

OrthoLine™ Distal Humeral Fracture System

Surgical Technique



Arthrex®
Vet Systems

OrthoLine™ Distal Humeral Fracture System

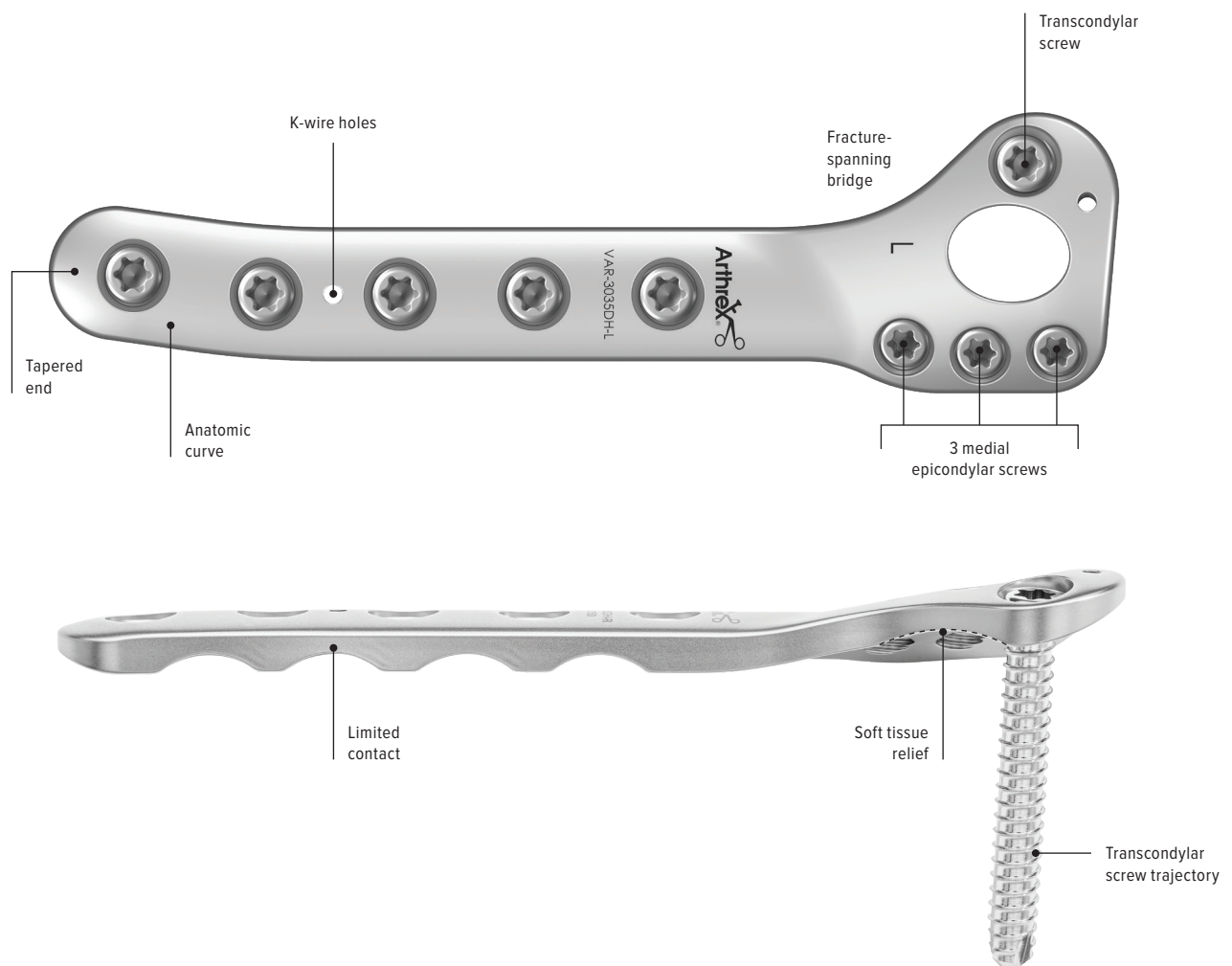
Introduction

The first anatomic medial distal humeral fracture plate designed to address medial, supracondylar, T-shaped, and Y-shaped fractures with a single plate is available in sizes ranging from 2.0 mm to 3.5 mm. OrthoLine plates were thoughtfully engineered using surgeon feedback and are designed to accommodate a range of patients.

Features and Benefits

- › Plate incorporates a transcondylar screw
- › Optimized trajectory for the transcondylar screw
- › Four screws in the distal aspect
- › Anatomic plate design with left and right options
- › Strong single-plate bridging design
- › Epicondylar relief
- › Designed for medial, supracondylar, T-shaped, and Y-shaped fractures¹

