stryker

VariAx® 2 Clavicle
Locking Plate System

Operative technique

VariAx 2 Clavicle
Locking Plate System

Contents

This publication sets forth detailed recommended procedures for using Stryker devices and instruments.

It offers guidance that you should heed, but, as with any such technical guide, each surgeon must consider the particular needs of each patient and make appropriate adjustments when and as required. A workshop training is recommended prior to first surgery.

All non-sterile devices must be cleaned and sterilized before use. Follow the instructions provided in our reprocessing guide (OT-RG-1). Multi-component instruments must be disassembled for cleaning. Please refer to the corresponding assembly/ disassembly instructions.

Please remember that the compatibility of different product systems has not been tested unless specified otherwise in the product labeling.

See package insert (instruction for use) (V15011 amd V15013) for a complete list of potential adverse effects, contraindications, warnings and precautions. The surgeon must discuss all relevant risks including the finite lifetime of the device with the patient when necessary.

Introduction

Clavicle fractures have long been treated non-operatively. However, studies have shown that fractures with comminution and / or significant displacement may be better served with surgical intervention1.

Nevertheless, the distinct anatomic shape of the clavicle poses difficulties for stable fixation and anatomic fit with conventional plating systems including midshaft and lateral fractures, mal-unions, and non-unions. Also, the clavicle may be stabilized either with fixation placed superiorly or anteriorly based on surgeon preference and fracture type.

With this in mind, Stryker has developed the VariAx 2 Clavicle Locking Plate System: an anatomically shaped, variable angled locking plate system, which offers a range of plate choices designed to address these common fractures. Given this range, surgeons may choose how best to fix the bone with the approach that they see fit.

Made of titanium alloy (Ti6Al4V) and treated with a Type II anodization, these plates are designed to carry the loads that are required of them while remaining low profile. Additionally, if locking is required, the 3.5mm and 2.7mm locking screws can be locked within a 30° cone in any circular hole.

The following pages contain a step by step operative technique which illustrates this locking plate system.

Superior midshaft plates

Superior lateral plate

Anterior midshaft plate

Anterior lateral plate

Lateral hook plate

1. Nonoperative Treatment Compared with Plate Fixation of Displaced Midshaft Clavicular Fractures. A Multicenter, Randomized Clinical Trial Canadian Orthopaedic Trauma Society J Bone Joint Surg Am. 2007;89:1-10. doi:10.2106/JBJS.F.00020

Indications, precautions & contraindications

Indications

Superior Midshaft & Lateral Plates and Anterior Midshaft & Lateral Plates

Indicated for fixation of single, segmental, and comminuted fractures, osteotomies, mal-unions, and non-unions of the clavicle.

Lateral Hook Plates

Indicated for fixation of lateral clavicle fractures, osteotomies, mal-unions, non-unions and dislocations of the acromioclavicular joint.

Contraindications

Any active or suspected latent infection or marked local inflammation in or about the affected area.

Compromised vascularity that would inhibit adequate blood supply to the fracture or the operative site.

Bone stock compromised by disease, infection or prior implantation that can not provide adequate support and/or fixation of the devices.

Material sensitivity, documented or suspected.

Obesity. An overweight or obese patient can produce loads on the implant that can lead to failure of the fixation of the device or to failure of the device itself.

Patients having inadequate tissue coverage over the operative site.

Implant utilization that would interfere with anatomical structures or physiological performance.

Any mental or neuromuscular disorder which would create an unacceptable risk of fixation failure or complications in postoperative care.

Other medical or surgical conditions which would preclude the potential benefit of surgery.

Precautions

Stryker systems have not been evaluated for safety and compatibility in MR environment and have not been tested for heating or migration in the MR environment, unless specified otherwise in the product labeling.

System overview

Implant choice

Surgeons may choose to treat clavicle fractures with plates either with a superior approach or an anterior approach.

The VariAx 2 Clavicle System offers a range of midshaft and lateral plates which are anatomically contoured to the superior or anterior surface of the bone. Additionally, the surgeon has a choice of different plate curvatures designed to fit various anatomies. Finally, these plates accept either 3.5mm or 2.7mm non-locking or locking screws.

Implant choice

The 3-dimensional anatomy of the clavicle is complex and varies from person to person. Stryker uses a CT Scan Database of clavicles of different size, gender, and ethnicity to design plates which are 3-dimensionally contoured.

Superior plates

Left **Right**

Midshaft

Lateral

Hook

Anterior plates - universal

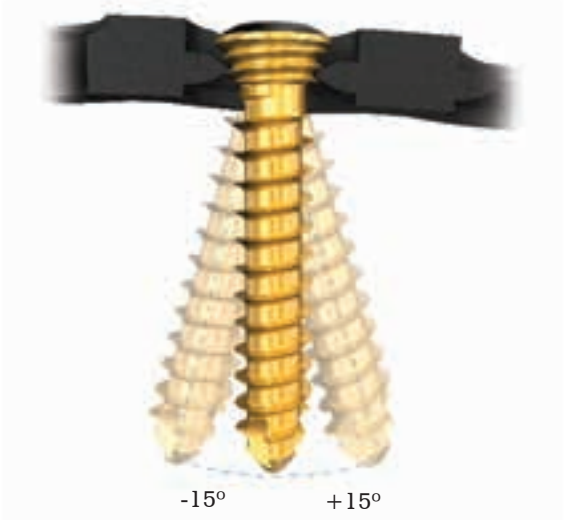
Midshaft **Lateral**

System overview

SmartLock locking technology[2]

The polyaxial locking technology works by using two different grades of titanium. Locking screws are made of titanium alloy (Ti6A14V) which is stronger than the pure titanium plate holes. When a screw is driven into a plate hole, the locking threads on the underside of the screw engage the circular 'lip' in the hole.

This technology allows the surgeon to aim and lock the screw within a 30° cone. For example, this may be helpful for fixation using the superior lateral plates, where the screw trajectory in the expanded lateral clavicle fragment can be chosen.



Type II anodization

The plates are processed with a Type II Anodization treatment.

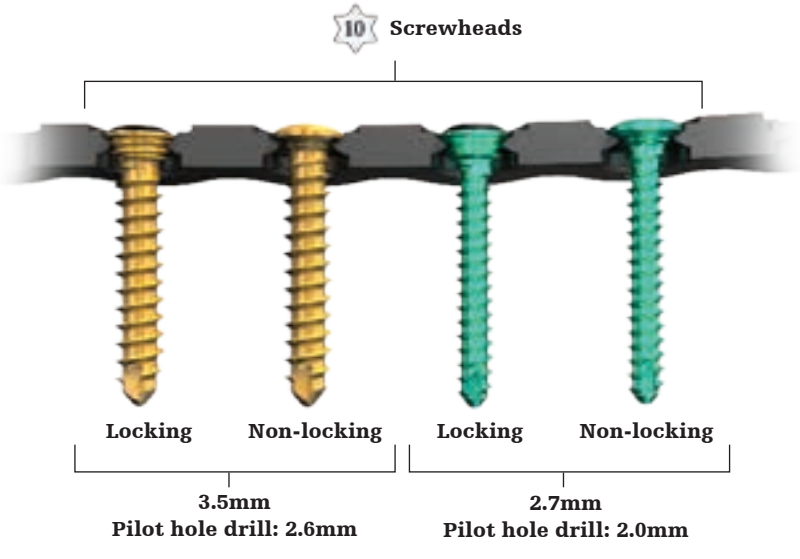
Locking or non-locking screws

The circular holes in the locking plates provide an option for locking and non-locking screws.

3.5mm or 2.7mm screws

The plates are used with either 3.5mm or 2.7mm screws, giving the choice of screws size based on the anatomy and fracture pattern.

Additionally, all screws in the system are inserted with the same T10 screwdriver for ease-of-use.



2. The SmartLock Technology is patented by Professor Dietmar Wolter, Hamburg Germany

Operative technique

Operative technique

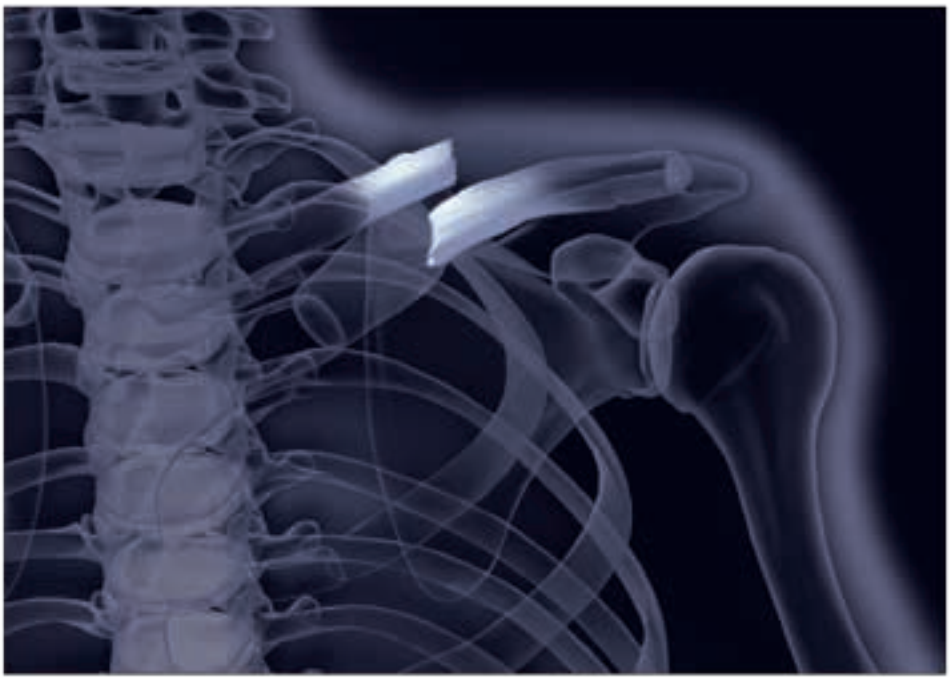
Examination, imaging, and patient positioning is done in the same manner for both superior and anterior plating as well as for midshaft and lateral fractures.

