	2.0 mm x 5" Quick Release Drill (MS-DC5020)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)	2.5 mm Quick Release Hex Driver (HPC-0025)	Large Cannulated Quick Release Driver Handle (MS-3200)

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

2.3 mm Locking Drill Guide 6–65 mm (80-0622)

3.5 mm Locking Hexalobe Screw (30-02XX)

3.0 mm Locking Hexalobe Screw (30-02XX)

3.5 mm Locking Cortical (Hex) Screw (COL-3XX0)

2.7 mm Locking Cortical (Hex) Screw (COL-2XX0)

3.5 mm Locking Drill Guide (MS-LDG35)

2.7 mm Locking Drill Guide (MS-LDG27)

2.8 mm Quick Release Drill (80-0387)

2.3 mm Quick Release Drill (80-0627)

2.8 mm x 5" Quick Release Drill (MS-DC28)

2.0 mm x 5" Quick Release Drill (MS-DC5020)

Depth Gauge 6–65 mm (80-0623)

6 mm–70 mm Depth Gauge (MS-9022)

T15 Stick Fit Hexalobe Driver (80-0760)

2.5 mm Quick Release Hex Driver (HPC-0025)

Large Cannulated Quick Release Driver Handle (MS-3200)

Anterior Clavicle Plate Surgical Technique [continued]

Note: Tapping with the 2.7 mm Cortical Screw Bone Tap (MS-LTT27) or 3.5 mm Cortical Screw Bone Tap (MS-LTT35) 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.[1] In hypertrophic nonunions, callus from the nonunion site may be sufficient to provide graft material.

2.7 mm Cortical Screw Bone Tap
(MS-LTT27)

3.5 mm Cortical Screw Bone Tap
(MS-LTT35)

Anterior Clavicle Plate Surgical Technique [continued]

7 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, sutures may be passed from medial to lateral around the coracoid and the plate to take stress off the lateral fixation. After radiographic evaluation and thorough irrigation, close the clavipectoral fascia over the clavicle and the plate. Follow by closing the subcutaneous tissue and musculature in separate layers.

Finally, close the skin by using interrupted absorbable sutures with a subcuticular stitch and dress the wound.

Figure 8

Postoperative Protocol

Postoperative care is at the discretion of the surgeon. The following protocol is provided as an example:

For the first four weeks, place the patient in either an arm sling or an abduction pillow to bring the arm up and the clavicle down, unloading the AC joint.[1] Initiate passive range of motion exercises during the first four weeks. Exercises may include pendulum, Codman, isometric bicep, and elbow and wrist motion. Emphasize 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, start active assisted exercise from four to six weeks, and initiate active strengthening at six to eight weeks postoperatively, once healing is seen radiographically. A full return to activities is permitted once healing has occurred.

8 Optional: Implant Removal Instructions

To remove a clavicle plate, use the T15 Stick Fit Hexalobe Driver (80-0760) or 2.5 mm Hex Driver (HPC-0025) and Large Cannulated Quick Release Driver Handle (MS-3200). Referencing the Screw Removal Brochure (SPF10-00) may aid in implant extraction if difficulty is experienced.

Caution: Due to risk of refracture, implant removal is generally not recommended before one year after ORIF.

T15 Stick Fit Hexalobe Driver (80-0760)

2.5 mm Quick Release Hex Driver (HPC-0025)

Large Cannulated Quick Release Driver Handle (MS-3200)

Superior Distal Clavicle Plate Surgical Technique

William B. Geissler, MD

Figure 1

Figure 2

1 Preoperative Planning and Patient Positioning

After a thorough radiographic evaluation has been completed, place the patient in a beach chair position with the head rotated and tilted 5 to 10 degrees away from the operative side. Place a bolster 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. Prep the patient's involved upper extremity and drape 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.

Note: Step 1 of the Superior Midshaft Clavicle 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.[3]

Figure 3

2 Exposure

Surgeons may choose one of two incisions. Option one, make a 4 cm transverse incision 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.

Carry down dissection to the fascia and elevate the skin flaps. Protect the cutaneous nerves. Then subperiosteally elevate the trapezial deltoid musculature off the bone fragments, avoiding the infraclavicular nerve branches below the clavicle.

Caution: It is important to retain soft tissue attachments to the butterfly fragments to maintain vascularity.

Superior Distal Clavicle Plate Surgical Technique [continued]

3 Plate Selection

Select the appropriate-size Superior Distal Clavicle Plate (70-0XXX) 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.

Note: Surgical technique from this point forward will highlight a Superior Distal Clavicle Plate with 2.3 mm screws.

If a lag screw technique is desired, reference the chart below for instrumentation related to each screw size option. A CO/CA Countersink (PL-2080) is also available if desired.

Note: 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 With Serrated Jaw (PL-CL04) or K-wires may be used to reduce and stabilize butterfly fragments to the main medial and lateral clavicle fragments.

Figure 4

Screw Size Option	Near Cortex Drill	Far Cortex Drill	Depth Gauge
3.5 mm Nonlocking Hexalobe Screw (30-02XX)	3.5 mm x 5" Quick Release Drill (MS-DC35)	2.8 mm Quick Release Drill (80-0387)	Depth Gauge 6–65 mm (80-0623)
3.0 mm Nonlocking Hexalobe Screw (30-03XX)	3.0 mm x 5" Quick Release Drill (80-1088)	2.3 mm Quick Release Drill (80-0627)	Depth Gauge 6–65 mm (80-0623)
Optional 3.5 mm (Nonlocking) Cortical (Hex) Screw (CO-3XX0)	3.5 mm x 5" Quick Release Drill (MS-DC35)	2.8 mm x 5" Quick Release Drill (MS-DC28)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)
Optional 2.7 mm (Nonlocking) Cortical (Hex) Screw (CO-27XX)	2.8 mm x 5" Quick Release Drill (MS-DC28)	2.0 mm x 5" Quick Release Drill (MS-DC5020)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)

Superior Distal Clavicle Plate (70-0XXX)

CO/CA Countersink (PL-2080)

Reduction Forceps With Serrated Jaw (PL-CL04)

3.5 mm Nonlocking Hexalobe Screw (30-02XX)

3.0 mm Nonlocking Hexalobe Screw (30-03XX)

Optional 3.5 mm (Nonlocking) Cortical (Hex) Screw (CO-3XX0)

Optional 2.7 mm (Nonlocking) Cortical (Hex)Screw (CO-27XX)

3.5 mm x 5" Quick Release Drill (MS-DC35)

3.0 mm x 5" Quick Release Drill (80-1088)

2.8 mm x 5" Quick Release Drill (MS-DC28)

2.8 mm Quick Release Drill (80-0387)

2.3 mm Quick Release Drill (80-0627)

2.0 mm x 5" Quick Release Drill (MS-DC5020)

Depth Gauge 6–65 mm (80-0623)

6 mm–70 mm Depth Gauge (MS-9022)

Superior Distal Clavicle Plate Surgical Technique [continued]

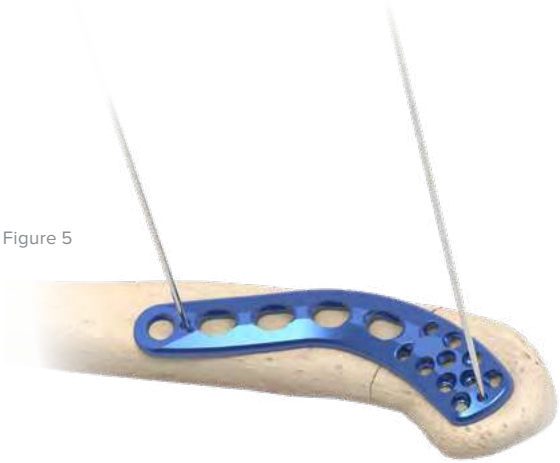


Figure 5

4 Plate Placement

Once the plate's ideal positioning has been selected, it is provisionally stabilized to the clavicle with .045" x 6" ST Guide Wire (WS-1106ST) or .059" x 5" ST Guide Wire (WS-1505ST) K-wires. Under radiographic evaluation, the most lateral K-wire hole of each Superior Distal Clavicle Plate (70-0XXX) 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 With Serrated Jaw (PL-CL04) 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. Plate Benders (PL-204X) are available in the event that plate contouring is required to achieve the desired fit to the clavicle.

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

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

.045" x 6" ST Guide Wire
(WS-1106ST)
Also used as a K-wire

.059" x 5" ST Guide Wire
(WS-1505ST)
Also used as a K-wire

Superior Distal Clavicle Plate
(70-0XXX)

Reduction Forceps With Serrated Jaw
(PL-CL04)

Plate Bender
(PL-204X)

Superior Distal Clavicle Plate Surgical Technique [continued]

5 Nonlocking Screw Insertion

For early stability, place the first two screws medial and lateral to the fracture site. If bicortical screws are used, take precautions to avoid over-penetration of the inferior cortex. Place the Clavicle Retractor (PL-CL03) under the inferior surface of the clavicle to protect the neurovascular structures from overpenetration when drilling.

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

If drilling for 3.5 mm size screws, the Offset Drill Guide (PL-2095) is available to assist in providing compression. The green side of the drill guide is neutral, while the gold side will generate compression when used in a compression slot on the plate.

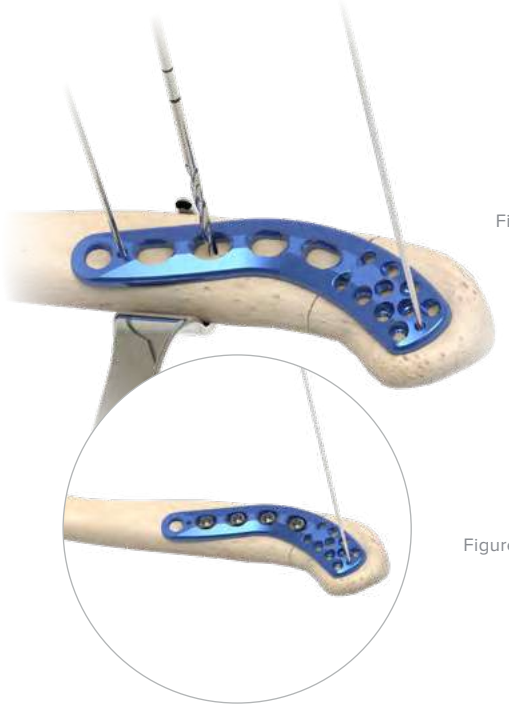


Figure 6

Figure 7

Screw Size Option	Drill	Depth Gauge	Driver	Driver Handle
3.5 mm Nonlocking Hexalobe Screw (30-02XX)	2.8 mm Quick Release Drill (80-0387)	Depth Gauge 6–65 mm (80-0623)	T15 Stick Fit Hexalobe Driver (80-0760)	Large Cannulated Quick Release Driver Handle (MS-3200)
3.0 mm Nonlocking Hexalobe Screw (30-03XX)	2.3 mm Quick Release Drill (80-0627)	Depth Gauge 6–65 mm (80-0623)	T15 Stick Fit Hexalobe Driver (80-0760)	Large Cannulated Quick Release Driver Handle (MS-3200)
Optional 3.5 mm (Nonlocking) Cortical (Hex) Screw (CO-3XX0)	2.8 mm x 5" Quick Release Drill (MS-DC28)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)	2.5 mm Quick Release Hex Driver (HPC-0025)	Large Cannulated Quick Release Driver Handle (MS-3200)
Optional 2.7 mm (Nonlocking) Cortical (Hex) Screw (CO-27XX)	2.0 mm x 5" Quick Release Drill (MS-DC5020)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)	2.5 mm Quick Release Hex Driver (HPC-0025)	Large Cannulated Quick Release Driver Handle (MS-3200)