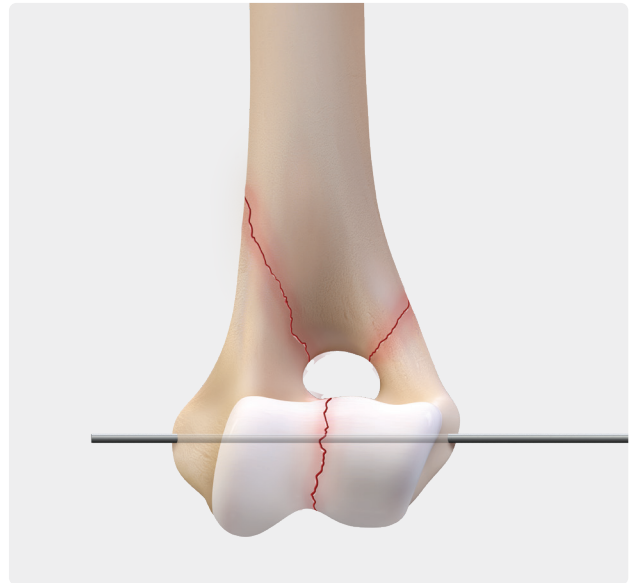
Anatomic Design



Reference

1. Arthrex, Inc. Data on file (APT 05162). Naples, FL; 2021.

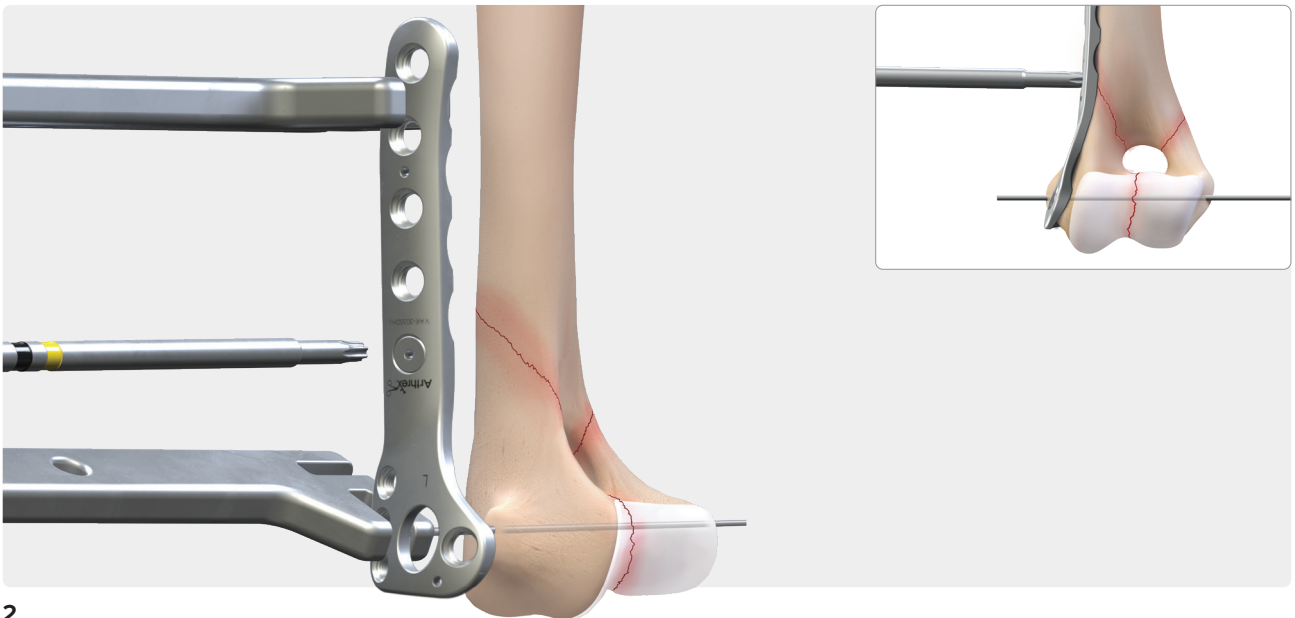
Surgical Technique



1

Use a standard bilateral approach to the distal humerus.

Note: Reduce the fracture and hold with a temporary reduction pin placed through the point of the epicondyle. The plate may be used as a guide for K-wire placement. When using the plate as a guide, it is important to position the pin proximal and caudal to allow movement of the plate in this direction for best transcondylar screw placement. If a temporary reduction pin is used, the pin should stay in place until application of the transcondylar screw is complete.

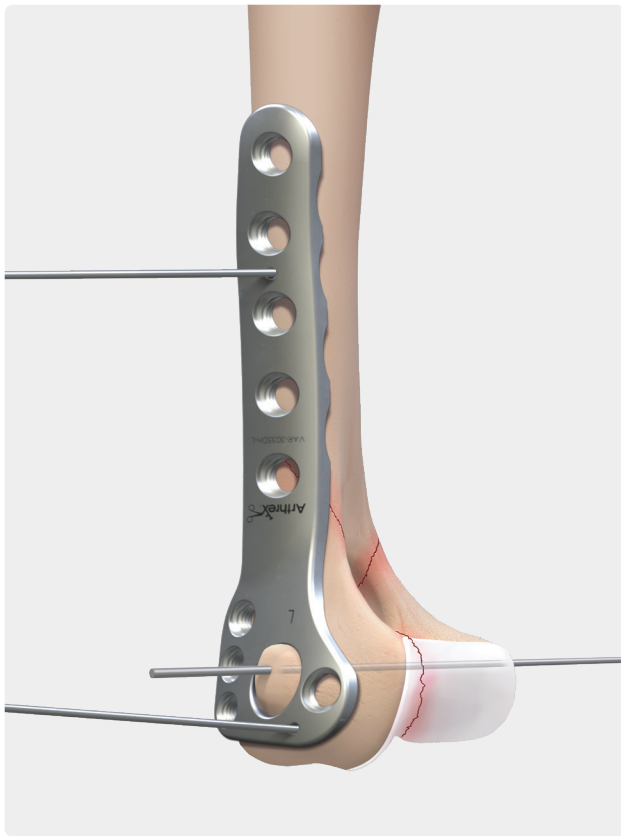


2

Place the plate on the medial surface of the bone, positioning the point of the epicondyle and the temporary reduction pin (if used) through the large central aperture. The plate should be placed as far caudal as the epicondyle will allow and slightly proximal. This positioning helps facilitate proper alignment of the transcondylar screw. Minimal contouring may be required to fit the anatomy; however, excessive

contouring may alter the intended screw trajectory and should be avoided. During contouring, place cannulated bending plug inserts into the locking screw holes where applicable.

Note: If a large degree of contouring is required, screw trajectories are likely to be altered.

