Headless Compression and Twist-Off Screws

Surgical Technique

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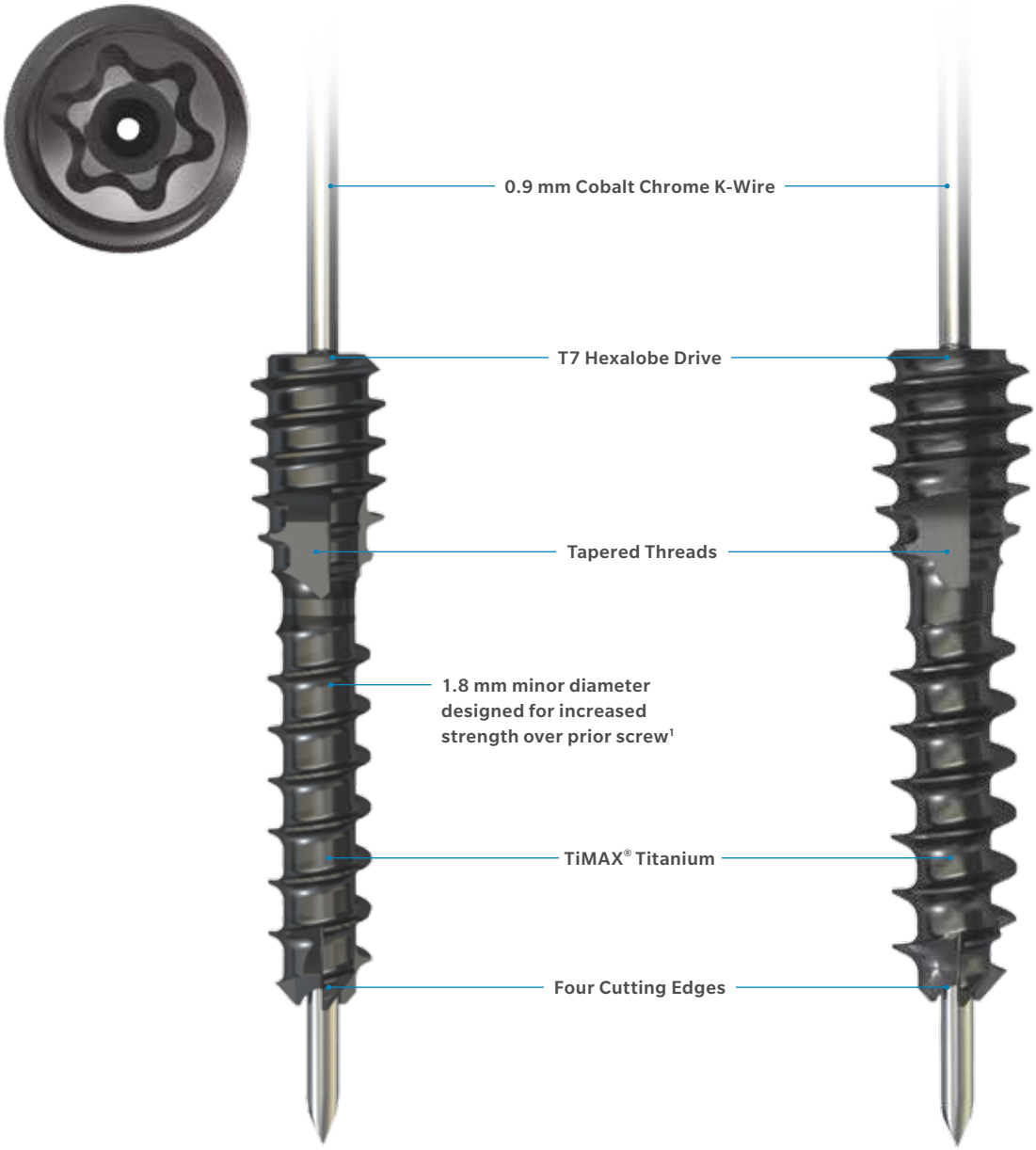
Headless Compression Screws



2.5 mm
10–40 mm (2 mm increments)

3.0 mm
10–40 mm (2 mm increments)

Headless Compression Screw Technique

Figure 1

Figure 2

The following surgical technique describes the use of a Headless Compression Screw for a distal Chevron osteotomy of the first metatarsal or various types of osteotomies (Figure 1).