Examination / imaging

The overlying skin and soft tissues are examined for deficits, old scars, or previous incisions. The length of the injured clavicle is measured from the sternoclavicular joint to the acromioclavicular joint, and compared to the opposite uninjured side both clinically and radiographically.

A carefully documented neurovascular examination of the upper extremity is performed to document any preoperative injury. Anteroposterior and 20° cephalad upshot views of the clavicle are obtained to assess fracture configuration.

After implantation, final radiographs are taken to ensure accurate fracture reduction and screw/plate placement.



An anteroposterior radiograph of a completely displaced midshaft clavicle fracture with significant displacement and rotation at the fracture site

Patient positioning

Use of a general anesthetic is preferred. The patient is placed in the beach chair position using a footboard to support the weight of the body and cushioned safety straps over the knees to prevent knee flexion. A small bump is placed under the posteromedial aspect of the shoulder girdle. The clavicle is prepared and draped using a laparotomy drape with the arm at the side. The operative arm may be free draped, but this is not typically necessary.

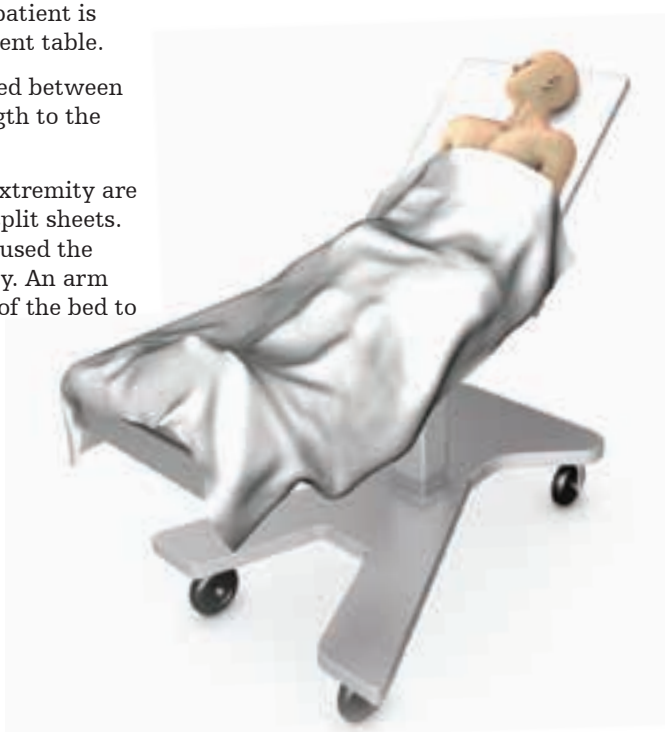
A bump under the shoulder girdle will aid in fracture reduction, as it allows the shoulder and lateral fragment to lateralize or "fall away" from the fracture site.

Positioning the head and endotracheal tube away from the operative site will allow greater access to the clavicle in the case of midshaft fractures. Tape across the forehead may be used to further stabilize the head position.

For an anterior approach, an alternative position may be used. The patient is placed supine on a radiolucent table.

A small towel bump is placed between the scapulas to provide length to the clavicles.

The clavicle and involved extremity are prepped and draped using split sheets. An impervious stockinet is used the wrap the involved extremity. An arm board is placed on the side of the bed to support the arm.



3. Portions of this operative technique are referenced from the following: Hall JA, McKee MD, Open reduction and plate fixation of displaced clavicle fractures, in "Orthopaedic Trauma Surgery: Operative Techniques", Schemitsch EH, McKee MD, eds, Chapter 1, pp 3-11, Saunders/ Elsevier, 2010, Philadelphia

Operative technique

Portals / exposures

The clavicle is exposed along the anterosuperior subcutaneous border. A 5 to 10cm incision is centered over the fracture site. As surgeons´ experience improves, smaller incisions may be possible and preferred.

If noted, superficial branches of the intermediate supraclavicular nerve are identified and protected. The skin edges are undermined in the subcutaneous plane to facilitate a mobile window of exposure.

The fascia and periosteum are often disrupted, and this defect is extended medially and laterally to create anterior and posterior soft tissue flaps for fracture visualization.

Any dissection that is required inferior to the clavicle must be done very carefully due to the proximity of the neurovascular structures.

A superior subcutaneous approach to the clavicle allows for fracture visualization without significant soft tissue dissection.

A two-layer exposure allows for a two-layer closure, providing greater soft tissue coverage of the hardware and fracture.

An alternative to this transverse incision is a vertical incision over the fracture site along Langer's lines.

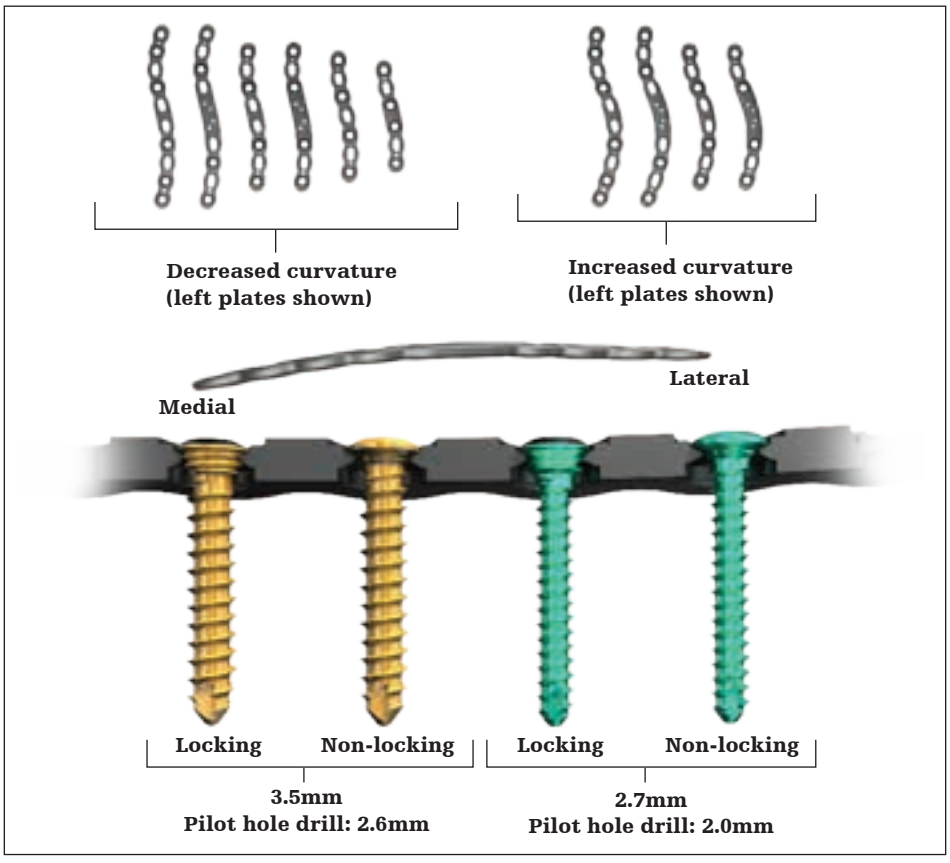
Implant choice / fracture reduction

The VariAx 2 system offers plates and screws in various shapes and sizes. The chart here shows the plate contours, lengths, and hole configurations as well as the screw diameters and types. 6 and 8 Hole Bridge Plates as well as standard 8 and 10 Hole Plates are designed in two different contours: decreased and increased curvature to accommodate different medial to lateral curvatures. All superior plates are curved to adapt to the AP bow of the clavicle.

The Bridge Plates are designed with suture holes which may be used to help reduce and hold comminuted fracture fragments.

All superior midshaft plates are marked with "Lat" and "Med" to indicate the standard fit of the plate. However, the surgeon may turn the plate 180° as needed for proper plate / bone fit.

Last, the system offers 3.5mm and 2.7mm locking and non-locking screws. Both screw diameters have the same screwhead diameter, which allows the surgeon to place either screw in the same plate hole.