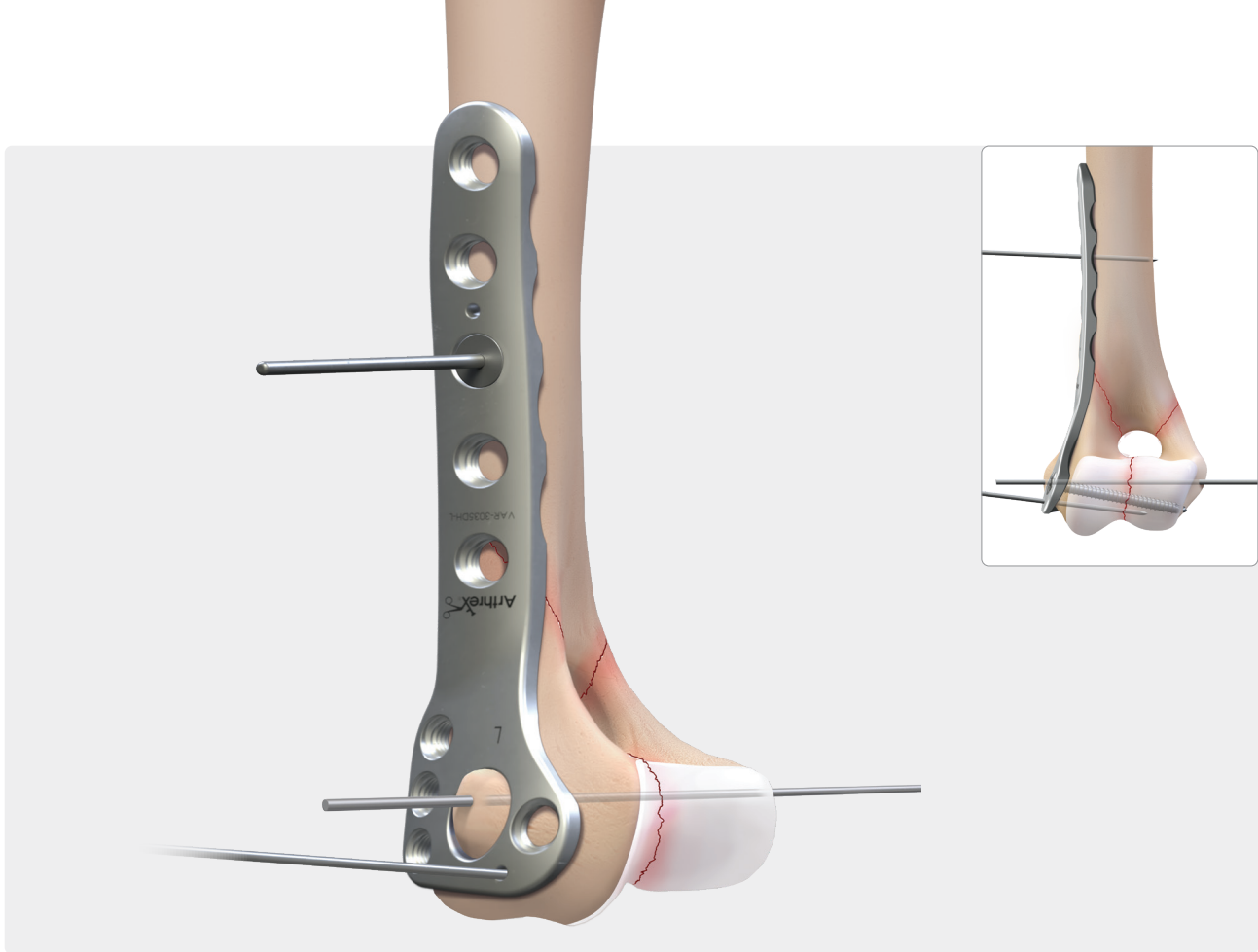


3a



3b

The plate may be temporarily affixed to the bone using a K-wire, cannulated bending plug, or threaded BB-Tak (the BB-Tak should only be used on the proximal aspect). It is important to note the distal K-wire hole has the same trajectory as the transcondylar screw and may be used as a reference guide. To achieve the appropriate trajectory, place the K-wire by hand so it rests in the hole before advancing it with the pin driver.