Clavicle Retractor (PL-CL03)

Offset Drill Guide (PL-2095)

3.5 mm Nonlocking Hexalobe Screw (30-02XX)

3.0 mm Nonlocking Hexalobe Screw (30-03XX)

Optional 3.5 mm (Nonlocking) Cortical (Hex) Screw (CO-3XX0)

Optional 2.7 mm (Nonlocking) Cortical (Hex) Screw (CO-27XX)

2.8 mm Quick Release Drill (80-0387)

2.3 mm Quick Release Drill (80-0627)

2.8 mm x 5" Quick Release Drill (MS-DC28)

2.0 mm x 5" Quick Release Drill (MS-DC5020)

Depth Gauge 6–65 mm (80-0623)

6 mm–70 mm Depth Gauge, 2 mm Increments (MS-9022)

T15 Stick Fit Hexalobe Driver (80-0760)

2.5 mm Quick Release Hex Driver (HPC-0025)

Large Cannulated Quick Release Driver Handle (MS-3200)

Superior Distal Clavicle Plate Surgical Technique [continued]

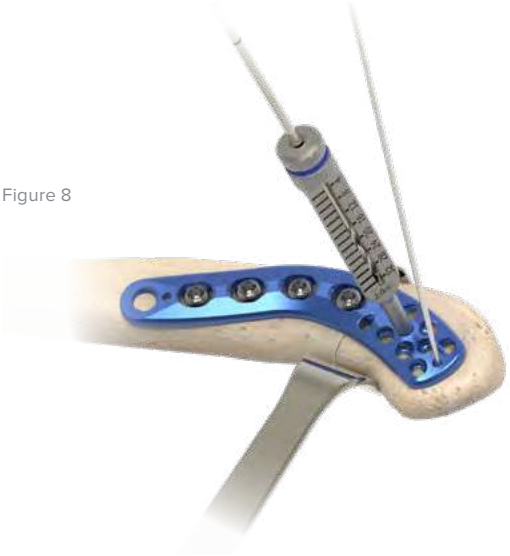


Figure 8

Figure 9

6 Nonlocking Screw Insertion in Distal Portion of Plate

Secure the plate to a distal fragment by inserting a 2.3 mm Nonlocking Cortical (Hex) Screw (CO-N23XX) through the medial-most center hole. Place the 2.0 mm Locking Drill Guide 4 mm–32 mm (80-0249) into the center hole and turn clockwise so that the guide fully threads into the plate. Insert the 2.0 mm Quick Release Drill (80-0318) and advance to the desired depth. Determine drill depth 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 (HPC-0015) with the Cruciform Driver Handle (MS-2210) to advance the 2.3 mm nonlocking screw until the screw head fully engages the plate.

2.3 mm Nonlocking Cortical (Hex) Screw
(CO-N23XX)

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

2.0 mm Quick Release Drill
(80-0318)

1.5 mm Hex Driver Tip
(HPC-0015)

Cruciform Driver Handle
(MS-2210)

Superior Distal Clavicle Plate Surgical Technique [continued]

7 Locking Screw Insertion

For the remaining distal locking holes, place the 2.0 mm Locking Drill Guide 4 mm–32 mm (80-0249) through the selected Targeting Guide, Distal Clavicle Plate (80-0451 or 80-0450) 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. The Targeting Guides are color coded blue and green to match the corresponding left and right 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.

Insert the 2.0 mm Quick Release Drill (80-0318) and advance to the desired depth. Determine drill depth 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 screw through the targeting guide. To place the 2.3 mm Locking Cortical Screws (CO-T23XX) into the threaded holes, use the 1.5 mm Hex Driver Tip (HPC-0015) with the Cruciform Driver Handle (MS-2210). 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.

Figure 10

Figure 11

Figure 12

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

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

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

2.0 mm Quick Release Drill (80-0318)

2.3 mm Locking Cortical Screw (CO-T23XX)

1.5 mm Hex Driver Tip (HPC-0015)

Cruciform Driver Handle (MS-2210)

Superior Distal Clavicle Plate Surgical Technique [continued]

Figure 13

For remaining proximal locking screw insertion, refer to the chart below for instrumentation related to each screw size option. Note that when utilizing either the 2.8 mm Hexalobe Locking Drill Guide 6–65 mm (80-0668), or the 2.3 mm Locking Drill Guide 6–65 mm (80-0622), the screw length can be estimated by matching the laser line on the drill with the markings on the drill guide. When in between sizes, it is recommended to choose the shorter screw option. Advance screws until the head fully engages the plate.

Note: Tapping with the 2.7 mm Cortical Screw Bone Tap (MS-LTT27) or 3.5 mm Cortical Screw Bone Tap (MS-LTT35) 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.[1] In hypertrophic nonunions, callus from the nonunion site may be sufficient to provide graft material.

Screw Size Option	Locking Drill Guide	Drill	Depth Gauge	Driver	Driver Handle
3.5 mm Locking Hexalobe Screw (30-02XX)	2.8 mm Hexalobe Locking Drill Guide 6–65 mm (80-0668)	2.8 mm Quick Release Drill (80-0387)	Depth Gauge 6–65 mm (80-0623)	T15 Stick Fit Hexalobe Driver (80-0760)	Large Cannulated Quick Release Driver Handle (MS-3200)
3.0 mm Locking Hexalobe Screw (30-02XX)	2.3 mm Locking Drill Guide 6–65 mm (80-0622)	2.3 mm Quick Release Drill (80-0627)	Depth Gauge 6–65 mm (80-0623)	T15 Stick Fit Hexalobe Driver (80-0760)	Large Cannulated Quick Release Driver Handle (MS-3200)
Optional 3.5 mm Locking Cortical (Hex) Screw (COL-3XX0)	3.5 mm Locking Drill Guide (MS-LDG35)	2.8 mm x 5" Quick Release Drill (MS-DC28)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)	2.5 mm Quick Release Hex Driver (HPC-0025)	Large Cannulated Quick Release Driver Handle (MS-3200)
Optional 2.7 mm Locking Cortical (Hex) Screw (COL-2XX0)	2.7 mm Locking Drill Guide (MS-LDG27)	2.0 mm x 5" Quick Release Drill (MS-DC5020)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)	2.5 mm Quick Release Hex Driver (HPC-0025)	Large Cannulated Quick Release Driver Handle (MS-3200)

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

2.3 mm Locking Drill Guide 6–65 mm (80-0622)

2.7 mm Cortical Screw Bone Tap (MS-LTT27)

3.5 mm Cortical Screw Bone Tap (MS-LTT35)

3.5 mm Locking Hexalobe Screw (30-02XX)

3.0 mm Locking Hexalobe Screw (30-02XX)

Optional 3.5 mm Locking Cortical (Hex) Screw (COL-3XX0)

Optional 2.7 mm Locking Cortical (Hex) Screw (COL-2XX0)

3.5 mm Locking Drill Guide (MS-LDG35)

2.7 mm Locking Drill Guide (MS-LDG27)

2.8 mm Quick Release Drill (80-0387)

2.3 mm Quick Release Drill (80-0627)

2.8 mm x 5" Quick Release Drill (MS-DC28)

2.0 mm x 5" Quick Release Drill (MS-DC5020)

Depth Gauge 6–65 mm (80-0623)

6 mm–70 mm Depth Gauge, 2 mm Increments (MS-9022)

T15 Stick Fit Hexalobe Driver (80-0760)

2.5 mm Quick Release Hex Driver (HPC-0025)

Large Cannulated Quick Release Driver Handle (MS-3200)

Superior Distal Clavicle Plate Surgical Technique [continued]

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 the lateral fixation. After radiographic evaluation and routine irrigation, close the trapezial-deltoid fascia over the clavicle and AC joint. Follow by closing the subcutaneous tissue and skin. Dress the wound and place the arm in an abduction pillow to bring the arm up and the clavicle down, unloading the AC joint.[1]

Postoperative Protocol

Postoperative care is at the discretion of the surgeon. The following protocol is provided as an example:

Initiate passive range of motion exercises during the first four weeks. Exercises may include pendulum, Codman, isometric bicep, and elbow and wrist motion. Emphasize 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, start active assisted exercise from four to six weeks, and initiate active strengthening at six to eight weeks postoperatively, once healing is seen radiographically. A full return to activities is permitted once healing has occurred.

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

Superior Distal Clavicle Plate Surgical Technique [continued]

Figure 14

9 Optional: Implant Removal Instructions

To remove a clavicle plate, use the T15 Stick Fit Hexalobe Driver (80-0760) or 2.5 mm Quick Release Hex Driver (HPC-0025) and Large Cannulated Quick Release Driver Handle (MS-3200) for all the 3.5 mm screws in the plate. Use the 1.5 mm Hex Driver Tip (HPC-0015) with the Cruciform Driver Handle (MS-2210) for the 2.3 mm screws. Referencing the Screw Removal Brochure (SPF10-00) may aid in implant extraction if difficulty is experienced.

Caution: Due to risk of refracture, implant removal is generally not recommended before one year after ORIF.

T15 Stick Fit Hexalobe Driver (80-0760)

2.5 mm Quick Release Hex Driver (HPC-0025)

Large Cannulated Quick Release Driver Handle (MS-3200)

1.5 mm Hex Driver Tip (HPC-0015)

Cruciform Driver Handle (MS-2210)

Acu-Sinch® Repair System

Ilya Voloshin, MD

1 Preoperative Planning and Patient Positioning

After a thorough radiographic evaluation has been completed, place the patient in a beach chair position with the head rotated and tilted 5 to 10 degrees away from the operative side. Place a bolster 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. Prep the patient's involved upper extremity and drape 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.

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.[3]

2 Exposure

Surgeons may choose one of two incisions. Option one, make a 3 cm to 5 cm transverse incision inferior to the distal clavicle and AC Joint. The incision is usually placed midway between the medial/lateral migrations of the proximal 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.

Carry dissection down to the fascia and elevate the skin flaps. Protect the cutaneous nerves. Then subperiosteally elevate the trapezial deltoid musculature off the bone fragments, avoiding the infraclavicular nerve branches below the clavicle.

Note: It is important to retain soft tissue attachments to the butterfly fragments and lateral fragment in an attempt to maintain vascularity.