Incision

A 7 cm incision is centered over the dorsal aspect of the first metatarsophalangeal joint, just medial and parallel to the EHL tendon. The incision is carried down to the subcutaneous tissues (Figure 2). Retract the soft tissues carefully being certain to protect the neurovascular bundle in the skin flap.

Lateral Release

If necessary, a standard lateral release is performed through the same incision. This includes the release of the adductor tendon and the fibular sesamoidal ligament.

Headless Compression Screw Technique – Unicortical Applications

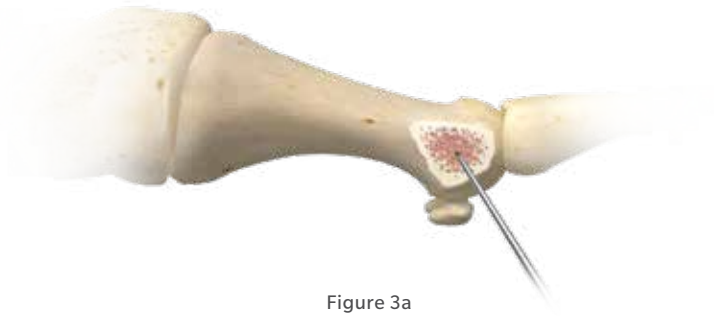


Figure 3a

Figure 3

Figure 3b

Osteotomy

A linear capsulotomy is then used to expose the joint. The hypertrophic medial eminence on the 1st metatarsal head is then osteotomized (Figure 3).

Insert a 0.9 mm k-wire perpendicular into the center of the first metatarsal head (Figure 3a).

A medially based long arm Chevron type osteotomy is then created from medial to lateral. Remove the k-wire. The capital fragment is then mobilized and transposed laterally to correct the 1st IMA and impacted on the 1st metatarsal shaft (Figure 3b).

Headless Compression Screw Technique – Unicortical Applications

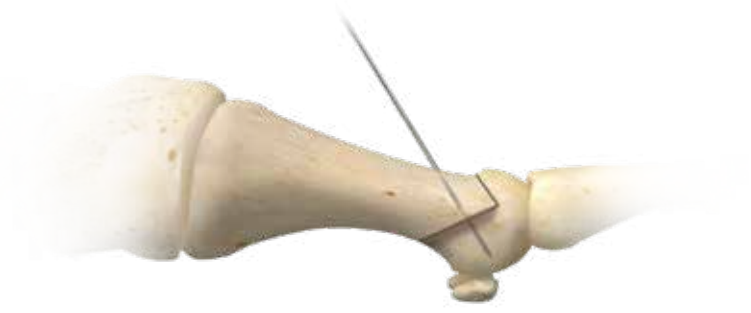


Figure 4

K-Wire Placement

The osteotomy is then stabilized in a uni-cortical application, such as a distal Chevron osteotomy, by advancing the 0.9 mm K-Wire across the osteotomy site until the tip is visible. Retract the wire slightly, so the tip is below the articular cartilage (Figure 4). Verify k-wire position via fluoroscopy.

Note: It is recommended to subtract 3-4 mm from the depth gauge measurement to avoid penetrating the articular cartilage with the distal tip of the screw. For example, if the measurement is 20 mm then select the 16 mm screw.

Tip: When using a screw longer than 28 mm for oblique applications, it may be beneficial to use a 0.9 mm x 105 mm k-wire.