Note: Only non-locking screws may be placed in the oblong holes of the plate. Circular holes accept either locking or non-locking screws.

4. The superior midshaft technique was written with guidance from Professors Michael McKee and Emil Schemitsch

Operative technique
Superior midshaft technique

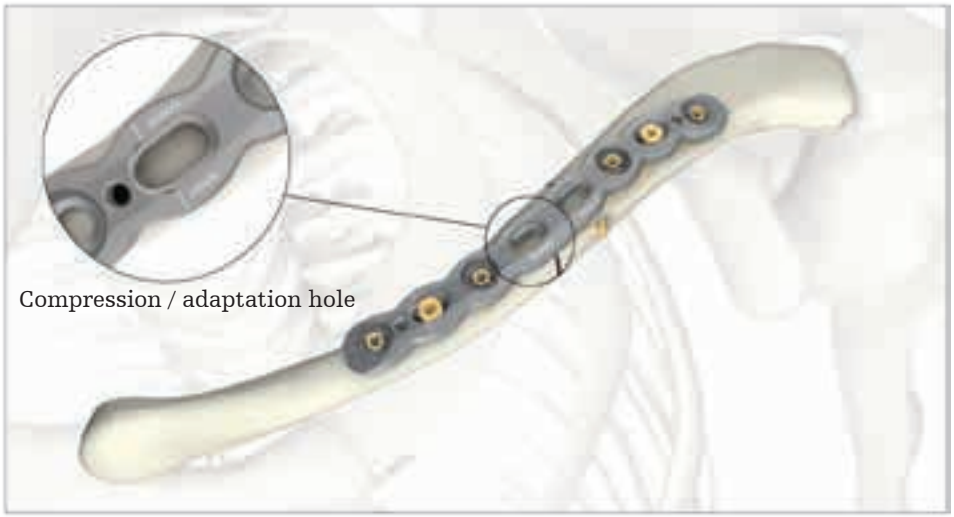
Implant choice/fracture reduction

The fracture ends are exposed and debrided of interposed hematoma and soft tissues. The fracture is reduced and may be held in place with Kirschner wires and/or reduction instruments with reduction techniques of the surgeon's choice. A lag screw may be placed perpendicular to the fracture plane (if possible). The system includes a countersink if required.

If axial compression using the plate is desired, do not use an independent lag screw in this step.

Plate fixation and optional compression

After the plate is positioned centrally over the fracture site, the plate is fixed to the bone in the usual manner. k-wire holes are designed in the plate to facilitate this fixation. The oblong holes can act as adaption holes to help with plate positioning or they can act as compression holes. It is important to note that if axial compression is desired, non-locking screws should be used in the oblong holes before any circular holes on the same side of the fracture are filled. Furthermore, an independent lag screw should not be used prior to axial compression. Compression is performed by placing a screw in the compression region of the plate. This is facilitated by using the Drill Guide for Compression (703882 for a 3.5mm screw or 703883 for a 2.7mm screw). Each uni-directional compression hole is marked with a line where the compression initiates. Bi-directional compression holes have no directional laser markings.



Also of note, any non-locking screws or lag screws must be placed in the plate before any locking screws are placed.

The circular holes in the plate can accept either locking or non-locking screws based on surgeon preference and fracture fixation. Make sure to use the proper drill guide which corresponds to the screw to be used.

Last, it is recommended to have at least 3 screws on either side of the fracture which are placed bi-cortically.

Operative technique
Anterior midshaft technique[5]

Portals / exposures

The clavicle is exposed along the anterosuperior subcutaneous border. A 5 to 10cm incision is centered over the fracture site. As surgeon's experience improves, smaller incisions may be possible and preferred.

If noted, superficial branches of the intermediate supraclavicular nerves are identified and protected. The fascia and periosteum are often disrupted, and this defect is extended medially and laterally to expose the fracture site.

The pectoralis major and deltoid origins on the anterioinferior portion of the clavicle may need to be elevated to expose the plating surface.

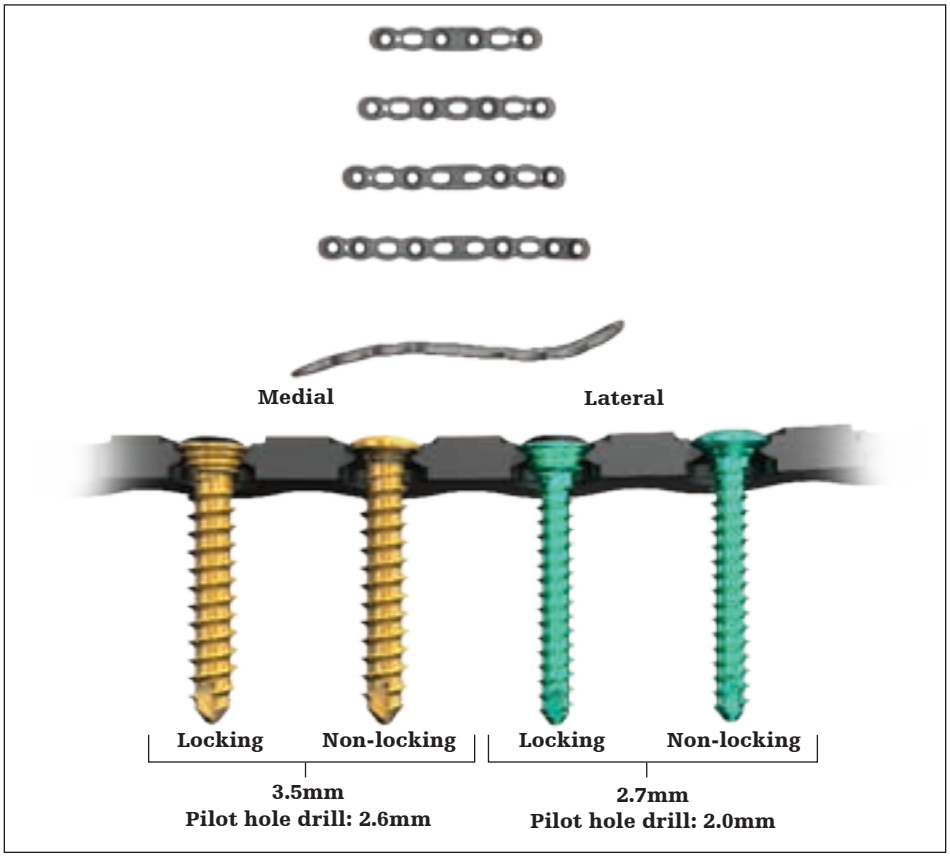
After the plating procedure, the muscle may be reattached over the plate. An alternative to this transverse incision is a vertical incision over the fracture site along Langer's lines.

Implant choice / fracture reduction

The VariAx 2 system offers plates and screws in various shapes and sizes. The chart to the right shows the plate range, lengths, and hole configurations as well as the screw diameters and types.

Also, the system offers 3.5mm and 2.7mm locking and non-locking screws. Both screw diameters have the same screwhead diameter, which allows the surgeon to place either screw in the same plate hole.

Note:
Only non-locking screws may be placed in the oblong holes of the plate. Circular holes accept either locking or non-locking screws.



5. The anterior midshaft technique was written with guidance from Dr. Howard Richter

Operative technique
Anterior midshaft technique

Implant choice / fracture reduction

The fractured ends are exposed and debrided of interposed hematoma and soft tissues. The fracture is reduced and may be held in place with Kirschner wires and /or reduction instruments with reduction techniques of the surgeon's choice. A lag screw may be placed perpendicular to the fracture plane (if possible).

This may be done anteriorly through one of the plate holes or in an independent interfragmentary manner. The system includes a countersink (45-80040) if required.

If axial compression using the plate is desired, do not use an independent lag screw in this step.

Note:
Take care when using the Lag Screw Drill Guide (703686 for 3.5mm screws or 703687 for 2.7mm screws) for overdrilling through a plate hole as the drill guide's tip or overdrill (703694 for 3.5mm screws or 703695 for 2.7mm screws) could be damaged or could damage the plate hole.