Figure 1

Figure 2

Figure 3

Acu-Sinch® Repair System [continued]

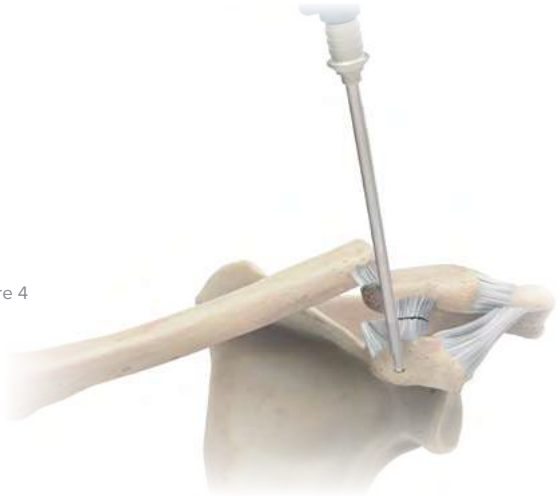


Figure 4

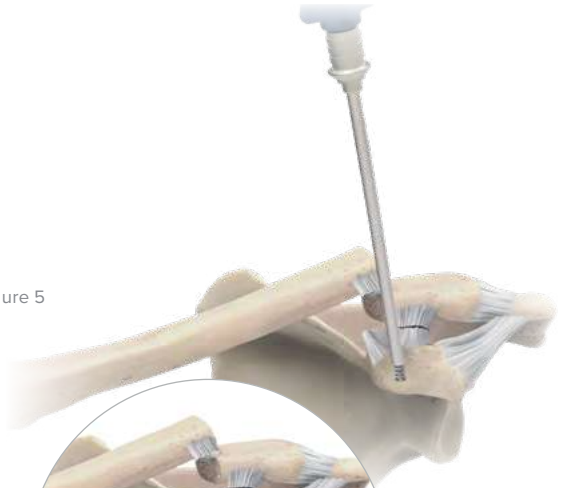


Figure 5

Figure 6

3 Coracoid Exposure and Drilling

Sharply incise the deltotrapezial fascia along the clavicle, then raise the subperiosteal flaps and protect 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 (80-0649). The Acu-Sinch Drill has a shoulder that is designed to prevent overdrilling. Do not drill through the second cortex. Damage to the anatomic structures around the coracoid is possible when overdrilling 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.

Note: Based on coracoid size and injury pattern, the surgeon can choose between one or two anchors at their discretion.

4 Anchor Insertion and Suture Release

Insert the anchor or anchors (preassembled with the suture on the Acu-Sinch Driver Assembly (80-0734) into the drill hole or holes to a depth with the driver interface barely sticking out. The shoulder on the Acu-Sinch Driver is intended to prevent inserting the anchor or anchors too deep.

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

Note: Direct visualization of the coracoid or imaging should be used when inserting the anchor to ensure that the anchor is not inserted too far into the coracoid.

Acu-Sinch Drill
(80-0649)

Acu-Sinch Driver Assembly
(80-0734)

Acu-Sinch® Repair System [continued]

5 Plate Selection

Select the appropriate-size Superior Distal Clavicle Plate (70-0XXX) 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.

Note: Surgical technique from this point forward will highlight a Superior Distal Clavicle Plate with eight 2.3 mm screws.

Note: 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.

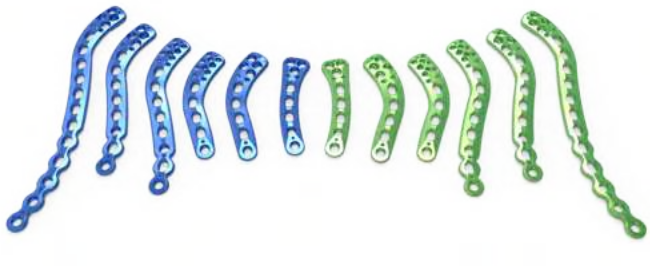
Note: Prior to placement of the plate, lag screw fixation across the major fracture fragments may be performed. Many Type IIB clavicle fractures have a horizontal cleavage fracture that extends into the AC joint, which may be fixed in this manner.[1] Reduction Forceps with Serrated Jaw (PL-CL04) or K-wires may be used to reduce and stabilize butterfly fragments to the main medial and lateral clavicle fragments.

Note: The reduction forceps should only 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. A Plate Bender (PL-204X) is available in the event that plate contouring is required to achieve the desired fit to the clavicle.

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

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

Figure 7



Superior Distal Clavicle Plate
(70-0XXX)

Reduction Forceps With Serrated Jaw
(PL-CL04)

Plate Bender
(PL-204X)

Acu-Sinch® Repair System [continued]

If a lag screw technique is desired, reference the chart below for instrumentation related to each screw size option. A CO/CA Countersink (PL-2080) is also available if desired.

Screw Size Option	Near Cortex Drill	Far Cortex Drill	Depth Gauge
3.5 mm Nonlocking Hexalobe Screw (30-02XX)	3.5 mm x 5" Quick Release Drill (MS-DC35)	2.8 mm Quick Release Drill (80-0387)	Depth Gauge 6–65 mm (80-0623)
3.0 mm Nonlocking Hexalobe Screw (30-03XX)	3.0 mm x 5" Quick Release Drill (80-1088)	2.3 mm Quick Release Drill (80-0627)	Depth Gauge 6–65 mm (80-0623)
Optional 3.5 mm (Nonlocking) Cortical (Hex) Screw (CO-3XX0)	3.5 mm x 5" Quick Release Drill (MS-DC35)	2.8 mm x 5" Quick Release Drill (MS-DC28)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)
Optional 2.7 mm (Nonlocking) Cortical (Hex) Screw (CO-27XX)	2.8 mm x 5" Quick Release Drill (MS-DC28)	2.0 mm x 5" Quick Release Drill (MS-DC5020)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)

CO/CA Countersink (PL-2080)

3.5 mm Nonlocking Hexalobe Screw (30-02XX)

3.0 mm Nonlocking Hexalobe Screw (30-03XX)

Optional 3.5 mm (Nonlocking) Cortical (Hex) Screw (CO-3XX0)

Optional 2.7 mm (Nonlocking) Cortical (Hex)Screw (CO-27XX)

3.5 mm x 5" Quick Release Drill (MS-DC35)

3.0 mm x 5" Quick Release Drill (80-1088)

2.8 mm x 5" Quick Release Drill (MS-DC28)

2.8 mm Quick Release Drill (80-0387)

2.3 mm Quick Release Drill (80-0627)

2.0 mm x 5" Quick Release Drill (MS-DC5020)

Depth Gauge 6–65 mm (80-0623)

6 mm–70 mm Depth Gauge, 2 mm Increments (MS-9022)

Acu-Sinch® Repair System [continued]

6 Plate Placement

Once the plate's ideal positioning has been selected, provisionally stabilize it to the clavicle with Plate Tacks (PL-PTACK) or Plate Clamps (80-0223). Under radiographic evaluation, place a .059" x 5" K-wire (WS-1505ST) 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.

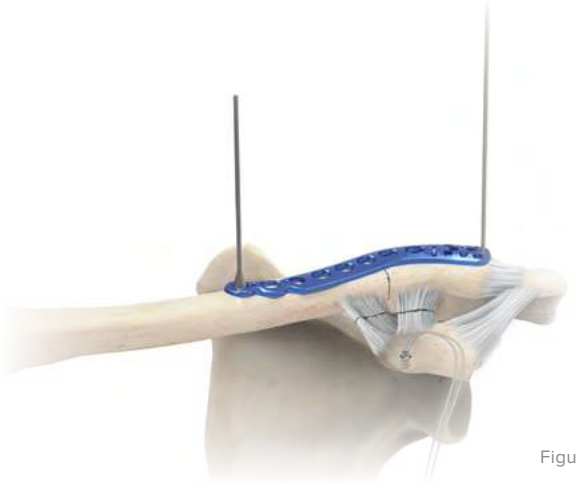


Figure 8

Plate Tack
(PL-PTACK)

Plate Clamp
(80-0223)

.059" x 5" ST Guide Wire
(WS-1505ST)
Also used as a K-wire

Acu-Sinch® Repair System [continued]

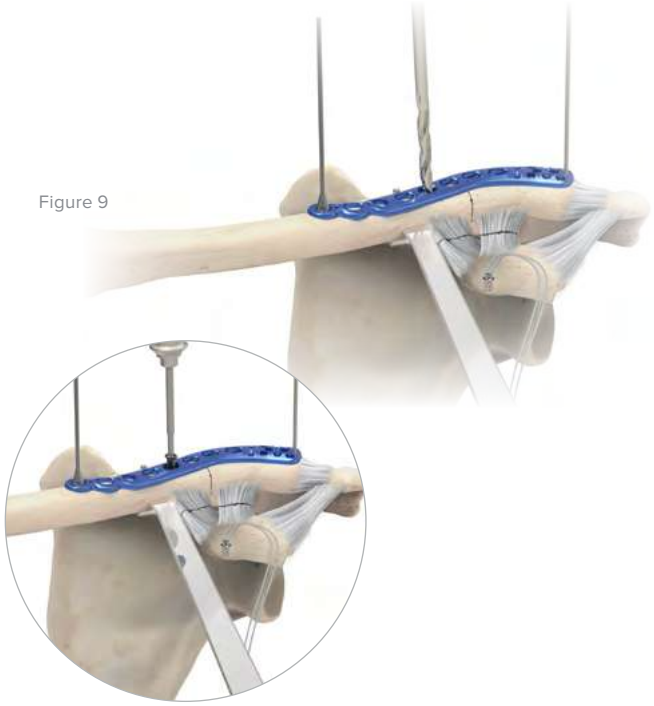


Figure 9

Figure 10

7 Nonlocking Screw Insertion

For early stability, place the first two screws medial and lateral to the fracture site.

If bicortical screws are used, precautions should be taken to avoid over-penetration of the inferior cortex. Place the Clavicle Retractor (PL-CL03) under the inferior surface of the clavicle to protect the neurovascular structures from over-penetration when drilling.

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

Note: 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.

Caution: When drilling through the slot (or slots), care should be taken to protect the Acu-Sinch Repair System suture from the drill bit and to avoid damage of neurovascular structures.

If drilling for 3.5 mm size screws, the Offset Drill Guide (PL-2095) is available to assist in providing compression. The green side of the drill guide is neutral, while the gold side will generate compression when used in a compression slot on the plate.