Tip: Screw length can be measured off of the black band on the k-wire, which indicates the 70 mm mark for use with the depth gauge.

Tip: For hammertoe applications, a sterile double tipped 0.9 mm x 152 mm k-wire is available for order.

K-Wire Options

0.9 x 70 mm K-wire Cobalt Chrome

0.9 x 105 mm Sterile K-wire Cobalt Chrome

0.9 x 152 mm Trocar Sterile K-wire Stainless Steel

Headless Compression Screw Technique – Unicortical Applications

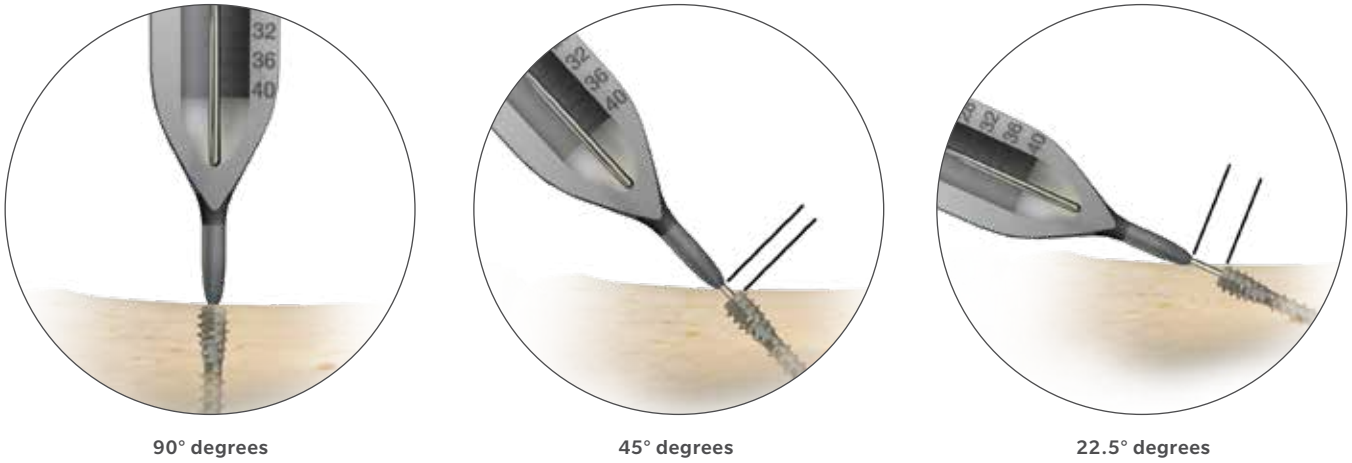


Figure 5

Screw Measurement

The length of the screws is measured using the depth gauge. Slide the depth gauge over the 0.9 mm k-wire down to bone ensuring the depth gauge is sitting flush against bone.

Note: The depth gauge is only compatible with the 0.9 mm x 70 mm and 0.9 mm x 105 mm k-wires.

The depth gauge displays the measurement from the distal tip of the depth gauge to the tip of the k-wire.

Important: The screw length may vary depending upon the level of obliquity applied to the k-wire during insertion. To determine the screw length, and with the obliquity of the k-wire in mind, record the measurement. Using the K-Wire Obliquity Chart below, subtract the corresponding millimeters from the recorded measurement (Figure 5).

It is recommended that each screw length be verified off the screw caddy measurement slot before the screw is implanted.