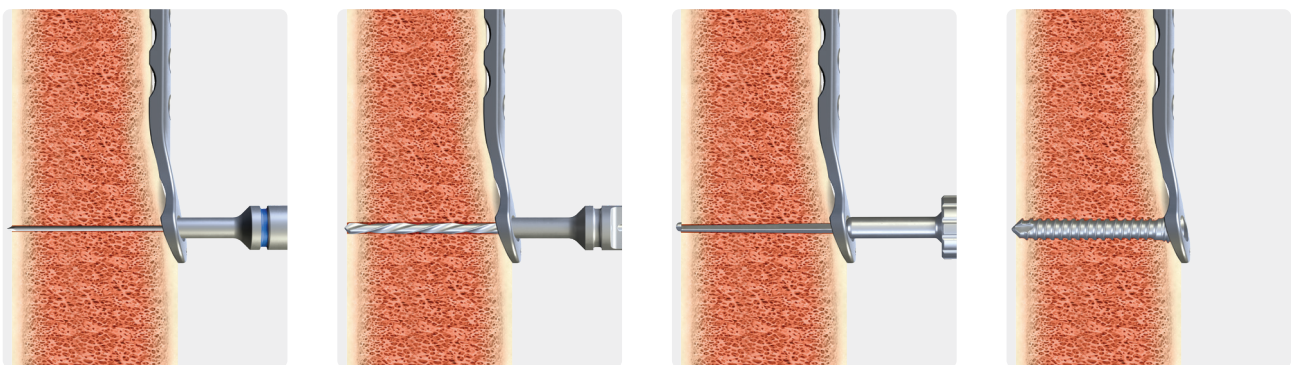


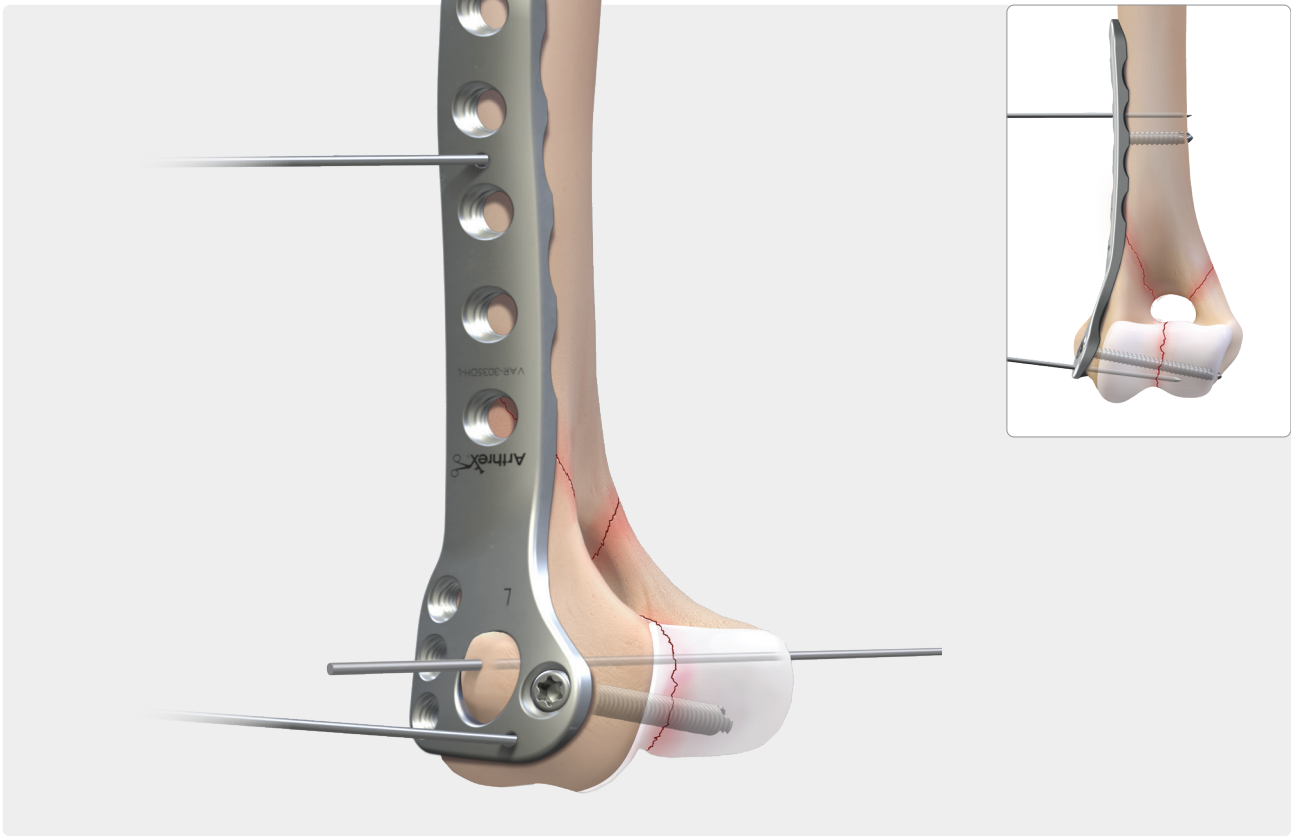
4

Place the K-wire through the locking K-wire guide and confirm placement by palpation or fluoroscopic imaging. If the trajectory is acceptable, a cannulated drill bit can be placed over the K-wire, or a locking drill guide may be used to create an appropriate pilot hole for the locking screw. Prior to screw insertion, place a vulsellum or point-to-point forceps to aid in fracture compression.

If the K-wire placement is not acceptable, redirect it and use the drill bit to create a pilot hole for a nonlocking cortical screw. Alternatively, for titanium plates (3.0 mm and below), if the deviation is 12° or less, use a variable-angle locking (VAL) screw.

Note: A KreuLock™ locking compression screw can be used to help achieve compression across the condyles.

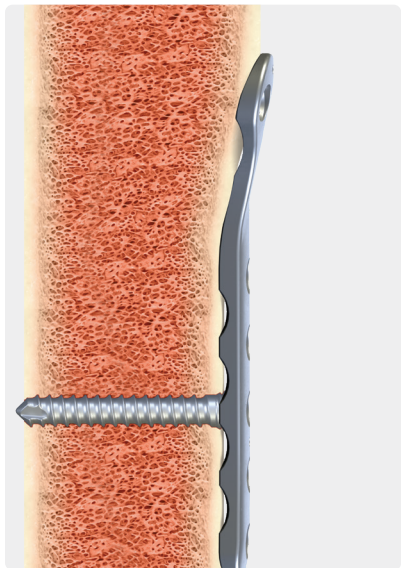
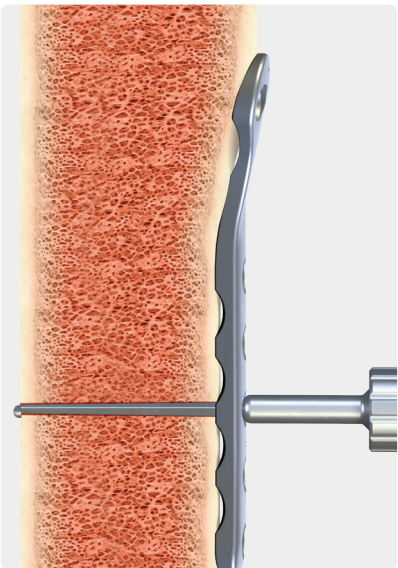
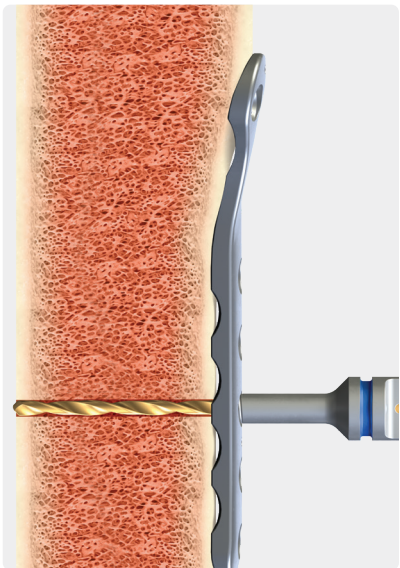