Screw Size Option	Drill	Depth Gauge	Driver	Driver Handle
3.5 mm Nonlocking Hexalobe Screw (30-02XX)	2.8 mm Quick Release Drill (80-0387)	Depth Gauge 6–65 mm (80-0623)	T15 Stick Fit Hexalobe Driver (80-0760)	Large Cannulated Quick Release Driver Handle (MS-3200)
3.0 mm Nonlocking Hexalobe Screw (30-03XX)	2.3 mm Quick Release Drill (80-0627)	Depth Gauge 6–65 mm (80-0623)	T15 Stick Fit Hexalobe Driver (80-0760)	Large Cannulated Quick Release Driver Handle (MS-3200)
Optional 3.5 mm (Nonlocking) Cortical (Hex) Screw (CO-3XX0)	2.8 mm x 5" Quick Release Drill (MS-DC28)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)	2.5 mm Quick Release Hex Driver (HPC-0025)	Large Cannulated Quick Release Driver Handle (MS-3200)
Optional 2.7 mm (Nonlocking) Cortical (Hex) Screw (CO-27XX)	2.0 mm x 5" Quick Release Drill (MS-DC5020)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)	2.5 mm Quick Release Hex Driver (HPC-0025)	Large Cannulated Quick Release Driver Handle (MS-3200)

Clavicle Retractor (PL-CL03)

Offset Drill Guide (PL-2095)

3.5 mm Nonlocking Hexalobe Screw (30-02XX)

3.0 mm Nonlocking Hexalobe Screw (30-03XX)

Optional 3.5 mm (Nonlocking) Cortical (Hex) Screw (CO-3XX0)

Optional 2.7 mm (Nonlocking) Cortical (Hex) Screw (CO-27XX)

2.8 mm Quick Release Drill (80-0387)

2.3 mm Quick Release Drill (80-0627)

2.8 mm x 5" Quick Release Drill (MS-DC28)

2.0 mm x 5" Quick Release Drill (MS-DC5020)

Depth Gauge 6–65 mm (80-0623)

6 mm–70 mm Depth Gauge, 2 mm Increments (MS-9022)

T15 Stick Fit Hexalobe Driver (80-0760)

2.5 mm Quick Release Hex Driver (HPC-0025)

Large Cannulated Quick Release Driver Handle (MS-3200)

Acu-Sinch® Repair System [continued]

8 Nonlocking Screw Insertion in Distal Portion of Plate

Secure the plate to a distal fragment by inserting a 2.3 mm Nonlocking Cortical (Hex) Screw (CO-N23XX) through the medial-most center hole. Place the 2.0 mm Locking Drill Guide 4 mm–32 mm (80-0249) into the center hole and turn clockwise so that the guide fully threads into the plate. Insert the 2.0 mm Quick Release Drill (80-0318) and advance to the desired depth. Determine drill depth 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 (HPC-0015) with the Cruciform Driver Handle (MS-2210) to advance the 2.3 mm nonlocking screw until the screw head fully engages the plate.

Figure 11

2.3 mm Nonlocking Cortical (Hex) Screw
(CO-N23XX)

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

2.0 mm Quick Release Drill
(80-0318)

1.5 mm Hex Driver Tip
(HPC-0015)

Cruciform Driver Handle
(MS-2210)

Acu-Sinch® Repair System [continued]

Figure 12

Figure 13

Figure 14

9 Locking Screw Insertion

The Targeting Guides (80-0451 or 80-0450) 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.

For the remaining distal locking holes, place the 2.0 mm Locking Drill Guide 4 mm–32 mm (80-0249) through the selected 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 Quick Release Drill (80-0318) and advance to the desired depth. Determine drill depth 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 Cortical (Hex) Screws (CO-T23XX) into the threaded holes, use the 1.5 mm Hex Driver Tip (HPC-0015) with the Cruciform Driver Handle (MS-2210). 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.

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

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

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

2.0 mm Quick Release Drill
(80-0318)

2.3 mm Locking Cortical (Hex) Screw
(CO-T23XX)

1.5 mm Hex Driver Tip
(HPC-0015)

Cruciform Driver Handle
(MS-2210)

Acu-Sinch® Repair System [continued]

For remaining proximal locking screw insertion, reference the chart below for instrumentation related to each screw size option. Note that when utilizing either the 2.8 mm Hexalobe Locking Drill Guide 6–65mm (80-0668), or the 2.3 mm Locking Drill Guide 6–65mm (80-0622), the screw length can be estimated by matching the laser line on the drill with the markings on the drill guide. When in between sizes, it is recommended to choose the shorter screw option. Advance screws until the head fully engages the plate.

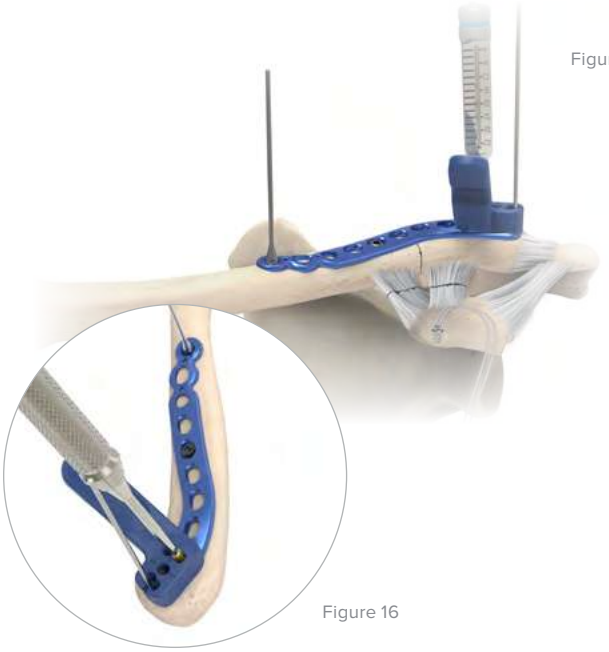


Figure 15

Figure 16

Screw Size Option	Locking Drill Guide	Drill	Depth Gauge	Driver	Driver Handle
3.5 mm Locking Hexalobe Screw (30-02XX)	2.8mmHexalobe Locking Drill Guide 6–65 mm (80-0668)	2.8 mm Quick Release Drill (80-0387)	Depth Gauge 6–65 mm (80-0623)	T15 Stick Fit Hexalobe Driver (80-0760)	Large Cannulated Quick Release Driver Handle (MS-3200)
3.0 mm Locking Hexalobe Screw (30-02XX)	2.3 mm Locking Drill Guide 6–65 mm (80-0622)	2.3 mm Quick Release Drill (80-0627)	Depth Gauge 6–65 mm (80-0623)	T15 Stick Fit Hexalobe Driver (80-0760)	Large Cannulated Quick Release Driver Handle (MS-3200)
Optional 3.5 mm Locking Cortical (Hex) Screw (COL-3XX0)	3.5 mm Locking Drill Guide (MS-LDG35)	2.8 mm x 5" Quick Release Drill (MS-DC28)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)	2.5 mm Quick Release Hex Driver (HPC-0025)	Large Cannulated Quick Release Driver Handle (MS-3200)
Optional 2.7 mm Locking Cortical (Hex) Screw (COL-2XX0)	2.7 mm Locking Drill Guide (MS-LDG27)	2.0 mm x 5" Quick Release Drill (MS-DC5020)	6–70 mm Depth Gauge, 2 mm Increments (MS-9022)	2.5 mm Quick Release Hex Driver (HPC-0025)	Large Cannulated Quick Release Driver Handle (MS-3200)

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

2.3 mm Locking Drill Guide 6–65 mm (80-0622)

3.5 mm Locking Hexalobe Screw (30-02XX)

3.0 mm Locking Hexalobe Screw (30-02XX)

3.5 mm Locking Cortical (Hex) Screw (COL-3XX0)

2.7 mm Locking Cortical (Hex) Screw (COL-2XX0)

3.5 mm Locking Drill Guide (MS-LDG35)

2.7 mm Locking Drill Guide (MS-LDG27)

2.8 mm Quick Release Drill (80-0387)

2.3 mm Quick Release Drill (80-0627)

2.8 mm x 5" Quick Release Drill (MS-DC28)

2.0 mm x 5" Quick Release Drill (MS-DC5020)

Depth Gauge 6–65 mm (80-0623)

6 mm–70 mm Depth Gauge, 2 mm Increments (MS-9022)

T15 Stick Fit Hexalobe Driver (80-0760)

2.5 mm Quick Release Hex Driver (HPC-0025)

Large Cannulated Quick Release Driver Handle (MS-3200)

Acu-Sinch® Repair System [continued]

Figure 17

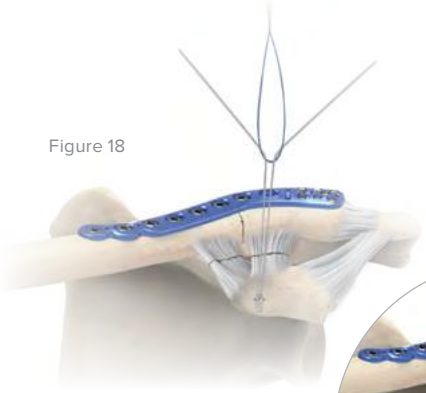


Figure 18

Figure 19

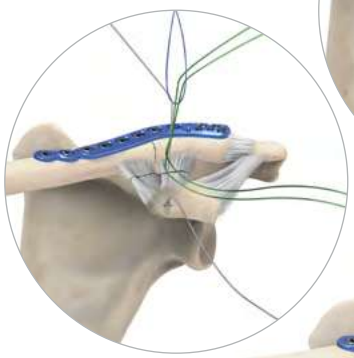


Figure 20

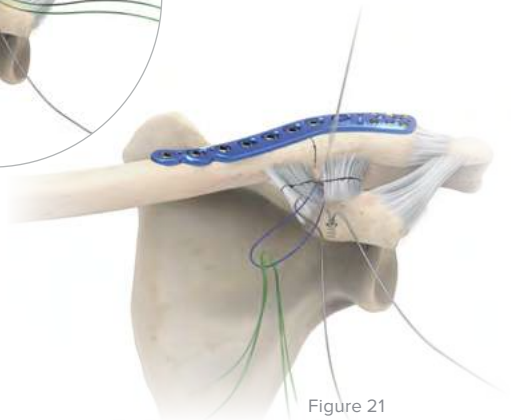


Figure 21

10 Drill

Identify the slot or slots 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 Quick Release Drill (MS-DC28 or 80-0387) under power, center the drill in a slot and drill through both cortices of the clavicle.

Caution: When drilling through the slot (or slots), care should be taken to protect the Acu-Sinch Repair System suture from the drill bit and to avoid damage of neurovascular structures.

11 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 (recommended but not provided in the Acu-Sinch Repair System) can be pulled through the clavicle at the same time to use 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.

2.8 mm x 5" Quick Release Drill
(MS-DC28)

2.8 mm Quick Release Drill
(80-0387)

Acu-Sinch® Repair System [continued]

12 Suture Retainer Assembly, Reduction, and Knot Tying

If using a standard knot tying technique, orient the Acu-Sinch Suture Retainer (55-0005) 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 or retainers. Slide the suture retainer into the plate slot or slots to sit flush with the top surface of the plate.

Note: Make sure 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. If two anchors are used, repeat for the second location.

Note: Make sure there is no suture slack and that the suture is not twisted prior to seating the retainer into the plate.

For either knot tying technique, pull on the suture to get the proper tension and reduction, then 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: Care should be taken when positioning the suture knot to avoid soft tissue irritation when closing the incision with the standard knot tying technique.