K-Wire Obliquity

90 degrees	Subtract 0 mm from measurement
45 degrees	Subtract 2 mm from measurement
22.5 degrees	Subtract 5-6 mm from measurement

Headless Compression Screw Technique – Unicortical Applications

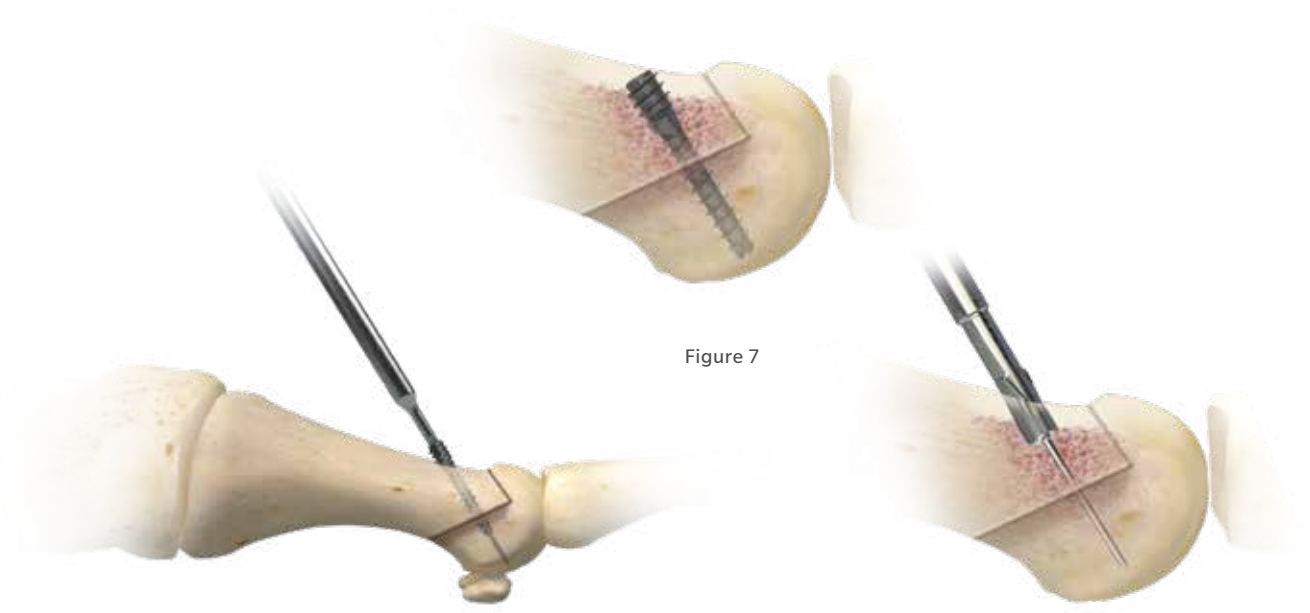


Figure 6

Figure 7

Figure 8

Insertion

Load the screw onto the T7 Cannulated Driver and Mini Rachet Handle. Place screw over the 0.9 mm k-wire down to surface of bone. Advance the screw into bone by turning the T7 Cannulated Driver clockwise (Figure 6). Continue advancing until the head of the screw is at or just below the near cortex. After compression is achieved, remove the T7 Cannulated Driver and 0.9 mm k-wire. Verify screw position with fluoroscopy (Figure 7).

Drilling (Optional)

Note: The Zimmer Biomet Headless Compression screws are designed to be self-drilling and self-tapping, and may be inserted under power.

If the bone is deemed to be too hard prior to screw insertion, or an oblique approach is required, use a Head Relief Drill to prepare the near cortex. This may reduce the risk of the driver twisting prior to screw failure (as designed) or twisting before the screw head is fully inserted.

Tip: For the 2.5 mm screw use the 2.5 mm Head Relief Drill, and for the 3.0 mm screw, use the 3.0 mm Head Relief Drill (Figure 8).

Screw Removal

For screw removal, insert the T7 Solid Driver into the head of the screw, and turn the Driver counterclockwise until the screw is removed.

2.5 mm Head Relief Drill AO
110027746

3.0 mm Head Relief Drill AO
110027747

Headless Compression Screw Technique – Bicortical Applications

Figure 9

Figure 10

K-Wire Placement

For bi-cortical applications, such as the Scarf-Z or Ludloff osteotomy, insert the k-wire until the tip begins to exit the outer wall of the far cortex (Figure 9). Screw measurement subtraction is not necessary for bi-cortical fixation.