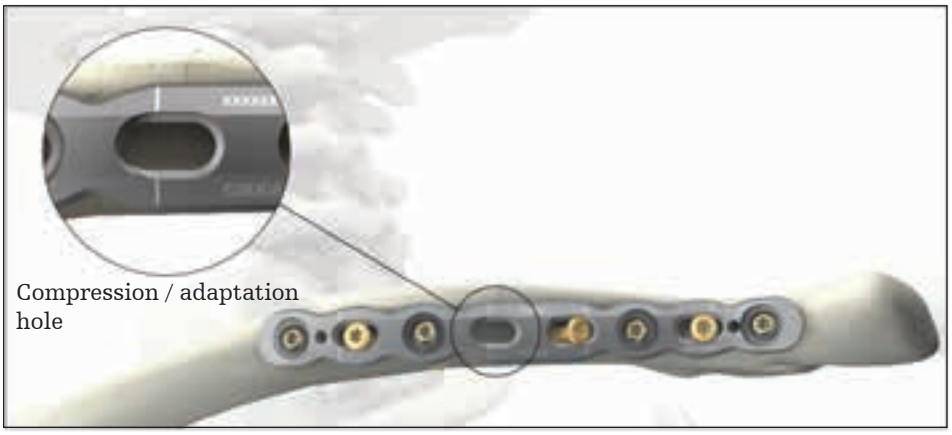
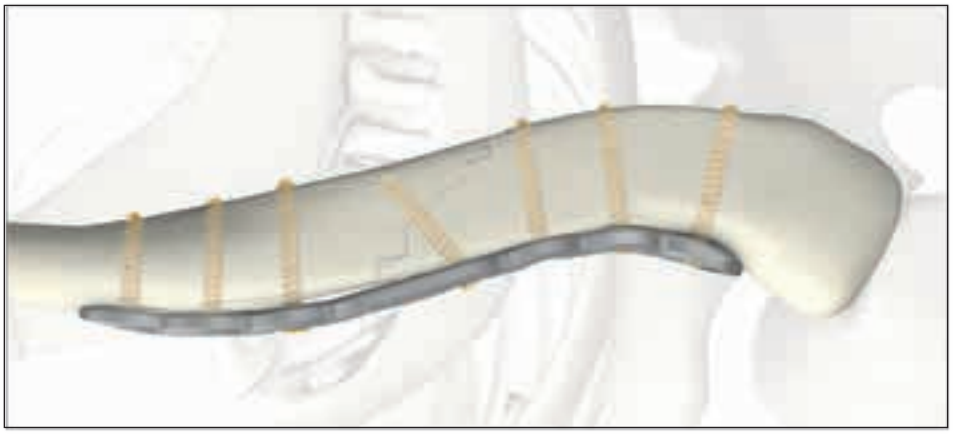


Plate fixation and optional compression

After the plate is positioned centrally over the fracture site, the plate is fixed to the bone in the usual manner. The oblong holes can act as adaption holes to help with plate positioning or they can act as compression holes. It is important to note that if axial compression is desired, non-locking screws should be used in the oblong holes before any circular holes on the same side of the fracture are filled. Furthermore, an independent lag screw should not be used prior to axial compression. Compression is performed by placing a screw in the compression region of the plate. This is facilitated by using the Drill Guide for Compression (703882 for a 3.5mm screw or 703883 for a 2.7mm screw). Each uni-directional compression hole is marked with a line where the compression initiates. Bi-directional compression holes have no directional laser markings. Also of note,



any non-locking screws or lag screws must be placed in the plate before any locking screws are placed. The circular holes in the plate can accept either locking or non-locking screws based on surgeon preference and fracture fixation. Be sure to use the drill guide that corresponds to the screw to be used.

Last, it is recommended to have at least 3 screws on either side of the fracture which are placed bi-cortically.

Operative technique
Superior lateral technique[6]

Portals / exposures

The clavicle is exposed along the anterosuperior subcutaneous border. A 3 to 5cm incision is centered over the fracture site ending just lateral to the AC joint.

If noted, superficial branches of the lateral supraclavicular nerve are identified and protected. The skin edges are undermined in the subcutaneous plane to facilitate a mobile window of exposure. The fascia and periosteum are often disrupted, and this defect is extended medially and laterally to create anterior and posterior soft tissue flaps for fracture visualization.

A superior subcutaneous approach to the clavicle allows for fracture visualization without significant soft tissue dissection.

A two-layer exposure allows for a two-layer closure, providing greater soft tissue coverage of the hardware and fracture.

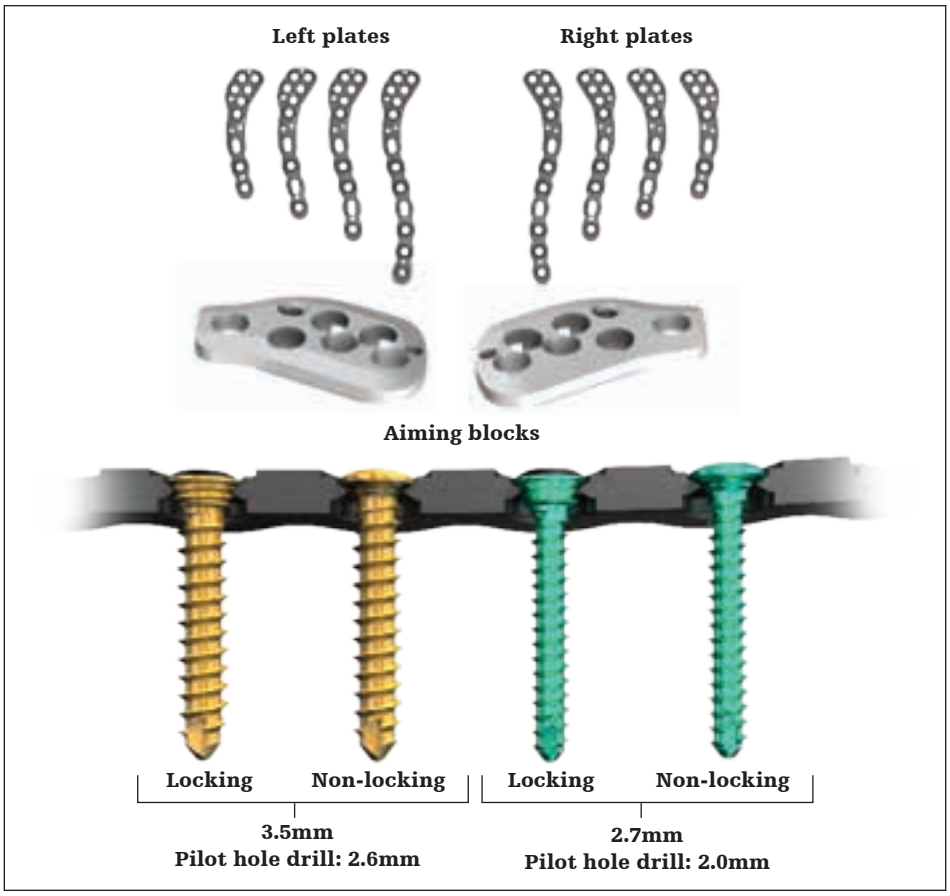
An alternative to this transverse incision is a vertical incision over the fracture site along Langer's lines.

Implant choice / fracture reduction

The VariAx 2 system offers plates and screws in various shapes and lengths. The chart shows the plate contours, lengths, and hole configurations as well as the screw diameters and types.

The circular holes in the plate can accept either 2.7mm or 3.5mm locking or non-locking screws based on surgeon preference and fracture fixation. Make sure to use the proper drill guide which corresponds to the screw to be used.

Additionally, the system offers an optional fixed-angled aiming block (703816 for Left plates or 703817 for Right plates) which may be used to help guide the surgeon in placing screws in a reproducible divergent screw pattern.



6. The superior lateral technique was written with guidance from Professors Michael McKee and Emil Schemitsch

Operative technique
Superior lateral technique

Implant choice / fracture reduction

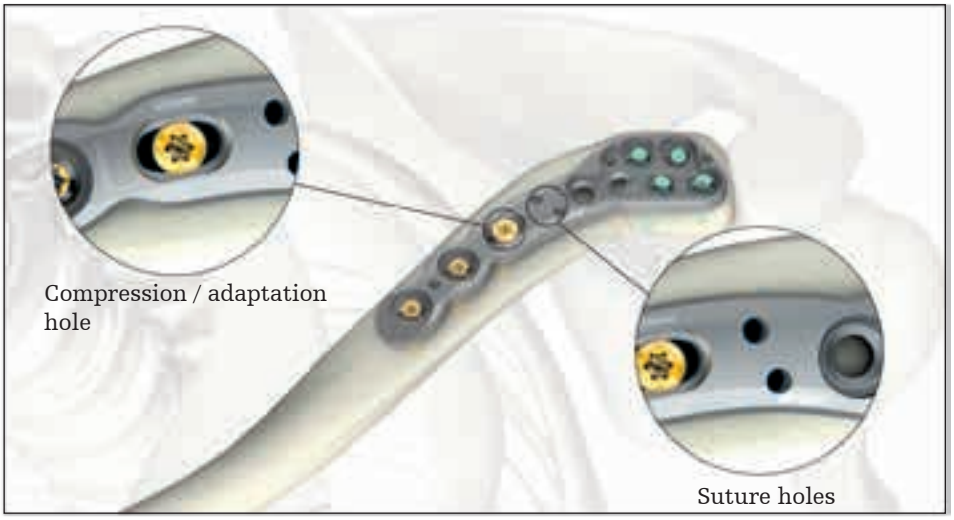
The fracture is exposed and debrided of interposed hematoma and soft tissues. The fracture is reduced and the AC joint is identified. This may be done using a small diameter needle.

Also, the use of a k-wire into the distal clavicle through the most lateral k-wire hole can help ensure that the screws will not be placed in the AC joint.

The plate is placed medial to the AC Joint. Then, the most lateral oblong hole may be used as an adaptation hole to determine the proper placement of the plate and to give primary fixation.