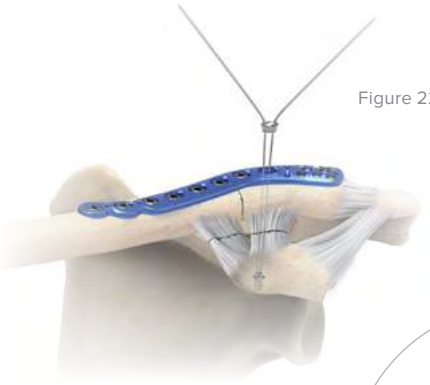


Figure 22

Figure 23

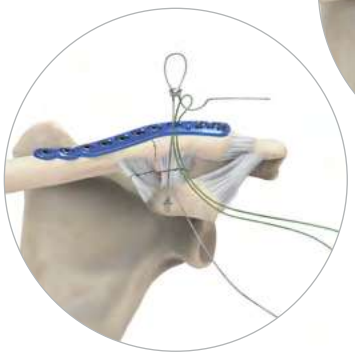


Figure 24

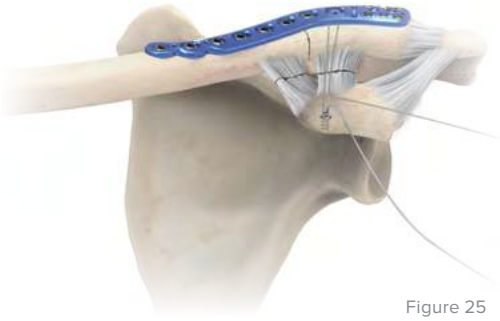


Figure 25

Acu-Sinch Suture Retainer
(55-0005)

Acu-Sinch® Repair System [continued]

Figure 26

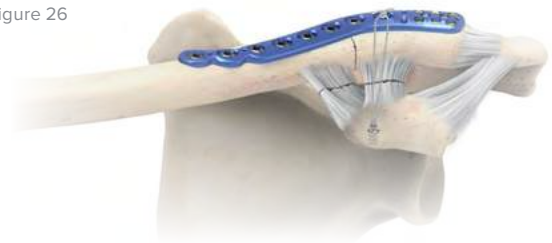
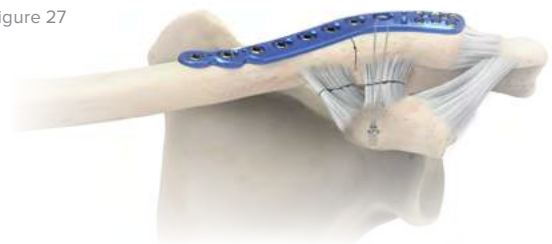


Figure 27



13 Wound Closure and Postoperative Protocol

An intraoperative radiograph is recommended to check the final reduction of the fracture and the position of the screws. After radiographic evaluation and routine irrigation, close the trapezial-deltoid fascia over the clavicle and AC joint. Follow by closure of the subcutaneous tissue and skin. Dress the wound and place the arm in an abduction pillow to bring the arm up and the clavicle down, unloading the AC joint.

Postoperative Protocol

Postoperative care is at the discretion of the surgeon. The following protocol is provided as an example:

Initiate passive range of motion exercises during the first four weeks in a supine position. The goal is to neutralize gravitational forces as much as possible in the first six weeks after surgery. A shoulder immobilizer with a 70° abduction pillow could facilitate this. Exercises may include pendulum, Codman, isometrics for biceps and rotator cuff, and elbow and wrist motion. Emphasize 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, start active assisted exercise from four to six weeks, and initiate active strengthening at six to eight weeks postoperatively, once healing is seen radiographically. A full return to activities is permitted once healing has occurred and patient shows painless range of motion and good strength.

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 small amount of soft tissue coverage over the Superior Distal Clavicle Plate in some patients.

Acu-Sinch® Repair System [continued]

14 Optional: Implant Removal Instructions

To remove the Acu-Sinch Repair System, ensure that an Acu-Sinch Kit (46-0001-S) 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 counterclockwise.

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

Caution: 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.

Acu-Sinch Removal Driver AO Shaft
(80-1950)

Quick Release Handle
(MS-1210)

Acutrak 2 5.5 Trephine
(80-0214)

References

1. Bishai SK, Plancher KD, Areson DG. Operative Treatment for Comminuted Midshaft Clavicle Fractures and Type IIB Distal Clavicle Fractures with Plating Techniques. In: Budoff JE, editor. Master Skills: Fractures of the Upper Extremity. Illinois: American Society for Surgery of the Hand. 2008. p. 395-403.
2. Renner et al. Scapula and Clavicle. *AO Principles of Fracture Management*. AO Publishing (Theime). 2007. 557-571.
3. Yeh PC, Miller SR, Cunningham JG, Sethi PM. Midshaft clavicle fracture and acromioclavicular dislocation: a case report of a rare injury. *J Shoulder Elbow Surg.* 2009;18(5):1-4.

Ordering Information

Trays and Caddies

Universal Tray Clavicle Plate Insert Base	80-0308
Universal Tray Large Base	80-0342
Universal Tray Large Lid	80-0343
Universal Tray Screw Insert Base	80-0346
Universal Tray Utility Insert	80-0347
Universal Tray Low Profile Clavicle Insert Base	80-0525
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
Clavicle 3 Instrument Tray 1	80-3789
Clavicle 3 Instrument Tray 2	80-3790
Optional	
Universal Tray Standard Screw Caddy	80-0348

Trial Plates

Distal Clavicle Plate Trial, Long	71-0111
Distal Clavicle Plate Trial, Short	71-0116
8-hole Lateral Anterior Clavicle Plate Trial	71-0118
8-hole Medial Anterior Clavicle Plate Trial	71-0119
6-hole Medial Anterior Clavicle Plate Trial	71-0120
10-hole Anterior Clavicle Plate Trial	71-0121
6-hole Lateral Anterior Clavicle Plate Trial	71-0122
Distal Clavicle Plate 3.5 mm 16-Hole Trial	7102-0416
Low Prof Clavicle Trial, 8-Hole Straight	71-0286
Low Prof Clavicle Trial, 8-Hole Large	71-0288
Low-profile Clavicle Trial, 8-hole Medium	71-0290
Low-profile Clavicle Trial, 8-hole Small	71-0292
Low-profile Clavicle Trial, 10-hole	71-0294
Narrow-profile Clavicle Trial, 6-hole	71-0296
Narrow-profile Clavicle Trial, 8-hole Straight	71-0298
Narrow-profile Clavicle Trial, 8-hole Large	71-0300
Low-profile Clavicle J-Plate Trial, 8-hole	71-0319
Locking Clavicle Plate 8-hole Straight Right Trial	75-0001
Locking Clavicle Plate 8-hole Straight Left Trial	75-0002
Distal Clavicle Plate 16-hole Trial Blank	99-0281

Acu-Sinch® Kit

Acu-Sinch Kit	46-0001-S
Acu-Sinch Driver Assembly*	80-0734
Acu-Sinch Drill*	80-0649
Acu-Sinch Suture Retainer*	55-0005

*Included in the Acu-Sinch Kit

Ordering Information

Tray Components

Superior Midshaft Clavicle Plates

1	Low-profile 10-hole, Right	70-0295
2	Low-profile 8-hole, Straight, Right	70-0287
3	Low-profile 8-hole, Large, Right	70-0289
4	Low-profile 8-hole, Medium, Right	70-0291
5	Low-profile 8-hole, Small, Right	70-0293
6	Narrow-profile, 6-hole, Right	70-0297
7	Narrow-profile, 8-hole, Straight, Right	70-0299
8	Narrow-profile, 8-hole, Large, Right	70-0301
9	Low-profile 8-hole, Straight, Left	70-0286
10	Low-profile 8-hole, Large, Left	70-0288
11	Low-profile 8-hole, Medium, Left	70-0290
12	Low-profile 8-hole, Small, Left	70-0292
13	Narrow-profile, 6-hole, Left	70-0296
14	Narrow-profile, 8-hole, Straight, Left	70-0298
15	Narrow-profile, 8-hole, Large, Left	70-0300
16	Low-profile 10-hole, Left	70-0294

Instrumentation

17	Clavicle Retractor	PL-CL03
18	CO/CA Countersink	PL-2080
19	2.5 mm Solid, Quick Release, Driver Tip	HT-2502
20	2.5 mm Flexible Hex Driver	80-0302
21	2.8 mm/3.5 mm Lag Guide	MS-DS2835
22	Sharp Hook	PL-CL06
23	3.5 mm Tap Sleeve Assembly	PL-2190

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Ordering Information [continued]

Tray Components

Superior Distal Clavicle Plates

1	16-Hole Distal Clavicle Plate, 2.3 mm, Right	70-0123
2	13-Hole Distal Clavicle Plate, 2.3 mm, Right	70-0125
3	12-Hole Distal Clavicle Plate, 3.5 mm, Right	70-0111
4	9-Hole Distal Clavicle Plate, 3.5 mm, Right	70-0116
5	9-Hole Distal Clavicle Plate, 3.5 mm, Left	70-0117
6	12-Hole Distal Clavicle Plate, 3.5 mm, Left	70-0112
7	13-Hole Distal Clavicle Plate, 2.3 mm, Left	70-0126
8	16-Hole Distal Clavicle Plate, 2.3 mm, Left	70-0124
9	Low-Profile Clavicle J-Plate, 8-Hole, Left	70-0319
10	Low-Profile Clavicle J-Plate, 8-Hole, Right	70-0320