K-Wire Options

0.9 x 70 mm K-wire Cobalt Chrome

0.9 x 105 mm Sterile K-wire Cobalt Chrome

0.9 x 152 mm Trocar Sterile K-wire Stainless Steel

Drilling (Optional)

Note: The Zimmer Biomet Headless Compression screws are designed to be self-drilling and self-tapping, and may be inserted under power.

If the bone is deemed to be too hard, or an oblique approach is required, use a Head Relief Drill to prepare the near cortex. This may reduce the risk of the driver twisting prior to screw failure (as designed) or twisting before the screw head is fully inserted.

Tip: For the 2.5 mm screw use the 2.5 mm Head Relief Drill, and for the 3.0 mm screw, use the 3.0 mm Head Relief Drill (Figure 10).

Headless Compression Screw Technique – Bicortical Applications

Figure 11

Drilling (Optional) (cont.)

In situations where bi-cortical lagging is required (such as a Scarf-Z Osteotomy), use the 2.0 mm Cannulated AO Drill for preparation of the far cortex (Figure 11).

The medial cortical shelf and metatarsal head are then osteotomized and rasped to a smooth contour.

Insertion

Load the screw onto the T7 Cannulated Driver and Mini Rachet Handle. Place screw over the 0.9 mm k-wire down to surface of bone. Advance the screw into bone by turning the T7 Cannulated Driver clockwise. Continue advancing until the head of the screw is at or just below the near cortex. After compression is achieved, remove the T7 Cannulated Driver and 0.9 mm k-wire. Verify screw position with fluoroscopy.

Screw Removal

For screw removal, insert the T7 Solid Driver into the head of the screw, and turn the Driver counterclockwise until the screw is removed.

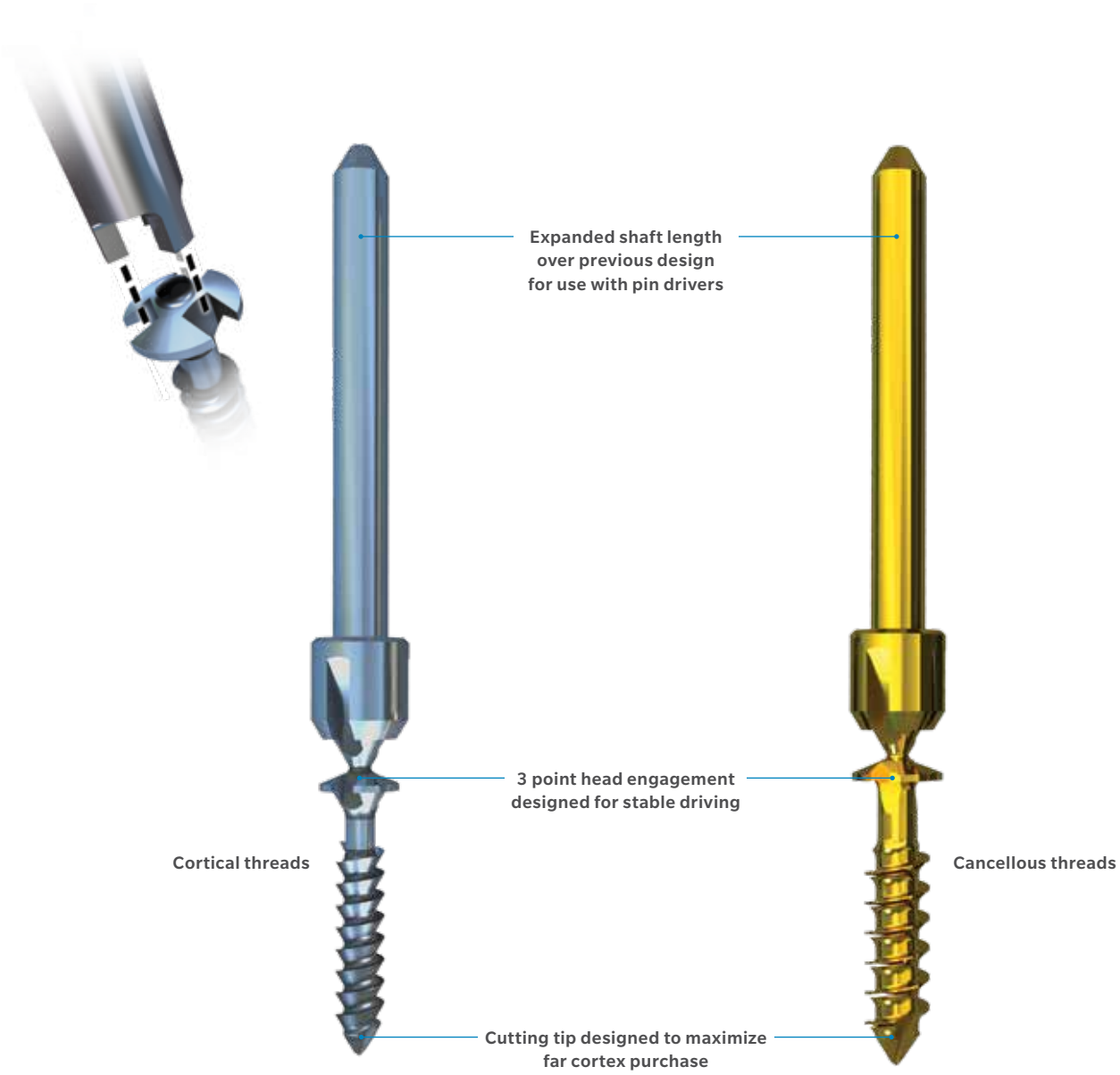
2.0 x 65 mm Cann Drill Bit AO 110027744
Compatible with the
70 mm and longer k-wires