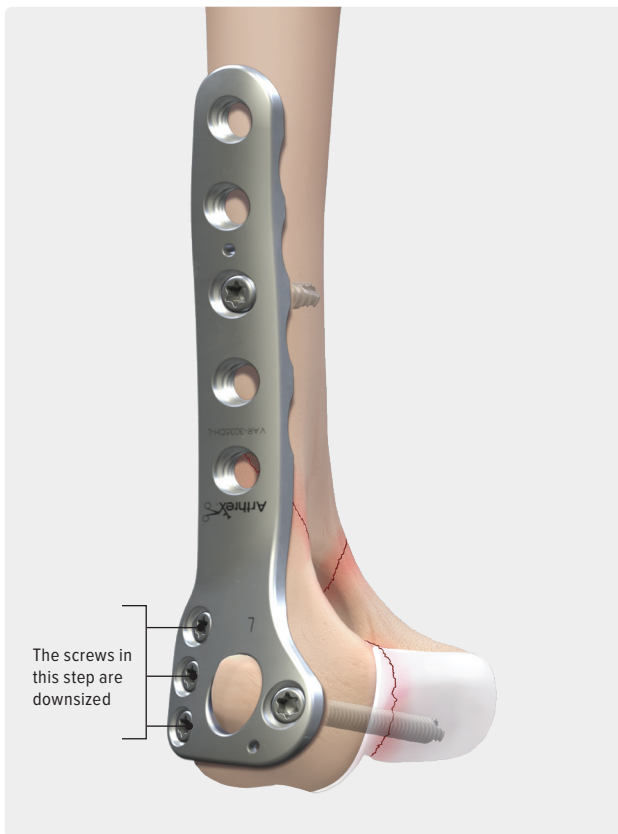


5

Place a proximal screw to secure the proximal fragment. Then lock in the locking drill guide, drill using the appropriate drill bit, measure, and place the screw. Screws may be placed under power; however, the final turns should be performed manually with a screwdriver.

Note: The variable-angle guide can also be used for VAL titanium and stainless steel screws.





6

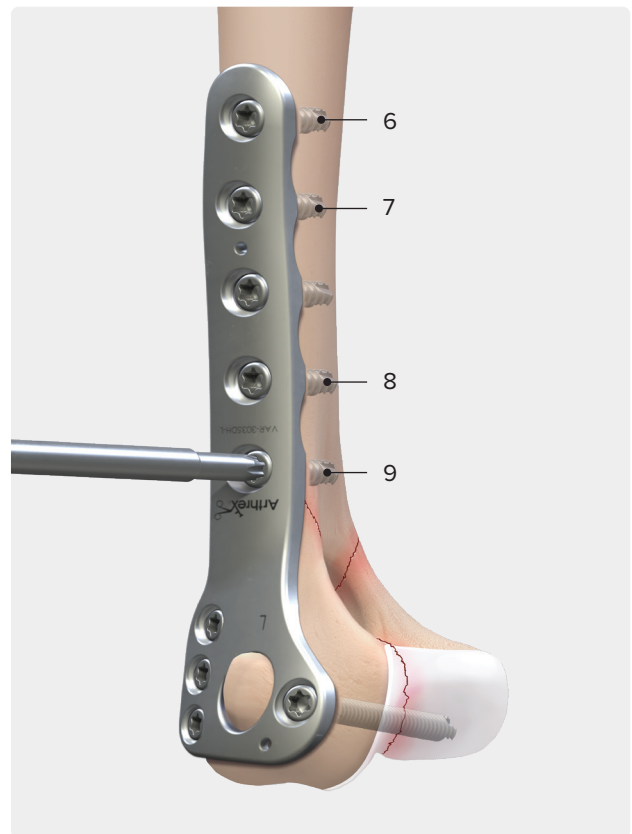
Care should be taken, as the caudal screws of the plate may enter the joint surface and should not extend past the transcortex, as they may interfere with the anconeal process and articular cartilage.

For each screw, lock the locking drill guide in the screw hole, drill using the appropriate drill, measure, and place the screw. Screws may be placed under power; however, the final turns should be performed manually with a screwdriver.

If the fracture site is below a screw hole, do not place a screw in this location. A bending plug can be used to fill the hole. K-wires can be removed at this point.

Note: The variable-angle guide can also be used for VAL titanium and stainless steel screws.

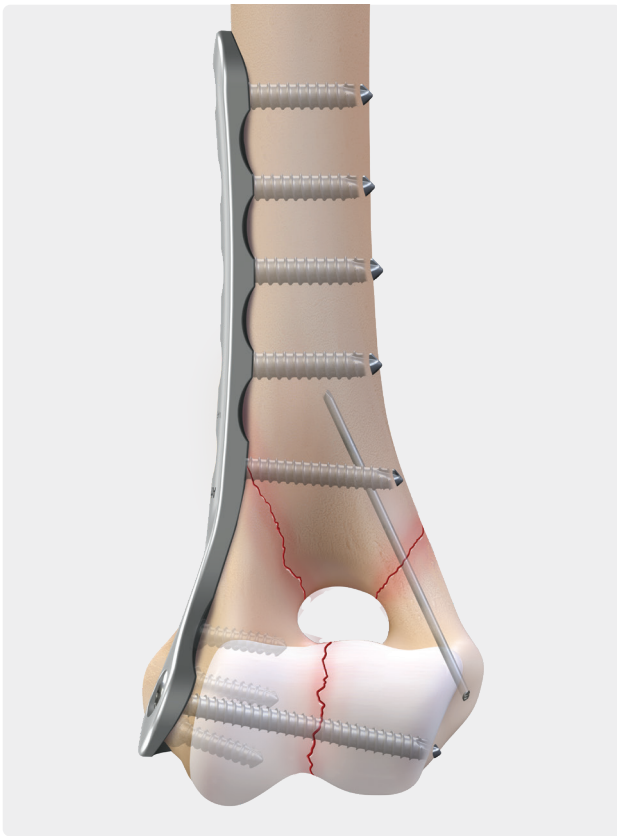
Note: The screws in this step are downsized. For example, the 3.5 mm plate uses 2.7 mm screws, the 3.0 mm plate uses 2.4 mm screws, the 2.4 mm plate uses 2.0 mm screws, and the 2.0 mm plate uses either 2.0 mm or 1.6 mm screws.