Anterior Medial and Lateral Clavicle Plates

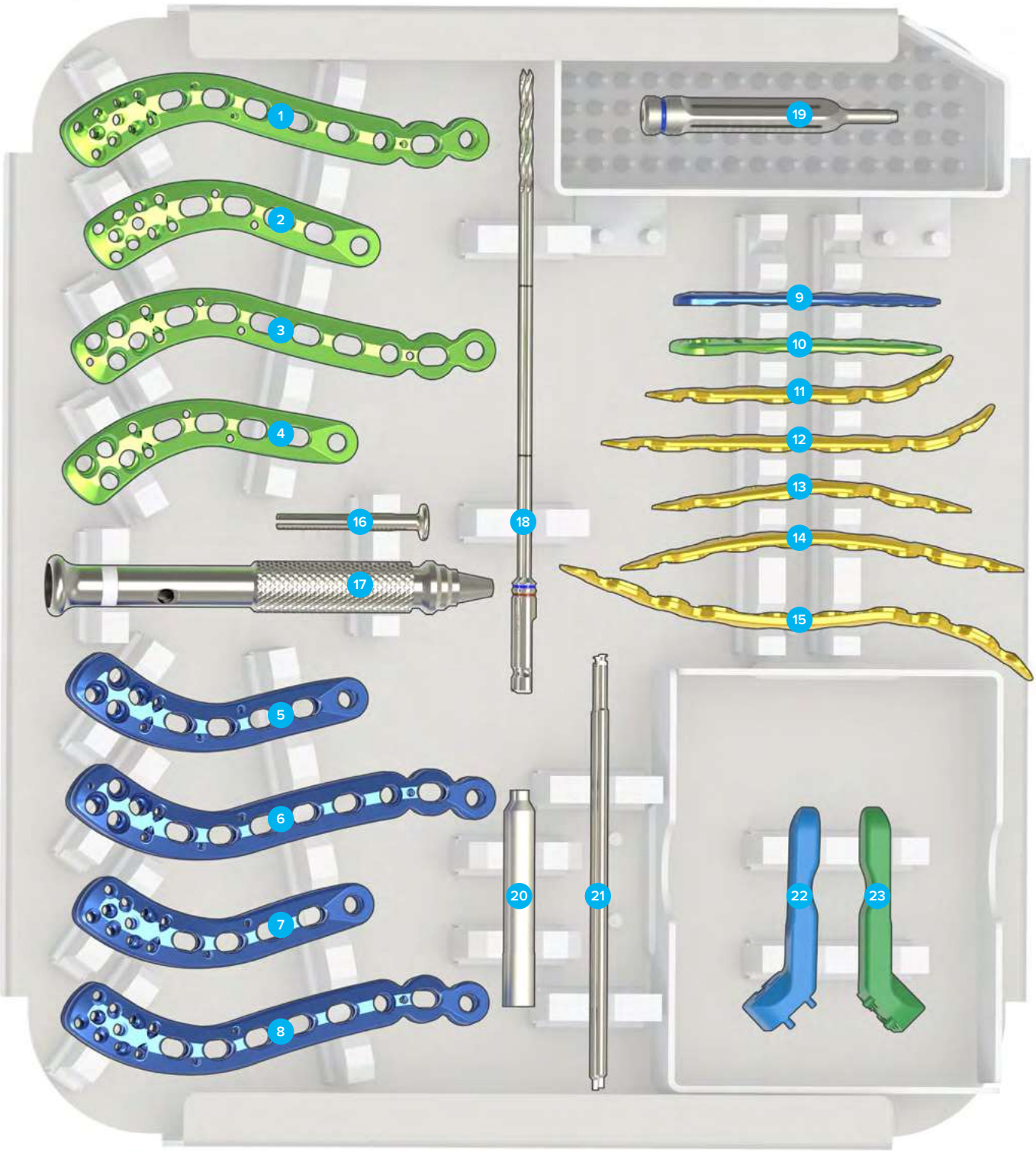
11	6-Hole Lateral Anterior Clavicle Plate	70-0122
12	8-Hole Lateral Anterior Clavicle Plate	70-0118
13	6-Hole Medial Anterior Clavicle Plate	70-0120
14	8-Hole Medial Anterior Clavicle Plate	70-0119
15	10-Hole Anterior Clavicle Plate	70-0121

Instrumentation

16	2.3 mm Screw Sleeve	MS-SS23
17	Cruciform Driver Handle	MS-2210
18	2.0 mm Quick Release Drill	80-0318
19	2.0 mm Locking Drill Guide, 4 mm–32 mm	80-0249
20	Drill Guide for Distal Screws	MS-LDG23
21	1.5 mm Hex Driver Tip	HPC-0015
22	Targeting Guide, Distal Clavicle Plate, Left	80-0451
23	Targeting Guide, Distal Clavicle Plate, Right	80-0450

Optional Sterile Implants

16-Hole Distal Clavicle Plate, 3.5 mm, Left	7002-0416L-S
16-Hole Distal Clavicle Plate, 3.5 mm, Right	7002-0416R-S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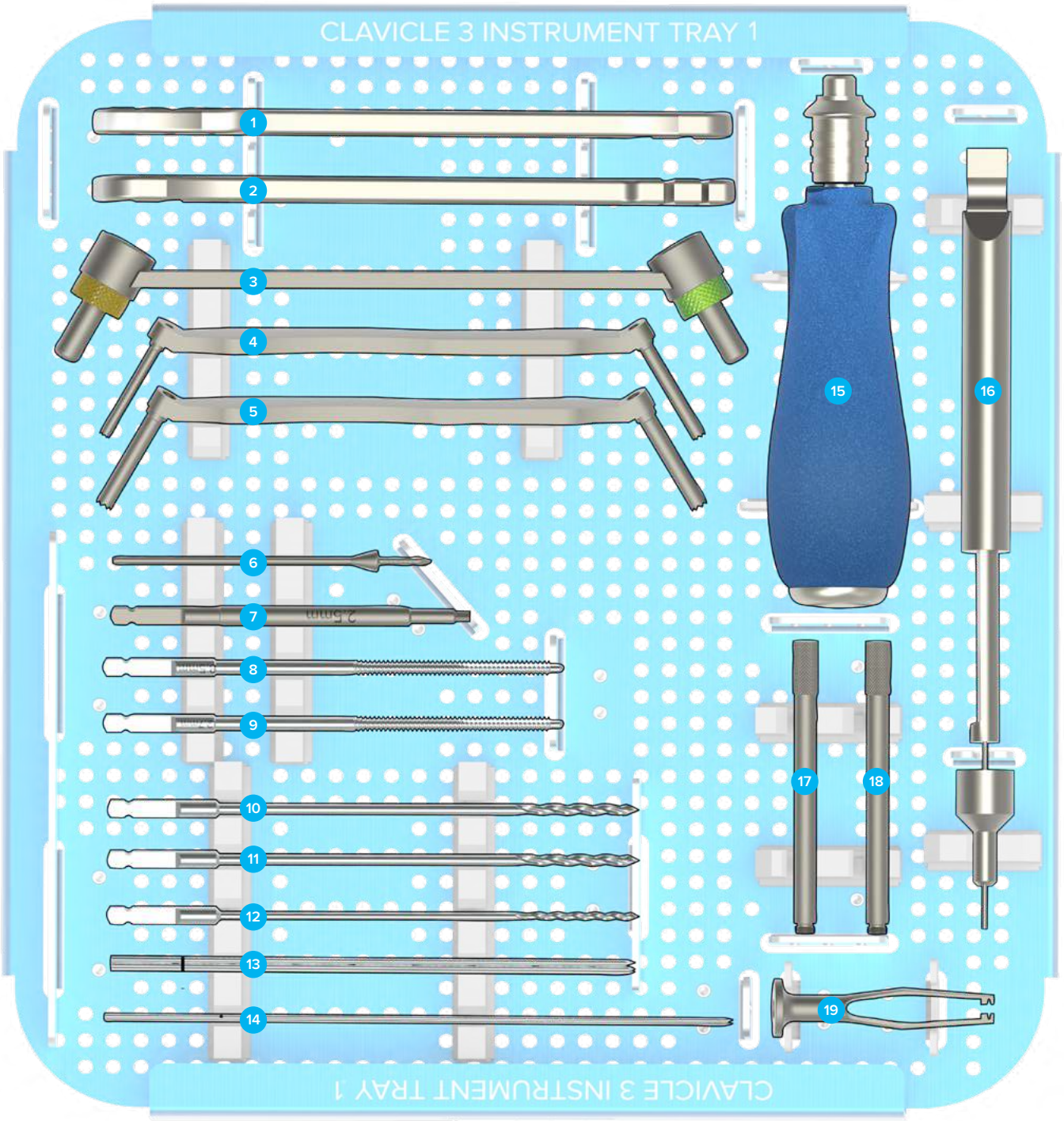
Ordering Information [continued]

Tray Components

Instrumentation

1	Plate Bender	PL-2040
2	Plate Bender, Large	PL-2045
3	Offset Drill Guide	PL-2095
4	2.0 mm/2.8 mm Thin Drill Guide	PL-2118
5	2.8 mm/3.5 mm Thin Drill Guide	PL-2196
6	Plate Tack	PL-PTACK
7	2.5 mm Quick Release Hex Driver	HPC-0025
8	3.5 mm Cortical Screw Bone Tap	MS-LTT35
9	2.7 mm Cortical Screw Bone Tap	MS-LTT27
10	3.5 mm x 5" Quick Release Drill	MS-DC35
11	2.8 mm x 5" Quick Release Drill	MS-DC28
12	2.0 mm x 5" Quick Release Drill	MS-DC5020
13	.059" x 5" ST Guide Wire*	WS-1505ST
14	.045" x 6" ST Guide Wire*	WS-1106ST
15	Large Cannulated Quick Release Driver Handle	MS-3200
16	6 mm–70 mm Depth Gauge, 2 mm Increments	MS-9022
17	2.7 mm Locking Drill Guide	MS-LDG27
18	3.5 mm Locking Drill Guide	MS-LDG35
19	3.5 mm Screw Driver Sleeve	MS-SS35

*Also used as a K-wire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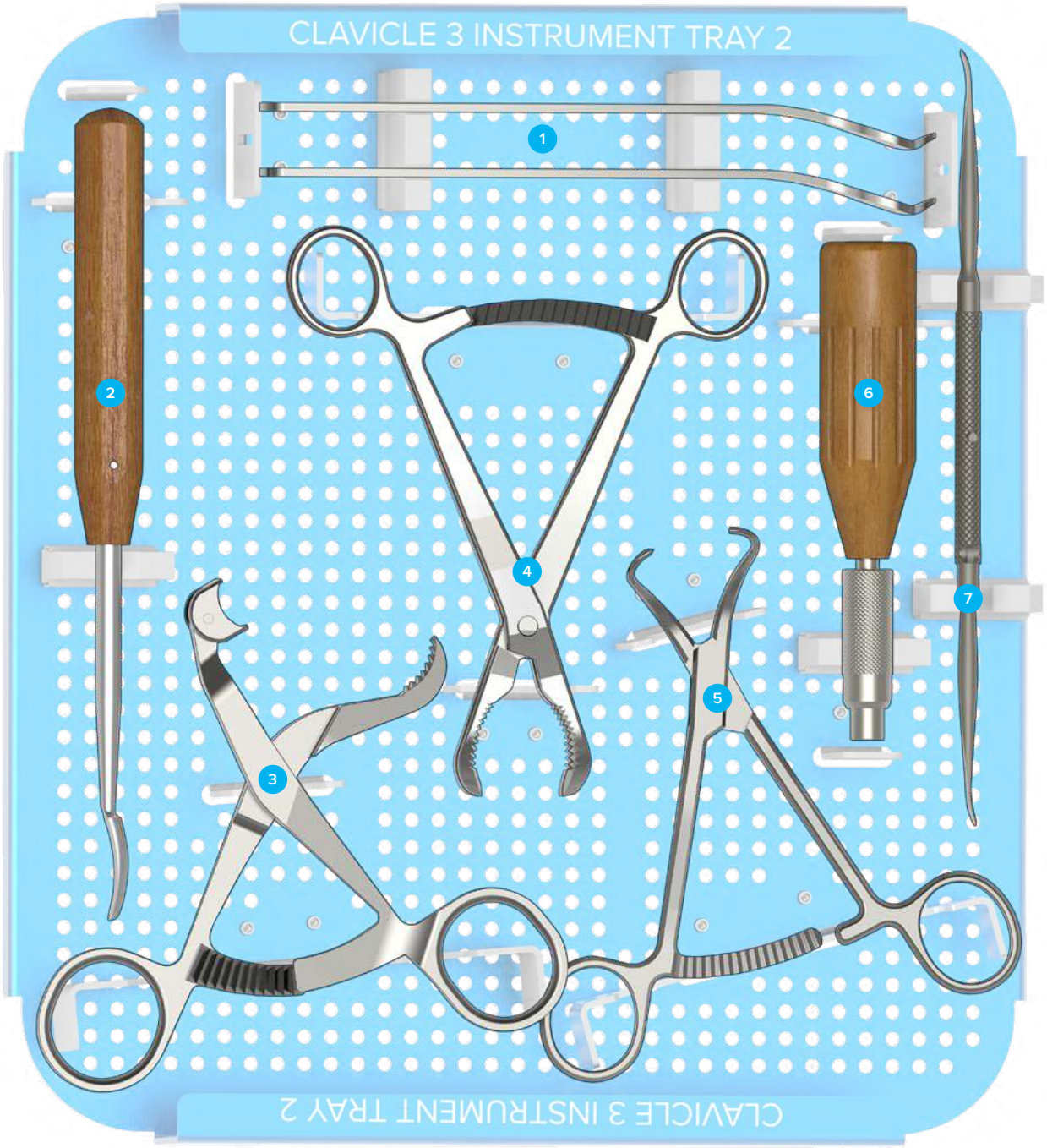
CLAVICLE 3 INSTRUMENT TRAY 1