Plate fixation and optional compression

It is important to note that if axial compression is desired, non-locking screws should be used in the oblong holes before any circular holes on the medial side of the fracture are filled. Compression is performed by placing a screw in the compression region of the plate. This is facilitated by using the Drill Guide for Compression (703882 for a 3.5mm screw or 703883 for a 2.7mm screw). If an oblong hole has been used as an adaptation hole it cannot be used as a compression hole. Bi-directional compression holes have no directional laser markings.

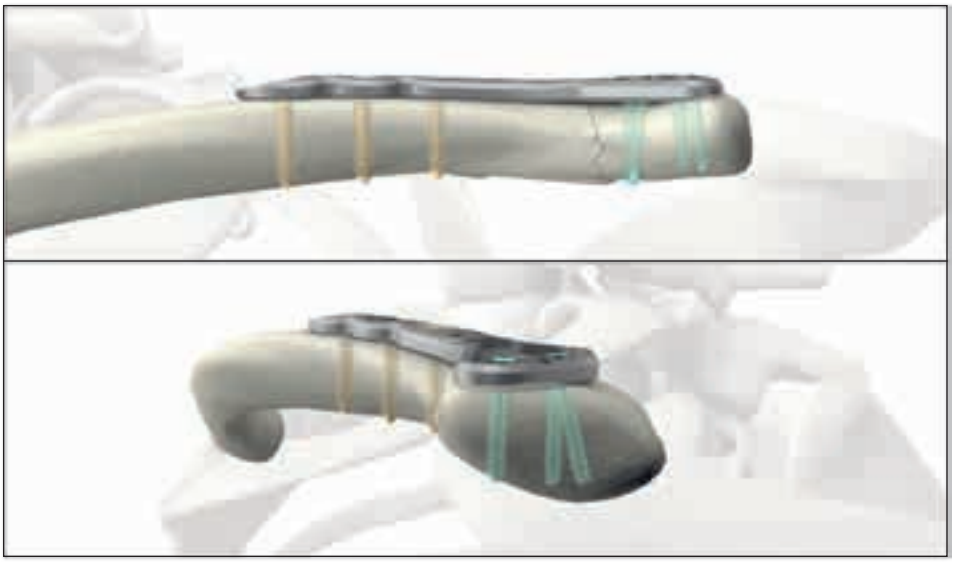


The superior lateral plates are designed with suture holes laterally which may be used to reattach the coraco-clavicular ligaments if they have been ruptured. If sutures are used, it is recommended to place the knot anterior to the plate as not to cause possible irritation superiorly.

After proper lateral fixation ensuring there are no intra-articular placement of the screws in the AC joint, the remaining medial screws are inserted in the usual manner.

Last, it is recommended to have at least 3 screws on either side of the fracture which are placed bi-cortically.

Also of note, any non-locking screws or lag screws must be placed in the plate before any locking screws are placed.



Operative technique
Anterior lateral technique[7]

Portals / exposures

The clavicle is exposed along the anterosuperior subcutaneous border. A 4 to 7cm incision is centered over the fracture site ending lateral to the AC joint.

If noted, superficial branches of the intermediate supraclavicular nerves are identified and protected. The fascia and periosteum are often disrupted, and this defect is extended medially and laterally to expose the fracture site.

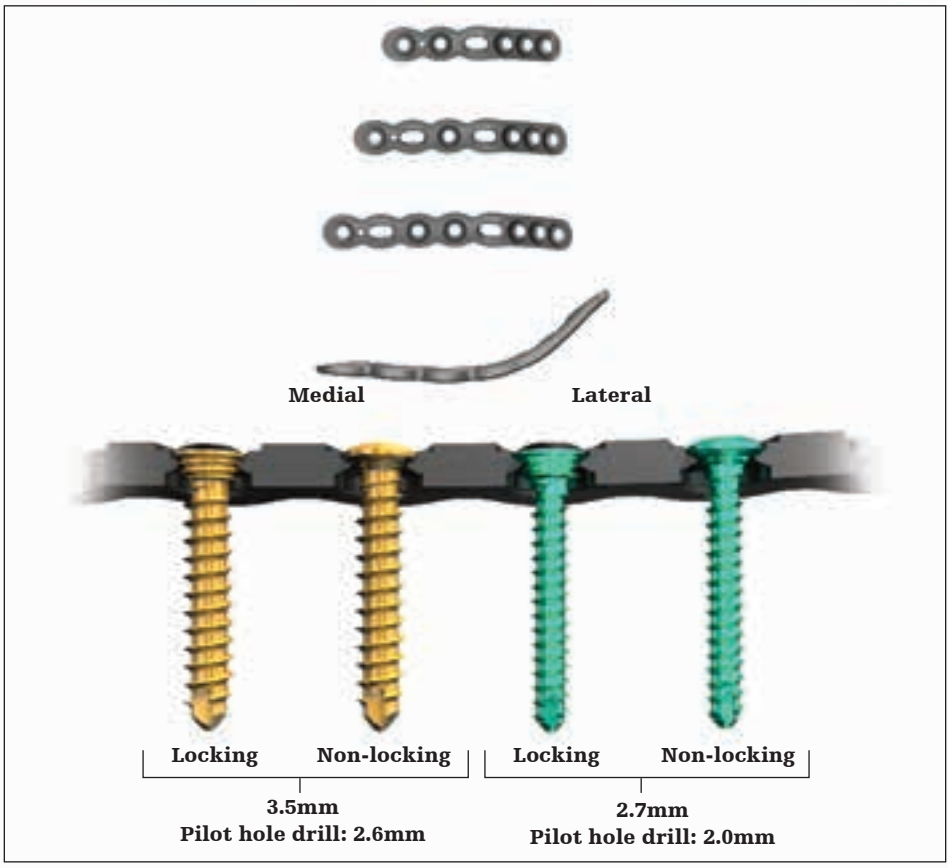
The pectoralis major and deltoid origins on the anterioinferior portion of the clavicle may need to be elevated to expose the plating surface.

After the plating procedure, the muscle may be reattached over the plate.

An alternative to this transverse incision is a vertical incision over the fracture site along Langer's lines.

Implant choice / fracture reduction

The VariAx 2 system offers plates and screws in various lengths. The chart to the right shows the plate contours, lengths, and hole configurations as well as the screw diameters and types.



7. The anterior lateral technique was written with guidance from Dr. Howard Richter

Operative technique
Anterior lateral technique

Implant choice / fracture reduction

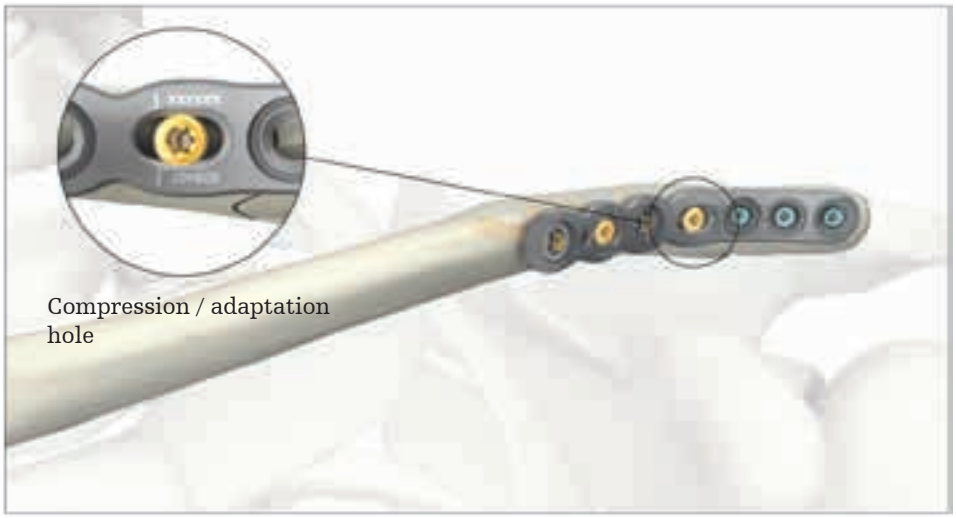
The fracture is exposed and debrided of interposed hematoma and soft tissues. The fracture is reduced and the AC joint is identified.

The plate is placed medial to the AC Joint. Then, the most lateral oblong hole may be used as an adaptation hole to determine the proper placement of the plate and to give primary fixation.

Plate fixation and optional compression

The circular holes in the plate can accept either 2.7mm or 3.5mm locking or non-locking screws based on surgeon preference and fracture fixation. Be sure to use the proper drill guide which corresponds to the screw to be used.

It is important to note that if axial compression is desired, non-locking screws should be used in the oblong holes before any circular holes on the medial side of the fracture are filled. Compression is performed by placing a screw in the marked compression region of the plate. This is facilitated by using the Drill Guide for Compression (703882 for a 3.5mm screw or 703883 for a 2.7mm screw). If an oblong hole has been used as an adaptation hole it cannot be used as a compression hole.