2.0 x 80 mm Cann Drill Bit AO 110018532
compatible with the
105 mm and longer k-wires

2.5 mm Head Relief Drill AO 110027746

3.0 mm Head Relief Drill AO 110027747

Twist-Off Screws



2.0 mm Screw
8 mm-15 mm (1 mm increments)

2.7 mm Screw
8 mm-16 mm (1 mm increments)
18-24 mm (2 mm increments)

Twist-Off Screw Technique

Figure 1

Figure 2

The following surgical technique describes a Twist-Off Screw being used in a Weil osteotomy.

Surgical Approach

A Weil osteotomy is performed using a dorsal approach. Incision is initiated within the intermetatarsal space and extends to the web space (Figure 1). Osteotomy skin retraction provides exposure of both extensor muscles.

Place the lesser metatarsal in plantar flexion to expose the metatarsal head and dislocate the joint. Placing one Hohmann retractor on each side of the metatarsal should make this maneuver much easier. The use of a spreader provides more exposure to adjacent tissues during the osteotomy.

Osteotomy

The osteotomy is made horizontal and parallel to the sole. It starts in the cartilage of the head, near the dorsal margin, and should be at least 2.5 cm long (Figure 2).

Caution: The direction of the cut should be adjusted according to the condition of the forefoot. In case of pes cavus, the cut may be too short and the resection level should therefore be raised. In case of pes planus (or for the fourth or fifth metatarsals), the cut may be too long and the resection level should be lowered.