7

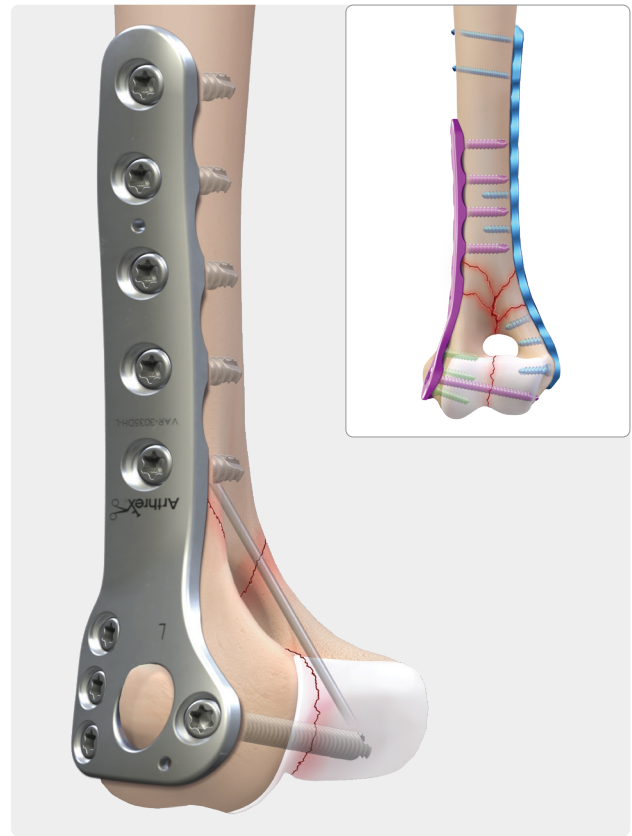
Apply the proximal screws. First, lock in the locking drill guide, drill using the appropriate drill bit, measure, and place the screw. Screws may be placed under power; however, the final turns should be performed manually with a the screwdriver.

Note: The variable-angle guide can also be used for VAL titanium and stainless steel screws.



8a

A lateral pin may be placed in the lateral epicondylar crest for additional fixation (caudal view).



8b

A second lateral plate should be considered in cases with minimal load sharing or where the surgeon feels appropriate (medial view).

Surgical Pearls

- › OrthoLine™ distal humeral plates use 2 screw sizes per implant:
 - › 3.5 mm: 3.5 mm/2.7 mm
 - › 3.0 mm: 3.0 mm/2.4 mm
 - › 2.4 mm: 2.4 mm/2.0 mm
 - › 2.0 mm: 2.0 mm/2.0 mm or 1.6 mm
- › If the K-wire interferes with the locking guide, cut the K-wire to less than 10 mm to allow proper placement of the locking drill guide into the threads of the locking screw hole.
- › A K-wire guide can be placed in a locking screw hole to check the trajectory with or without fluoroscopic guidance.
- › Bending plugs match the material of the plate to avoid

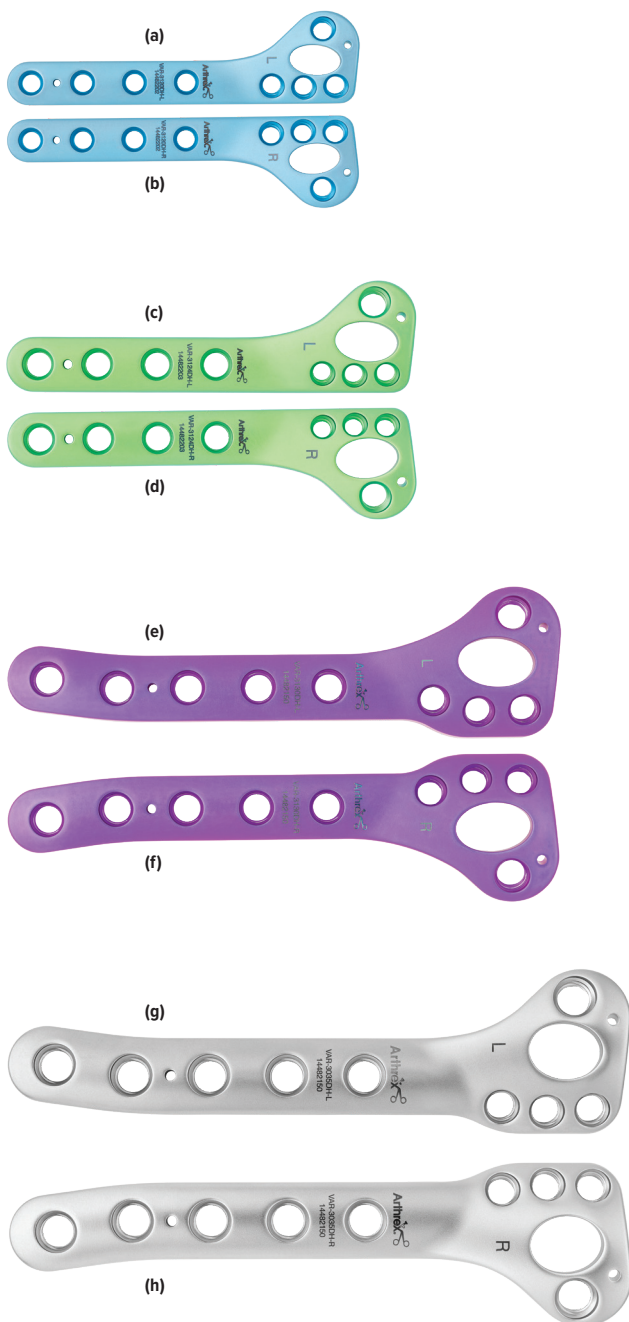
galvanic corrosion.