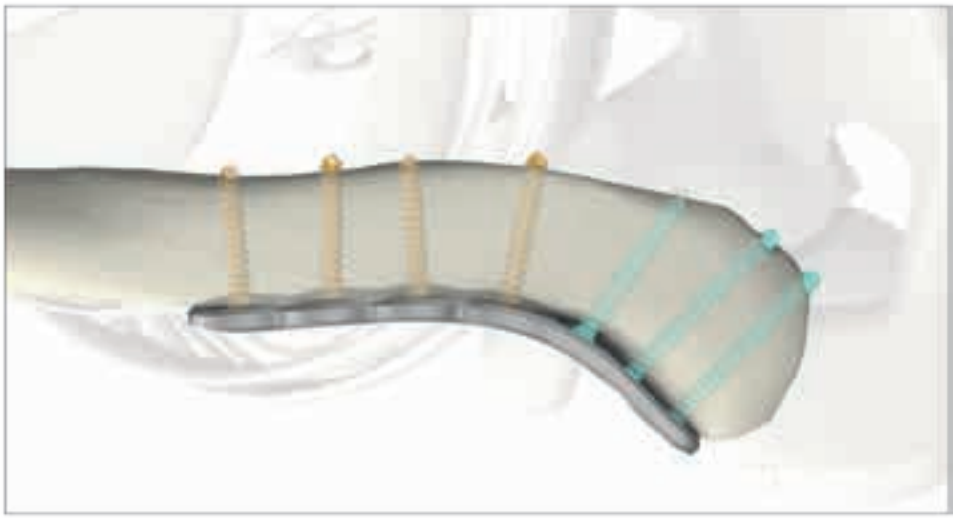


Compression / adaptation hole

Also of note, any non-locking screws or lag screws must be placed in the plate before any locking screws are placed.

After proper lateral fixation, the remaining medial screws are inserted in the usual manner.

Last, it is recommended to have at least 3 screws on either side of the fracture which are placed bi-cortically.



Operative technique
Lateral hook technique[8]

Portals / exposures

The clavicle and AC joint is exposed along the anterosuperior subcutaneous border. A 3 to 5cm incision is centered over the fracture site ending just lateral to the AC joint.

If noted, superficial branches of the lateral supraclavicular nerve are identified and protected. The skin edges are undermined in the subcutaneous plane to facilitate a mobile window of exposure. The fascia and periosteum are often disrupted, and this defect is extended medially and laterally to create anterior and posterior soft tissue flaps for fracture visualization.

A two-layer exposure allows for a two-layer closure, providing greater soft tissue overage of the hardware and fracture.

An alternative to this transverse incision is a vertical incision over the fracture site along Langer's lines.

Fracture / dislocation reduction

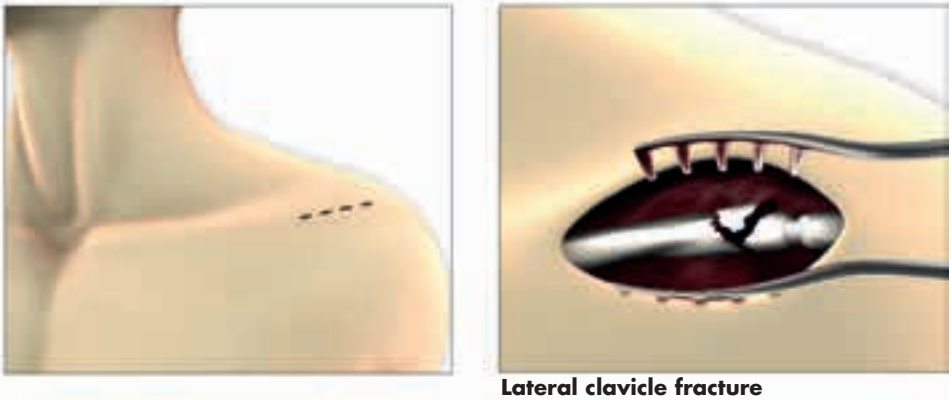
In the case of fracture, the fracture is exposed and debrided of interposed hematoma and soft tissues. The fracture is reduced and the AC joint is identified.

In the case of dislocation, re-align the AC Joint by manipulation, and temporarily fixate the joint with a k-wire if preferred.

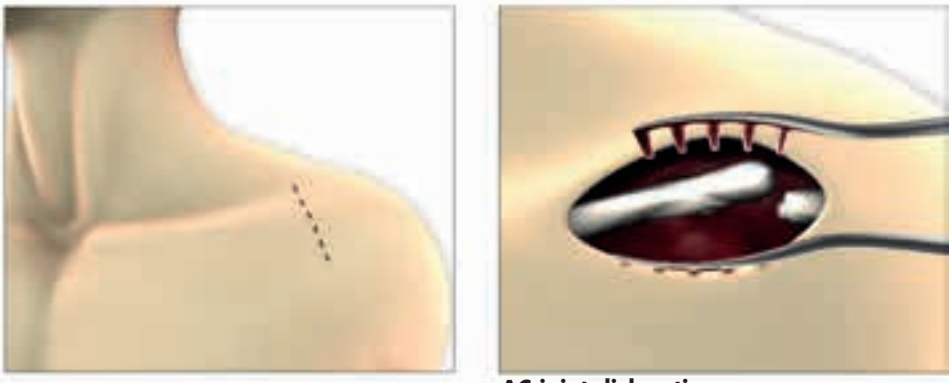
Implant choice

The VariAx 2 system offers plates and screws in various shapes and sizes. The chart here shows the plate contours, lengths, and hole configurations as well as the screw diameters and types.

The hook is anatomically pre-contoured to fit the inferior aspect of the acromion. This may help reduce impingement and point loading on the bone surface.

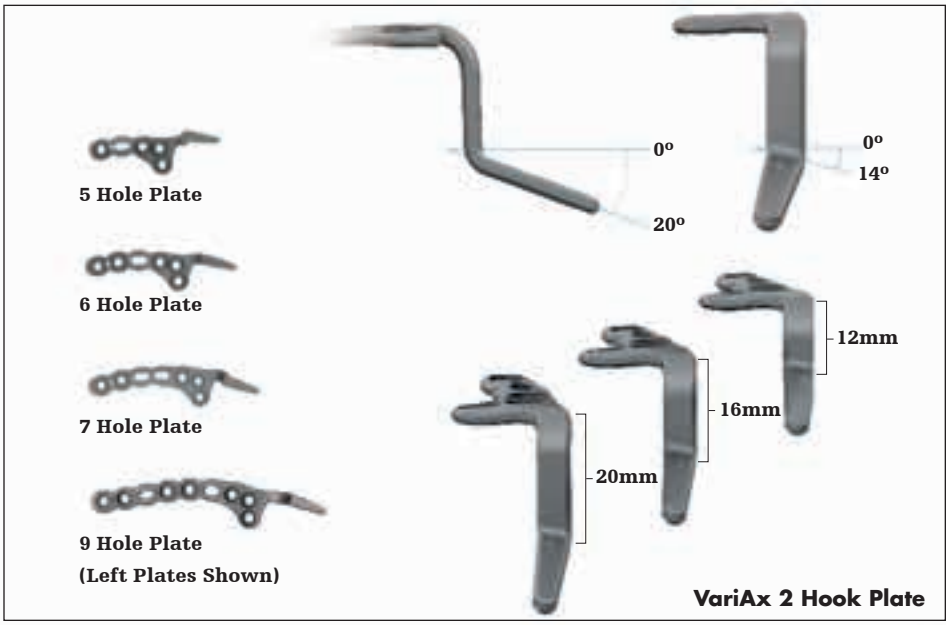


Lateral clavicle fracture



AC joint dislocation

Fracture reduction



8. The lateral hook technique was written with guidance from Professors Michael McKee and Emil Schemitsch

Operative technique
Lateral hook technique

Implant choice / fracture reduction

Plate Trials are provided to identify the proper depth of the hook. The plate is offered with hook depths of 12, 16, and 20mm. Start with the hook size that seems appropriate for the anatomy.

To determine the proper length of the plate shaft, use the plate trial ruler.

Note that the over reduction of the medial clavicle segment may lead to postoperative discomfort. On the other hand, a hook depth which is too deep may cause impingement in the shoulder joint.

To avoid over or under reduction, it is helpful to obtain a pre-operative radiograph of the contralateral AC joint to better understand the patient's intrinsic anatomy, which can be quite variable.

An important radiographic image to observe is an AP view of the acromion with a 20° superior tilt while the plate trial is in place. This will confirm if the proper depth has been obtained. The surgeon should notice a flush fit of the hook to the inferior aspect of the acromion while still having a proper anatomic distance between the clavicle and coracoid.

As an option in some cases, especially in chronic cases or those with pre-existing arthritis, the surgeon may excise the lateral clavicle ridge in order to provide a better fit of the plate to the clavicle. Ensure this is done before trialing of the Hook Plate as the proper depth will need to be adapted.

The most lateral oblong hole may be used as an adaptation hole to determine the proper placement of the plate and to give primary fixation.

After the final position of the hook is determined the remaining holes can be filled as necessary. It is recommended to place a minimum of 3 screws bi-cortically which are medial to the fracture or AC separation.