Ordering Information [continued]

Tray Components

Instrumentation

1	15 mm Hohmann Retractor	MS-46827
2	Periosteal Elevator	MS-46212
3	Plate Clamp	80-0223
4	Reduction Forceps With Serrated Jaw	PL-CL04
5	Small Pointed Reduction Forceps	OW-1200
6	Quick Release Handle	MS-1210
7	Freer Elevator, 7.5	MS-57614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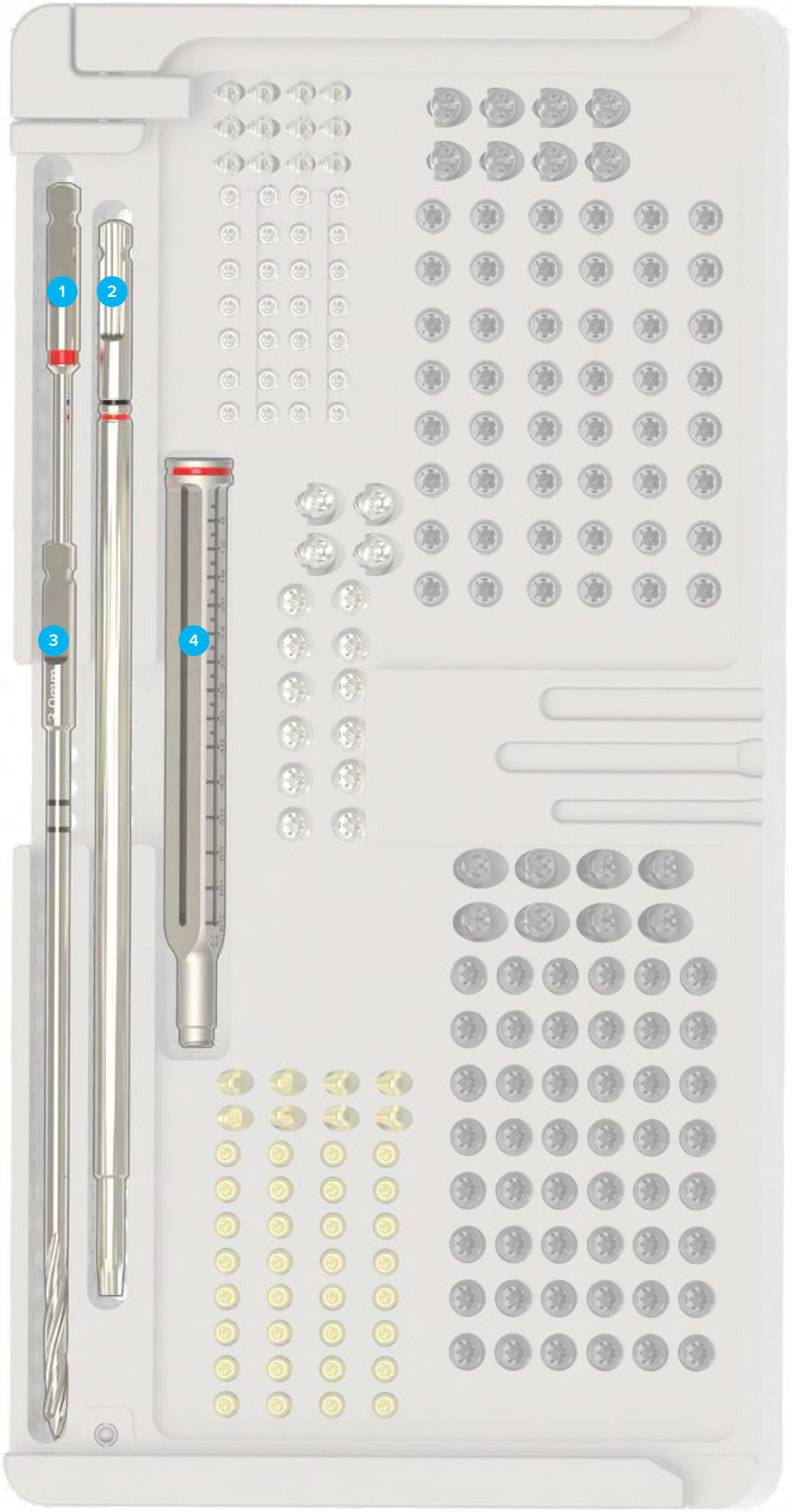
CLAVICLE 3 INSTRUMENT TRAY 2

Ordering Information [continued]

Tray Components

Instrumentation

1	2.3 mm Quick Release Drill	80-0627
2	T15 6" Long Stick Fit Hexalobe Driver	80-1065
3	3.0 mm x 5" Quick Release Drill	80-1088
4	2.3 mm Locking Drill Guide 6–65 mm	80-0622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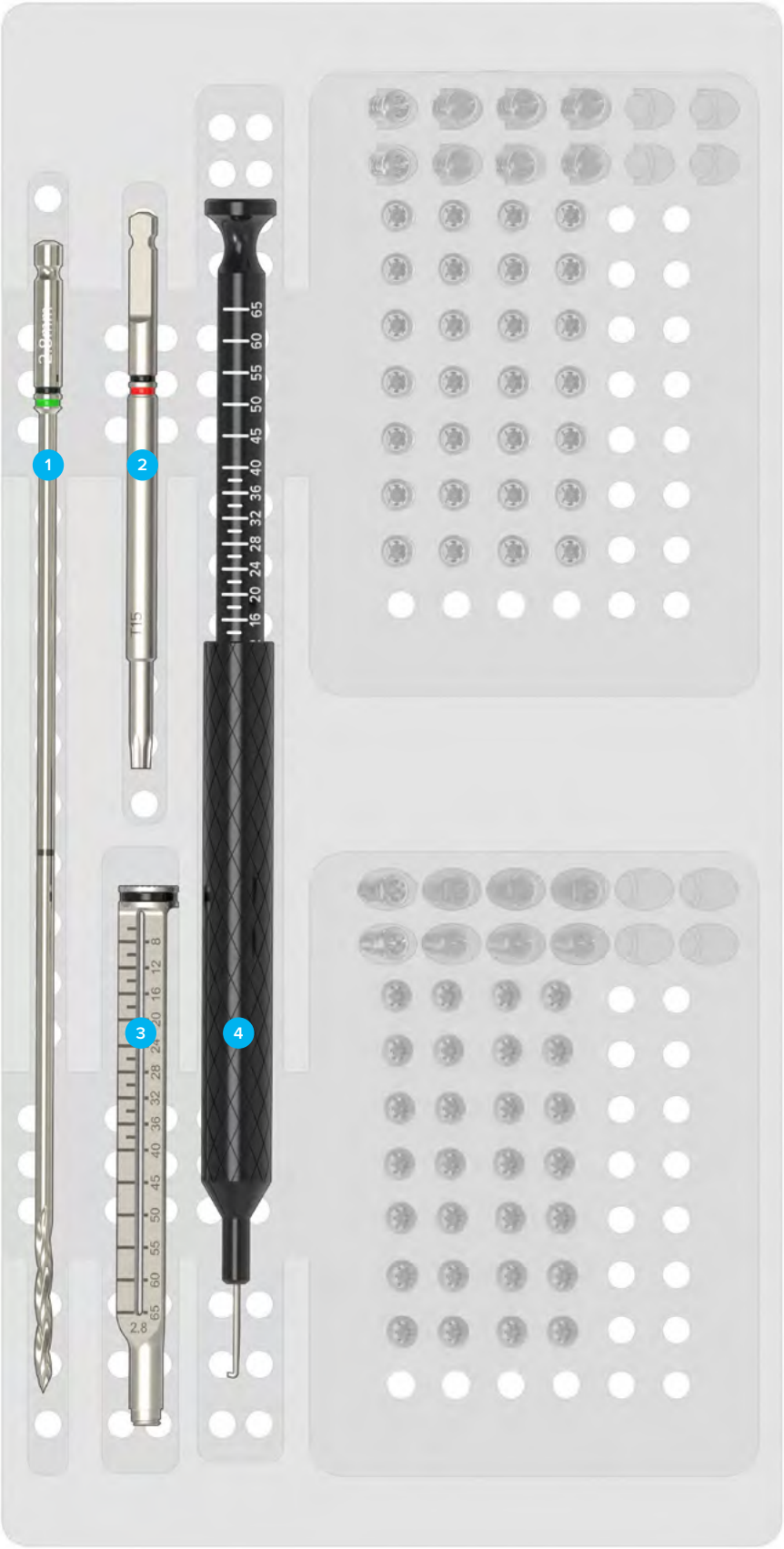
Ordering Information [continued]

Tray Components

Instrumentation

1	2.8 mm Quick Release Drill	80-0387
2	T15 Stick Fit Hexalobe Driver	80-0760
3	2.8 mm Hexalobe Locking Drill Guide 6–65 mm	80-0668
4	Depth Gauge 6–65 mm	80-0623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Ordering Information [continued]

Screws

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

3.5 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

Hexalobe Short 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

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

3.0 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 [continued]

Screws

4.0 mm Cancellous Screws

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

2.3 mm Non-Toggling (Nonlocking) Cortical (Hex) 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

2.3 mm Locking Cortical (Hex) 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

Ordering Information [continued]