- › The distal humeral plates are designed to be placed medial for medial, Y-shaped, and T-shaped fractures.
- › VAL screws, if not carefully handled, can converge with another screw depending on angle, length, and overall orientation.
- › The plate should be positioned as far caudally and proximally as possible, using the epicondylar relief hole as guidance.
- › A cannulated drill bit can be used to overdrill the K-wire guide.
- › Common screw sizes should be put in a peel pack, as this plate system uses many of the same sizes.

Ordering Information

Distal Humeral Plates

Distal humeral plate, Ti, 2.0 mm, left (a)	VAR-3120DH-L
Distal humeral plate, Ti, 2.0 mm, right (b)	VAR-3120DH-R
Distal humeral plate, Ti, 2.4 mm, left (c)	VAR-3124DH-L
Distal humeral plate, Ti, 2.4 mm, right (d)	VAR-3124DH-R
Distal humeral plate, Ti, 3.0 mm, left (e)	VAR-3130DH-L
Distal humeral plate, Ti, 3.0 mm, right (f)	VAR-3130DH-R
Distal humeral plate, SS, 3.5 mm, left (g)	VAR-3035DH-L
Distal humeral plate, SS, 3.5 mm, right (h)	VAR-3035DH-R



Screws

1.6 mm Low-Profile Cortical, Variable-Angle

Low-profile cortical screw, 1.6 mm × 6-20 mm Sizes: 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 20 mm	VAR-8916-06 to -20
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Low-profile variable-angle screw, 1.6 mm × 6-20 mm Sizes: 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 20 mm	VAR-8916V-06 to -20
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2.0 mm Low-Profile Cortical, Variable-Angle, Locking

Low-profile cortical screw, 2.0 mm × 6-30 mm Sizes: 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 20, 22, 24, 26, 28, 30 mm	VAR-8920-06 to -30
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Low-profile variable-angle screw, 2.0 mm × 6-30 mm Sizes: 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 20, 22, 24, 26, 28, 30 mm	VAR-8920V-06 to -30
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Low-profile locking screw, 2.0 mm × 6-30 mm Sizes: 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 20, 22, 24, 26, 28, 30 mm	VAR-8920L-06 to -30
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2.4 mm Low-Profile Cortical, Variable-Angle, Locking

Low-profile cortical screw, 2.4 mm × 8-30 mm Sizes: 8, 9, 10, 11, 12, 13, 14, 16, 18, 20, 22, 24, 26, 28, 30 mm	VAR-8924-08 to -30
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Low-profile variable-angle screw, 2.4 mm × 8-30 mm Sizes: 8, 9, 10, 11, 12, 13, 14, 16, 18, 20, 22, 24, 26, 28, 30 mm	VAR-8924V-08 to -30
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Low-profile locking screw, 2.4 mm × 8-30 mm Sizes: 8, 9, 10, 11, 12, 13, 14, 16, 18, 20, 22, 24, 26, 28, 30 mm	VAR-8924L-08 to -30
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2.7 mm Low-Profile Cortical, Locking

Low-profile cortical screw, 2.7 mm × 10-34 mm Sizes: 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34 mm	VAR-8827-10 to -34
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Low-profile locking screw, 2.7 mm × 10-34 mm Sizes: 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34 mm	VAR-8827L-10 to -34
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3.0 mm Low-Profile Cortical, Variable-Angle, Locking

Low-profile cortical screw, 3.0 mm × 8-40 mm Sizes: 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40 mm	VAR-8930-08 to -40
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Low-profile variable-angle screw, 3.0 × 8 mm-40 mm Sizes: 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40 mm	VAR-8930V-08 to -40
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Low-profile locking screw, 3.0 mm × 8-40 mm Sizes: 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38 40 mm	VAR-8930L-08 to -40
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3.0 mm Hybrid Low-Profile, Cortical, Locking, Variable-Angle, Titanium

Low-profile hybrid, cortical screw, 3.0 mm × 8-65 mm Sizes: 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 65 mm	VAR-8930H-08 to -65
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Low-profile hybrid, locking screw, 3.0 mm × 8-65 mm Sizes: 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 65 mm	VAR-8930HL-08 to -65
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Low-profile hybrid, variable-angle screw, 3.0 mm × 8-65 mm Sizes: 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 65 mm	VAR-8930HV-08 to -65
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3.5 mm Low-Profile Cortical, Locking, Variable-Angle, Stainless Steel	
Low-profile cortical screw, 3.5 mm × 8-65 mm Sizes: 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 65 mm	VAR-8835-08 to -65
Low-profile locking screw, 3.5 mm × 10-60 mm Sizes: 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60 mm	VAR-8835L-10 to -60
Low-profile, variable-angle screw, 3.5 mm × 10-65 mm Sizes: 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 65 mm	VAR-8835V-10 to -65 mm

4.0 mm Low-Profile Cortical, Locking	
Low-profile locking screw, 4.0 mm × 18-65 mm Sizes: 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 65 mm	VAR-8840L-18 to -65