Twist-Off Screw Technique

Figure 3

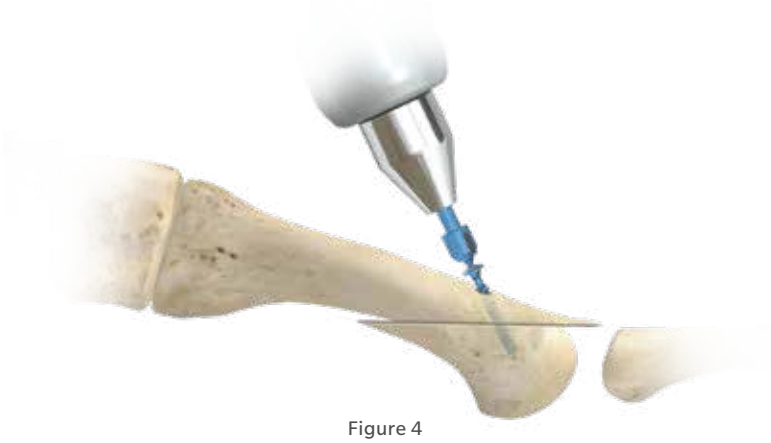


Figure 4

Figure 5

Osteotomy (cont.)

Once the osteotomy has been completed, slide the plantar segment of the metatarsal head proximally to the desired position (Figure 3).

Note: For applications other than a Weil osteotomy, it may be necessary to measure for screw length prior to insertion. To do so, insert the 0.9 mm k-wire across the osteotomy to the desired depth. Slide the depth gauge over the k-wire ensuring that it is sitting flush with the bone. The depth gauge displays the measurement from the distal tip of the depth gauge to the top of the k-wire.

Insertion

Hold the head against the metatarsal with the forefinger. The placement of a dorsal clamp aids in accurate head positioning and desired fixation. Using the Pin Driver on the Twist-Off Screw, drive the screw into the bone slowly under power at the same trajectory as was the k-wire (Figure 4).

Note: To reduce the potential for the tip of the screw to slide down the bone while under power, perforate the near cortex with the 0.9 mm k-wire prior to screw insertion (Figure 5).

Twist-Off Screw Technique

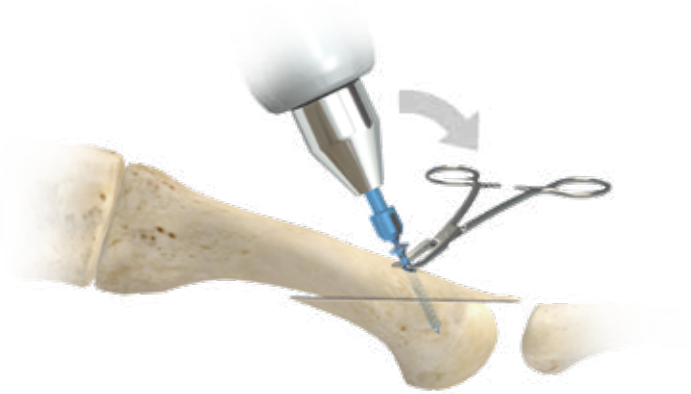


Figure 7

Figure 6

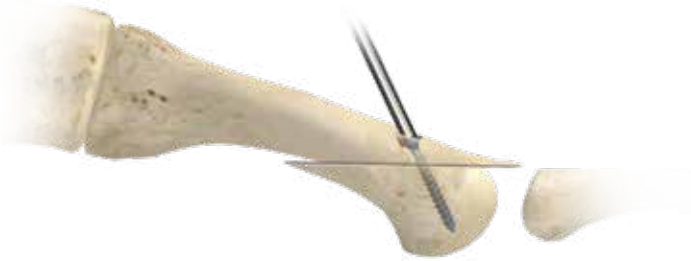


Figure 8

Insertion (cont.)

Once the screw head engages the dorsal cortex, the support prongs are designed to snap off (Figure 6).

If inserting the Twist-Off Screw in osteoporotic bone, stop advancing the screw before the head engages the near cortex. Place the mosquito clamp against the screw, below the head, applying pressure while bending the pin driver towards the mosquito clamp (Figure 7), until the shaft breaks off from the screw head.

Place the Twist-Off Finishing Driver on the Mini Rachet Handle and finish screw placement by hand (Figure 8).