Screws

2.7 mm (Nonlocking) Cortical (Hex) Screws		2.7 mm Locking Cortical (Hex) Screws	
2.7 mm x 8 mm Cortical Screw	CO-2708	2.7 mm x 8 mm Locking Cortical Screw	COL-2080
2.7 mm x 10 mm Cortical Screw	CO-2710	2.7 mm x 10 mm Locking Cortical Screw	COL-2100
2.7 mm x 12 mm Cortical Screw	CO-2712	2.7 mm x 12 mm Locking Cortical Screw	COL-2120
2.7 mm x 14 mm Cortical Screw	CO-2714	2.7 mm x 14 mm Locking Cortical Screw	COL-2140
2.7 mm x 16 mm Cortical Screw	CO-2716	2.7 mm x 16 mm Locking Cortical Screw	COL-2160
2.7 mm x 18 mm Cortical Screw	CO-2718	2.7 mm x 18 mm Locking Cortical Screw	COL-2180
2.7 mm x 20 mm Cortical Screw	CO-2720	2.7 mm x 20 mm Locking Cortical Screw	COL-2200
2.7 mm x 22 mm Cortical Screw	CO-2722	2.7 mm x 22 mm Locking Cortical Screw	COL-2220
2.7 mm x 24 mm Cortical Screw	CO-2724	2.7 mm x 24 mm Locking Cortical Screw	COL-2240
2.7 mm x 26 mm Cortical Screw	CO-2726	2.7 mm x 26 mm Locking Cortical Screw	COL-2260
2.7 mm x 28 mm Cortical Screw	CO-2728	2.7 mm x 28 mm Locking Cortical Screw	COL-2280
2.7 mm x 30 mm Cortical Screw	CO-2730	2.7 mm x 30 mm Locking Cortical Screw	COL-2300
2.7 mm x 32 mm Cortical Screw	CO-2732	2.7 mm x 32 mm Locking Cortical Screw	COL-2320
2.7 mm x 34 mm Cortical Screw	CO-2734	2.7 mm x 34 mm Locking Cortical Screw	COL-2340
2.7 mm x 36 mm Cortical Screw	CO-2736	2.7 mm x 36 mm Locking Cortical Screw	COL-2360
2.7 mm x 38 mm Cortical Screw	CO-2738	2.7 mm x 38 mm Locking Cortical Screw	COL-2380
2.7 mm x 40 mm Cortical Screw	CO-2740	2.7 mm x 40 mm Locking Cortical Screw	COL-2400
2.7 mm x 45 mm Cortical Screw	CO-2745	2.7 mm x 45 mm Locking Cortical Screw	COL-2450
2.7 mm x 50 mm Cortical Screw	CO-2750	2.7 mm x 50 mm Locking Cortical Screw	COL-2500
2.7 mm x 55 mm Cortical Screw	CO-2755	2.7 mm x 55 mm Locking Cortical Screw	COL-2550
2.7 mm x 60 mm Cortical Screw	CO-2760	2.7 mm x 60 mm Locking Cortical Screw	COL-2600
2.7 mm x 65 mm Cortical Screw	CO-2765	2.7 mm x 65 mm Locking Cortical Screw	COL-2650

Ordering Information [continued]

Screws

3.5 mm (Nonlocking) Cortical (Hex) 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 (Hex) 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 [continued]

Sterile Screws

3.5 mm Locking Hexalobe Screws

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

3.0 mm Locking Hexalobe Screws

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

3.5 mm Nonlocking Hexalobe Screws

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

3.0 mm Nonlocking Hexalobe Screws

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

Ordering Information [continued]

Sterile Screws

2.3 mm Locking Cortical Screws

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

4.0 mm Cancellous Screws

4.0 mm x 12.0 mm Cancellous Screw	CA-4120-S
4.0 mm x 14.0 mm Cancellous Screw	CA-4140-S
4.0 mm x 16.0 mm Cancellous Screw	CA-4160-S
4.0 mm x 18.0 mm Cancellous Screw	CA-4180-S
4.0 mm x 20.0 mm Cancellous Screw	CA-4200-S
4.0 mm x 22.0 mm Cancellous Screw	CA-4220-S
4.0 mm x 24.0 mm Cancellous Screw	CA-4240-S
4.0 mm x 26.0 mm Cancellous Screw	CA-4260-S

2.3 mm Non-Toggling Cortical Screws

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

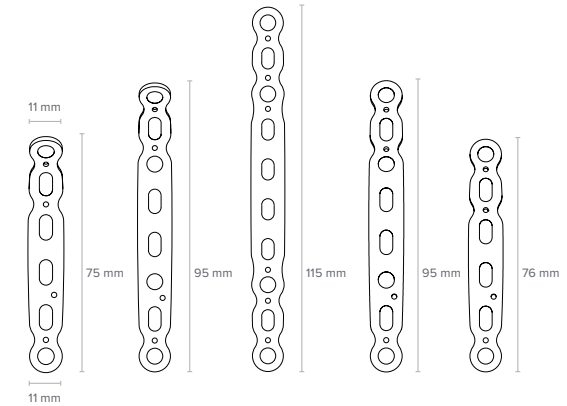
Ordering Information [continued]

Sterile Plates

Distal Clavicle Plate 3.5 mm 12-hole, Right	70-0111-S
Distal Clavicle Plate 3.5 mm 12-hole, Left	70-0112-S
Distal Clavicle Plate 3.5 mm 9-hole, Right	70-0116-S
Distal Clavicle Plate 3.5 mm 9-hole, Left	70-0117-S
8-hole Lateral Anterior Clavicle Plate	70-0118-S
8-hole Medial Anterior Clavicle Plate	70-0119-S
6-hole Medial Anterior Clavicle Plate	70-0120-S
10-hole Anterior Clavicle Plate	70-0121-S
6-hole Lateral Anterior Clavicle Plate	70-0122-S
Distal Clavicle Plate 2.3 mm 16-hole, Right	70-0123-S
Distal Clavicle Plate 2.3 mm 16-hole, Left	70-0124-S
Distal Clavicle Plate 2.3 mm 13-hole, Right	70-0125-S
Distal Clavicle Plate 2.3 mm 13-hole, Left	70-0126-S
Low-profile Clavicle Plate, 8-hole Straight, Left	70-0286-S
Low-profile Clavicle Plate, 8-hole Straight, Right	70-0287-S
Low-profile Clavicle Plate, 8-hole Large, Left	70-0288-S
Low-profile Clavicle Plate, 8-hole Large, Right	70-0289-S
Low-profile Clavicle Plate, 8-hole Medium, Left	70-0290-S
Low-profile Clavicle Plate, 8-hole Medium, Right	70-0291-S
Low-profile Clavicle Plate, 8-hole Small, Left	70-0292-S
Low-profile Clavicle Plate, 8-hole Small, Right	70-0293-S
Low-profile Clavicle Plate, 10-hole Left	70-0294-S
Low-profile Clavicle Plate, 10-hole Right	70-0295-S
Narrow-profile Clavicle Plate, 6-hole Left	70-0296-S
Narrow-profile Clavicle Plate, 6-hole Right	70-0297-S
Narrow-profile Clavicle Plate, 8-hole Straight, Left	70-0298-S
Narrow-profile Clavicle Plate, 8-hole Straight, Right	70-0299-S
Narrow-profile Clavicle Plate, 8-hole Large, Left	70-0300-S
Narrow-profile Clavicle Plate, 8-hole Large, Right	70-0301-S
Low-profile Clavicle J-Plate, 8-hole Left	70-0319-S
Low-profile Clavicle J-Plate, 8-hole Right	70-0320-S

Clavicle Plating Diagrams

Anterior Medial and Lateral Clavicle Plates



(70-0122) 6-Hole Lateral Anterior Clavicle Plate

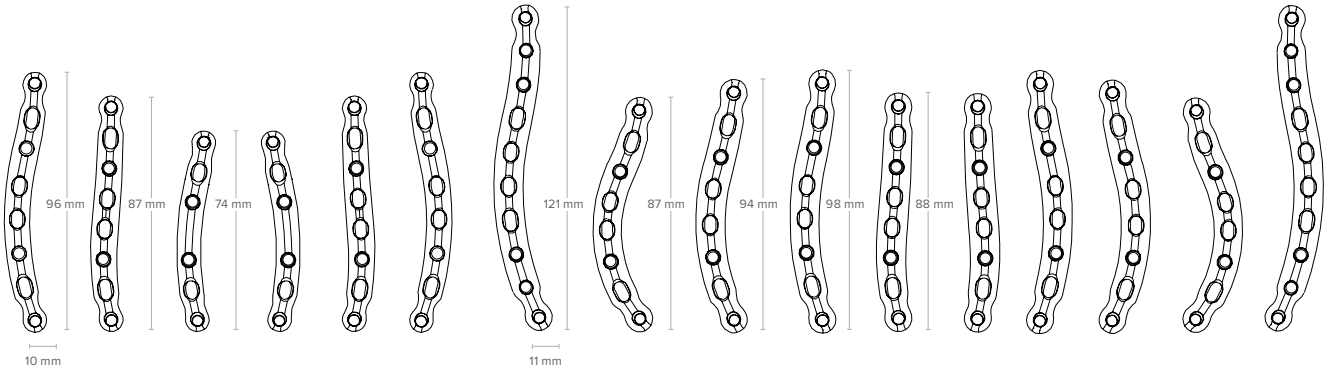
(70-0118) 8-Hole Lateral Anterior Clavicle Plate

(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) Narrow-Profile 8-Hole Large, Left

(70-0298) Narrow-Profile 8-Hole Straight, Left

(70-0296) Narrow-Profile 6-Hole Left

(70-0297) Narrow-Profile 6-Hole Right

(70-0299) Narrow-Profile 8-Hole Straight, Right

(70-0301) Narrow-Profile 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

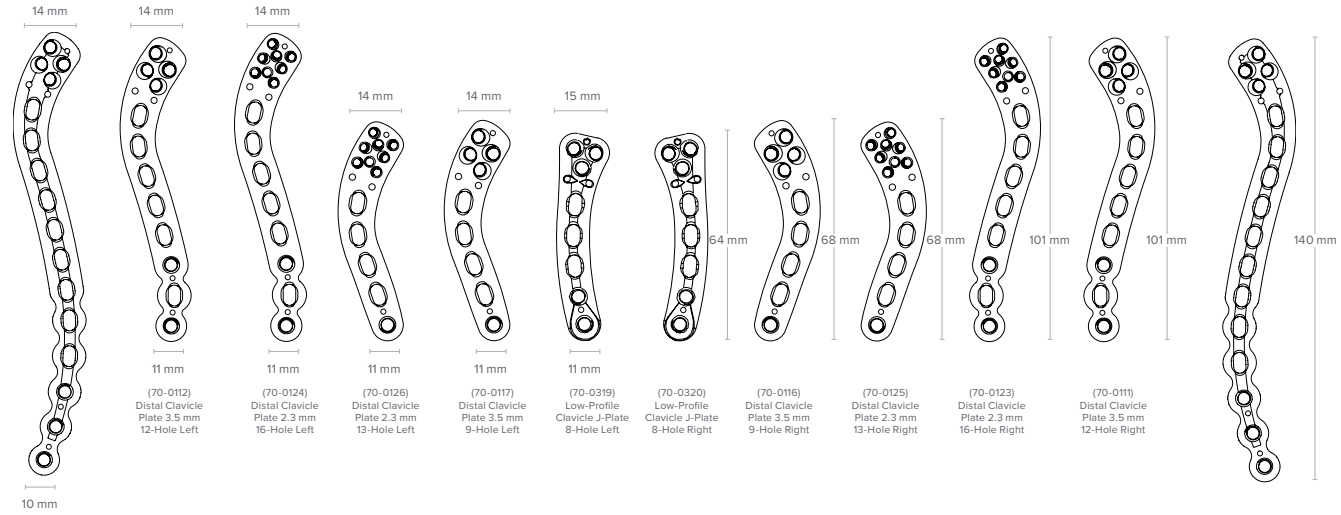
(70-0289) Low-Profile 8-Hole Large, Right

(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

Notes:

Notes:

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