Under reduction of medial clavicle segment

Over reduction of medial clavicle segment

Correct reduction

In the case of fracture, fixation can be augmented with screws in the lateral fragment.

The circular holes in the plate can accept either 2.7mm or 3.5mm locking or non-locking screws based on surgeon preference and fracture fixation. Be sure to use the drill guide that corresponds to the screw to be used.

Note:
Only non-locking screws may be placed in the oblong holes of the plate. Circular holes accept either locking or non-locking screws.

Operative technique

VariAx 2 instrumentation usage

Color coding systems

Color coding of the screws and appropriate instruments helps identify the components during surgery as the color identifies the screw diameter.

All instruments that are color coded orange are used with the 3.5mm screws, and all of the turquoise blue colored instruments are used with the 2.7mm screws. Additionally, all drills are laser marked with the corresponding drill diameter.

Note:
Always match the color ring marking on the drill bit with the color marking on the drill guide. Additionally, always match the screw anodization color with at least one of the color ring markings.

Screwdriver blade options

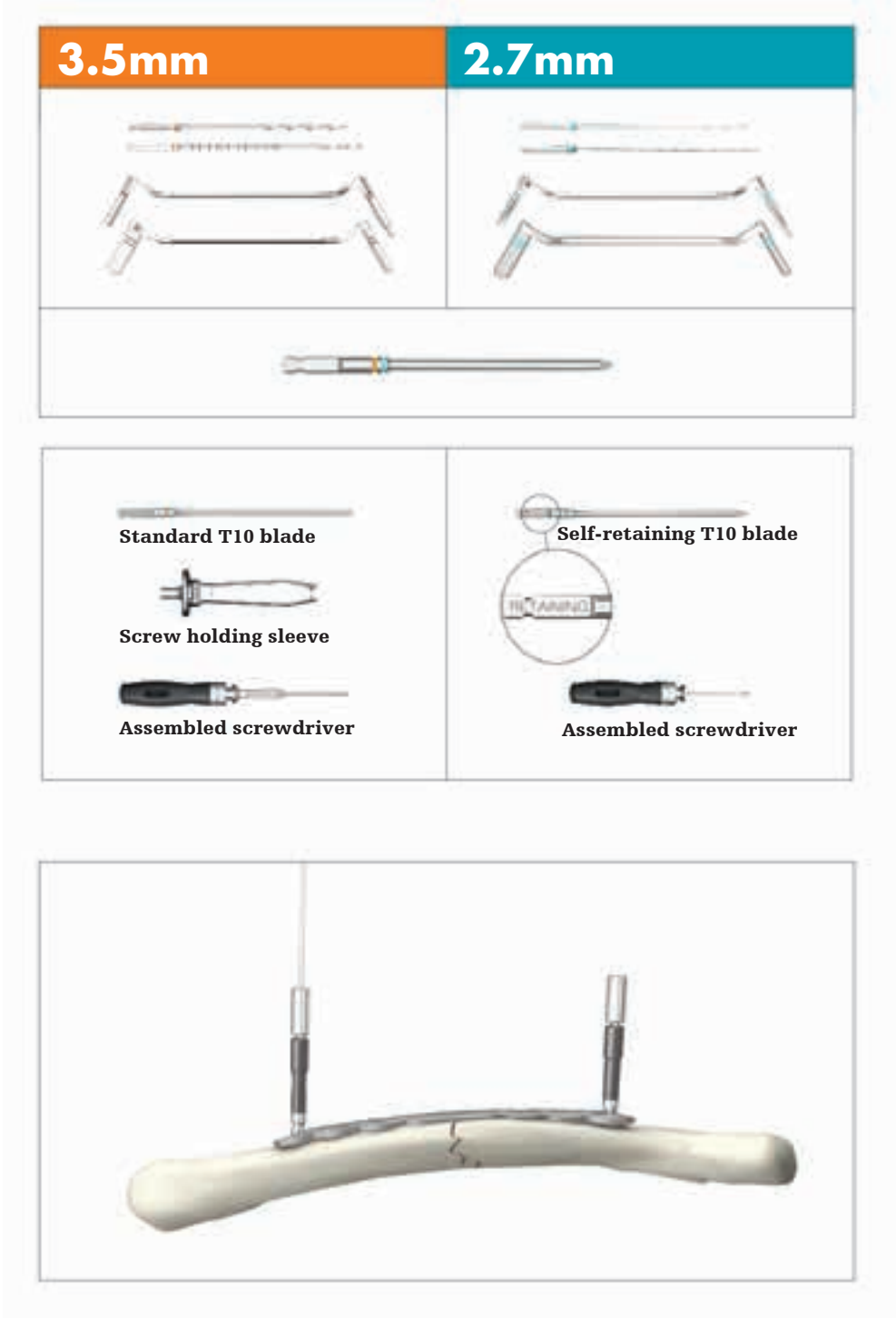
The VariAx 2 System has a variety of different blades to choose from. The self–retaining blade (703880) is identified with a symbol and has the word "RETAINING" on the AO coupling interface. Its conical tip helps ensure a friction fit connection with the screw head.

Note:
The self–retaining blade (703880) cannot be used with the screw holding sleeve (703675).

Joystick for plate position & temporary fixation

The Joystick for T10 screw holes (703928) can be used in any circular hole to aid in plate positioning. Additionally, it can also be used to temporarily fix the plate to the bone by inserting a k-wire with a diameter up to 1.6mm through a joystick that is already engaged in the plate hole.

Note:
Do not insert a k-wire through a joystick on the compression side of the fracture if compression is needed.

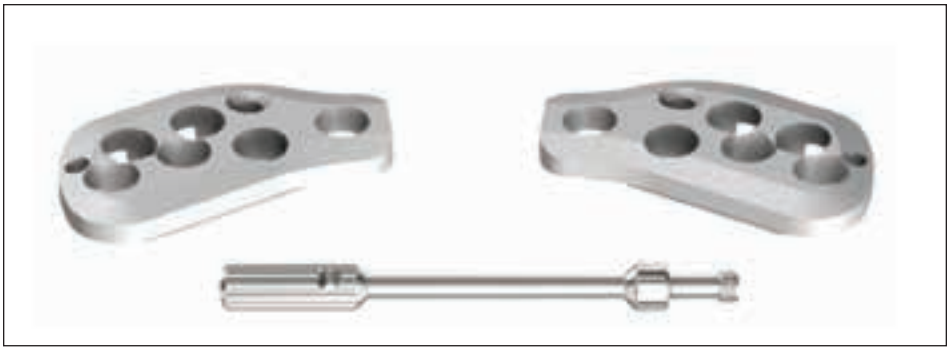


After inserting the joystick tip in the circular hole, turn the knob on the upper part of the joystick clockwise to fix it in the hole. To remove the joystick, simply remove any k-wire and turn the knob counter–clockwise to disengage the tip from the hole.

Note:
Do not use the engaged joystick to apply bending to the plate as this may damage the plate or joystick.

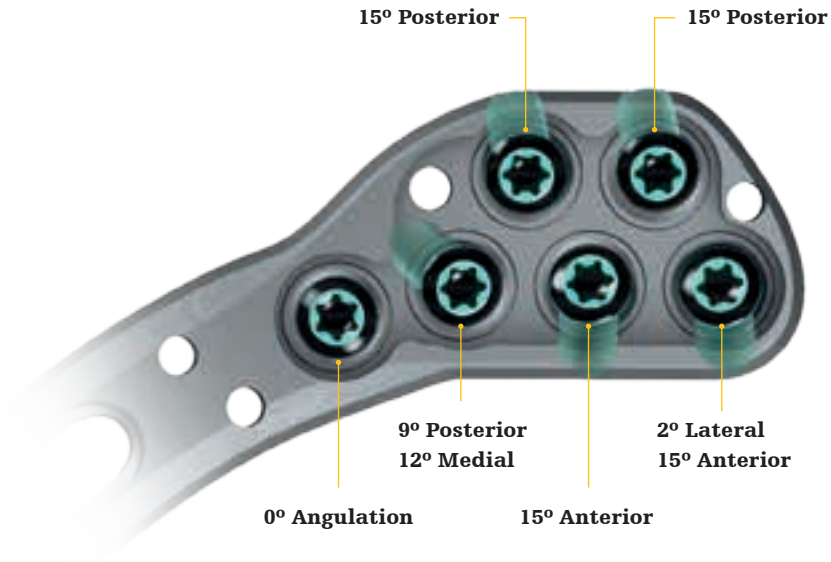
Operative technique

The superior lateral plates are offered with optional aiming blocks, (703816 for Left Plates / 703817 for Right Plates) which allow the surgeon to drill divergent drill holes in the lateral position of the plate. The joystick for aiming block (703823) is designed to facilitate plate insertion and may act to manipulate plate positioning and fracture reduction.



Aiming blocks and joystick

Screw positions using the aiming block



Taps & countersink

2.7mm and 3.5mm taps (703899 for 2.7mm screws / 703898 for 3.5mm screws) are available in the system. Although all screws are self–tapping, it is recommended to use a tap if excessive resistance is felt during insertion or if the bone is dense.