Disposables/Limited Reusables

Drill bit, solid, AO, 1.1 mm	VAR-4016D
Drill bit, solid, AO, 1.5 mm	VAR-4020D
Drill bit, solid, AO, 1.8 mm	VAR-4024D
Drill bit, solid, AO, 2.3 mm	VAR-4030D
Drill bit, solid, short, AO, 2.5 mm	VAR-8943-30
Drill bit, solid, 2.7 mm	VAR-8944-22
Drill bit, solid, AO, 2.8 mm	VAR-4035D
Drill bit, solid, AO, 3.5 mm	VAR-4040D
Drill bit, solid, short, AO, 1.1 mm	VAR-4016SD
Drill bit, solid, short, AO, 1.5 mm	VAR-4020SD
Drill bit, solid, short, AO, 1.8 mm	VAR-4024SD
Drill bit, solid, short, AO, 2.3 mm	VAR-4030SD
Guidewire w/ trocar, 0.86 mm × 80 mm	VAR-8929K
Guidewire w/ trocar, 1.1 mm × 150 mm	VAR-8933K
Guidewire w/ trocar, 1.3 mm × 150 mm	VAR-8937K

Instruments






Depth measuring device, 1.6 mm/2.0 mm/2.4 mm	VAR-2024DD
Depth measuring device, 2.7 mm/3.0 mm/3.5 mm/4.0 mm	VAR-8943-15
T6 driver, 1.6 mm/2.0 mm	VAR-4020-01
T8 driver, 2.4 mm	VAR-4024-01
T10 driver, 3.0 mm	VAR-8944DH
T15 driver, 3.5 mm	VAR-8941DH
T6 screwdriver, 1.6 mm/2.0 mm	VAR-4020-02
T8 screwdriver, 2.4 mm	VAR-4024-02
T10 screwdriver, 2.7 mm/3.0 mm	VAR-8943-08
T15 screwdriver, 3.5 mm/4.0 mm	VAR-8943-10
Locking plate holder, 2.0 mm	VAR-4020-03
Locking plate holder, 2.4 mm	VAR-4024-03
Locking plate holder, 2.7 mm/3.0 mm	VAR-8950-09
Locking plate holder, 3.5 mm	VAR-8954-07
Screw-holding forceps	VAR-8941F
Drill/depth guide, locking, 1.6 mm	VAR-4016DG
Drill/depth guide, locking, 2.0 mm	VAR-4020DG
Drill/depth guide, locking, 2.4 mm	VAR-4024DG
Drill/depth guide, locking, 3.0 mm	VAR-4030DG
Drill/depth guide, locking, 3.5 mm	VAR-4035DG
Drill/depth guide, locking, 4.0 mm	VAR-4040DG
Drill guide, 1.1 mm	VAR-4016TDG

Tap/drill guide, 1.5 mm	VAR-4020TDG
Tap/drill guide, 1.8 mm	VAR-4024TDG
Tap/drill guide, 2.0 mm	VAR-8943-31
Tap/drill guide, 2.3 mm	VAR-4030TDG
Tap/drill guide, 2.4 mm	VAR-8943-14
BB-Tak, small, threaded	VAR-8933TBB
BB-Tak, small	VAR-8933BB
BB-Tak, large, threaded	VAR-8941TBB
BB-Tak, large	VAR-8941BB
Drill guide, variable, 1.6 mm	VAR-4016VDG
Drill guide, variable, 2.0 mm	VAR-4020VDG
Drill guide, variable, 2.4 mm	VAR-4024VDG
Drill guide, variable, 3.0 mm	VAR-4030VDG
Drill guide, VAL, locking, 3.0 mm	VAR-4030VDGL
Drill guide, variable, 3.5 mm	VAR-4035VDG
Drill guide, VAL, locking, 3.5 mm	VAR-4035VDGL
Bone tap, 2.0 mm	VAR-4020T
Bone tap, 2.4 mm	VAR-4024T
Bone tap, 2.7 mm	VAR-4027T
Bone tap, 3.0 mm	VAR-4030T
K-wire drill guide, 0.86 mm (1.6 mm/2.0 mm)	VAR-4020KDG
K-wire drill guide, 1.14 mm (2.4 mm)	VAR-4024KDG
K-wire drill guide, 1.14 mm (2.7 mm/3.0 mm)	VAR-4030KDG
K-wire drill guide, 1.3 mm (3.5 mm)	VAR-4035KDG
Bending plug, cannulated, 1.6 mm/2.0 mm	VAR-4020-04
Bending plug, cannulated, 2.4 mm	VAR-4024-04
Bending plug, cannulated, 2.7 mm	VAR-4027-04
Bending plug, cannulated, 3.0 mm	VAR-4030-04
Bending plug, cannulated, 3.5 mm	VAR-4035-04
Bending iron, small, 1.6 mm/2.0 mm	VAR-4000-07
Bending iron, medium, 2.4 mm/3.0 mm	VAR-4000-08
Bending iron, large 3.5 mm/broad 3.5 mm	VAR-4000-09
Freer elevator	VAR-4000-10
Hohmann retractor, double-ended, 6 mm/10 mm	VAR-4000-11
Ikuta clamp	VAR-4000-12
Lobster clamp, mini	VAR-4000-13
Lobster clamp, mini, radiolucent	VAR-4000-14
Periosteal elevator, 6 mm curved blade	VAR-4000-15
Pliers, needle-nose	VAR-4000-16
Pointed reduction forceps	VAR-4000-17
Reduction forceps, guidewire	VAR-4000-18
Sharp hook	VAR-4000-19
Termite forceps	VAR-4000-20
Toothed reduction forceps, Kocher	VAR-4000-21

Additional Screw Caddies and Lids

3.0 mm hybrid/3.5 mm screw caddy	VAR-3035SC-01
3.0 mm hybrid screw caddy lid	VAR-3035HSLC-01

Cases and Caddies

Product Image	Product Description	Item Number
	OrthoLine™ case	VAR-4000GC
	Generic case insert	VAR-4000GC-01
	1.6 mm screw caddy	VAR-3016SC-01
	2.0 mm screw caddy	VAR-3020SC-01
	2.4 mm screw caddy	VAR-3024SC-01
	2.7 mm screw caddy	VAR-4027SC-01
	3.0 mm screw caddy	VAR-3030SC-01
	3.5 mm/4.0 mm screw caddy	VAR-4035SC-02
	Bending plug caddy	VAR-4000BPC

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US patent information