A countersink (45-80040) is also available for reducing the screw head prominence when the screw is used independently of a plate.

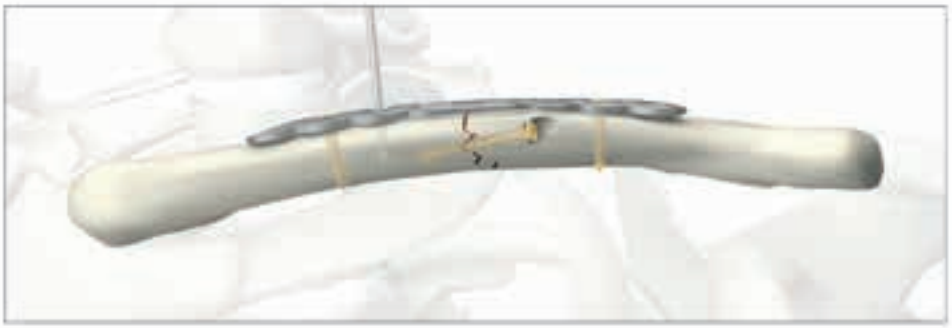
Tap for 3/5mm screws

Countersink

Operative technique

K-wire with stop

The k-wire with Stop (703818) can be used in any screw hole or k-wire hole in order to temporarily fix the plate to the bone.



K-wire clamp

Depth measurement options

VariAx 2 offers various options to evaluate the screw length. As previously mentioned, all drills are scaled so that the surgeon may evaluate the screw length when using the drill through the dedicated drill guides.

A SpeedGuide is also offered that allows the surgeon to drill and measure the hole depth in one step with a single instrument. For further information on the SpeedGuide, please refer to the SpeedGuide Operative Technique.

Lastly, a standard Depth Gauge (705170) may be used either independently or through a plate hole.

Drill & drill guides

Drill diameter	Drill bit	Drill guide
2.0	703690	703883
2.6	703691	703882

Scaled drill and drill guide

SpeedGuides up to 30mm

Drill diameter	Drill bit	SpeedGuide
2.0	703892	703887
2.6	703894	703886

SpeedGuides

Depth gauge

Operative technique

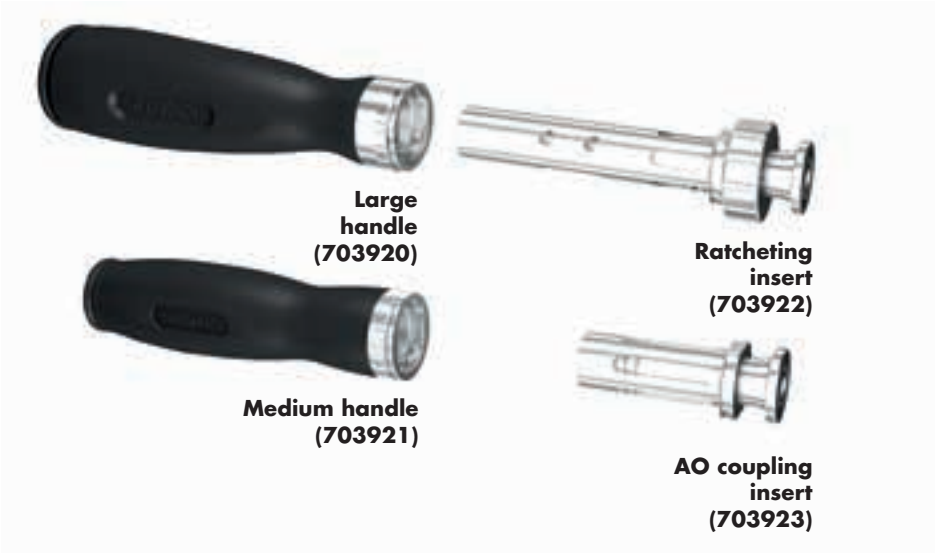
Modular handle

VariAx 2 offers a modular handle system. This is composed of two handle grip sizes (medium and large) that can be interchanged with either a bi-directional ratcheting AO-Coupling insert or a standard AO-Coupling insert.

Both handle sizes are equipped with a spin-cap to allow insertion using a two-finger technique. In order to disengage the insert from the handle, push down on the button on the distal part of the handle and pull the insert away from the handle.

Note:
The inserts must be removed from the handles before cleaning.

The ratcheting insert can work in three modes: clockwise ratcheting, counterclockwise ratcheting or neutral. To switch between the different modes, simply twist the distal part of the insert to the desired driving direction.



Note:
To ensure appropriate ratcheting function, perform appropriate maintenance on the insert by applying medical-grade lubricant oil through the marked cut-outs.

Reduction clamps

The Plate Holding Clamp (703821) is designed to secure the plate to the bone superiorly. The fine toothed portion of the clamp grips the inferior clavicle surface while the pivoting portion of the clamp holds the plate surface.

The Straight Reduction Clamp (703822) allows the surgeon to apply apposition/compression forces to the fracture on one surface of the clavicle while placing the plate on another surface. As seen in the image here, the surgeon drills a 2.0mm hole on either side of the fracture, places the clamp in the drill holes, and then applies the necessary compression.

Plate holding clamp

Operative technique

Then, the plate is placed in the usual manner, and the clamp does not interfere with the plate placement.

The Repositioning Forceps are designed to reduce a fracture, and then allow a plate to be placed between its jaws while retaining the reduction. This may be especially helpful in short oblique or transverse fractures.

The Repositioning Forceps (702932) and Small Reduction Clamp (702926) are used in the usual manner to reduce and hold the fracture.

The Periosteal Elevator (705294) and Ball Spike (700153) is used in the usual manner to elevate soft tissue and help reduce the fracture.

Straight reduction clamp

Plate contouring

All of the VariAx 2 Plates are pre-contoured to fit to a range of anatomies. Although not usually necessary, the plates may be contoured to adapt to individual patient anatomy. Design requirements are strict when it comes to shaping a plate to the clavicle. For example, the surgeon should avoid sharp bends, reverse bends or bending the device at a screw hole.

Hohmann retractor

The Hohmann Retractor 15mm (700667) may be placed under the clavicle to protect the neurovascular structure inferior to the clavicle while drilling from the superior side.

The Hohmann blade must be aligned with the hole being drilled.

Notes

Plate trials

Plate Trials are supplied in order to properly determine the correct length and shape of the plate to be implanted. For Hook Plates, trials are provided in the three depths: 12mm, 16mm, and 20mm corresponding to the different depths of the implants.

A ruler for the hook plate shaft is provided to determine the length of the plate on the clavicle. Trials are especially useful when working with sterile packed plates.

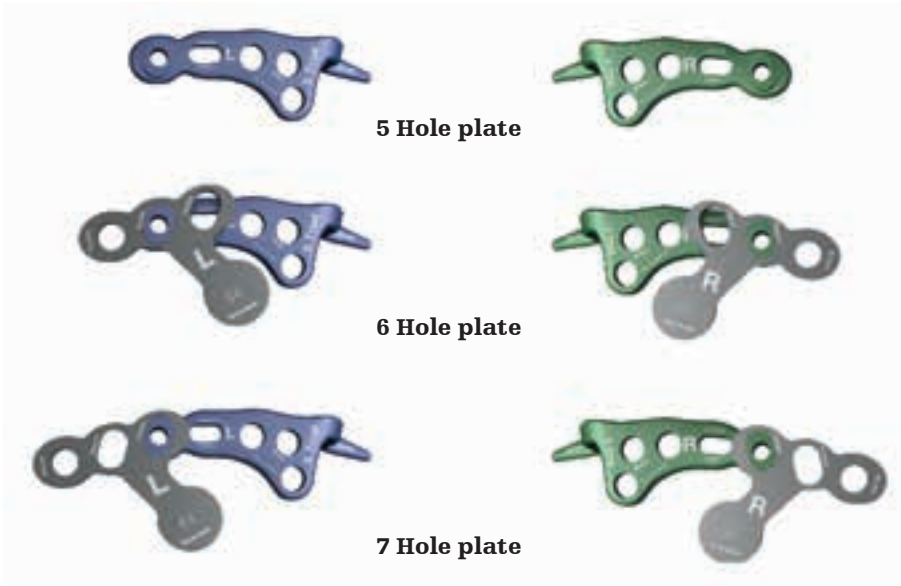
The trials are color coded. BLUE indicates LEFT plates. GREEN indicates RIGHT plates and GREY indicates non-sided (universal) plates.

Left hook plate trials **Right hook plate trials**

12mm Hook depth 703870	16mm Hook depth 703872	20mm Hook depth 703874	Hook plate trial ruler 703876	12mm Hook depth 703871	16mm Hook depth 703873	20mm Hook depth 703875

Plate trials measuring

Left hook plate trials **Right hook plate trials**



Notes

stryker

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Trauma & Extremities

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Content ID: VAX-ST-16 Rev 2, 07-2017 / CA2310

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