Twist-Off Screw Technique

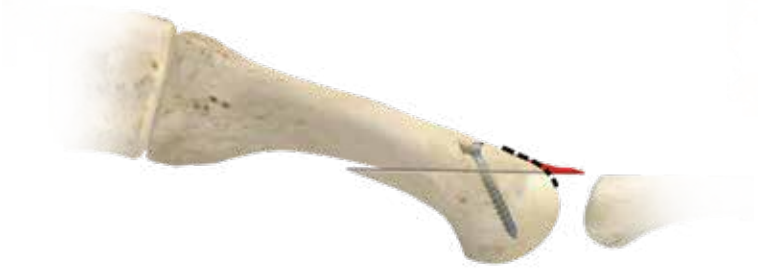


Figure 9

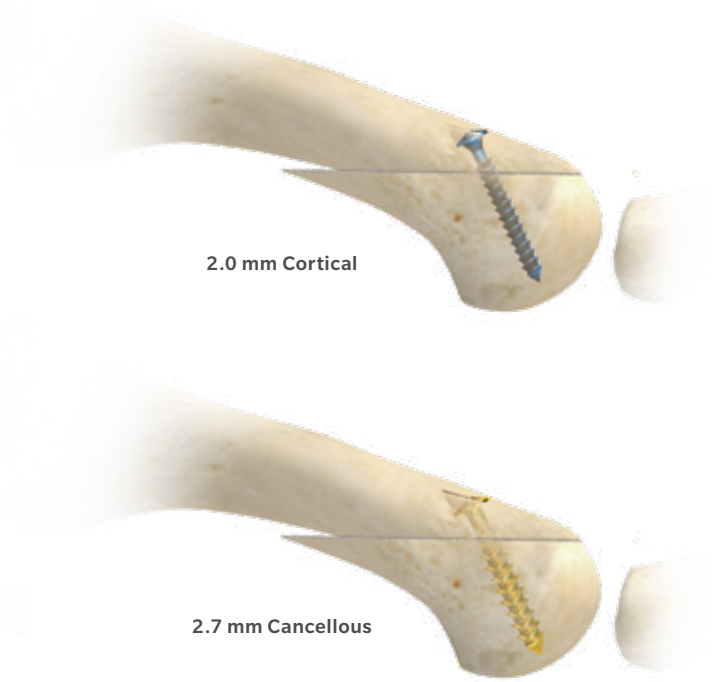


Figure 10

Final Step

Resection of the dorsal peak is the final step of this procedure (Figure 9). Despite shortening, Z-shaped release of extensor muscles is often necessary. Close the incision.

Note: The 2.0 mm Twist-Off Screw is designed with cortical threads, while the 2.7 mm Twist-Off Screw has cancellous threads for use in softer bone and is designed for increased purchase (Figure 10).

Ordering Information

Implants – Headless Compression Screws

2.5 mm Screws, Fully Threaded

Non-Sterile	Description
110018415	HCS Screw 2.5 x 10
110018416*	HCS Screw 2.5 x 12
110018417*	HCS Screw 2.5 x 14
110018418*	HCS Screw 2.5 x 16
110018419*	HCS Screw 2.5 x 18
110018420*	HCS Screw 2.5 x 20
110018421*	HCS Screw 2.5 x 22
110018422*	HCS Screw 2.5 x 24
110018423*	HCS Screw 2.5 x 26
110018528	HCS Screw 2.5 x 28
110018529	HCS Screw 2.5 x 30
110018530	HCS Screw 2.5 x 32
110018550	HCS Screw 2.5 x 34
110018551	HCS Screw 2.5 x 36
110018552	HCS Screw 2.5 x 38
110018553	HCS Screw 2.5 x 40

*Included in tray

3.0 mm Screws, Fully Threaded

Non-Sterile	Description
110018448	HCS Screw 3.0 x 10
110018449*	HCS Screw 3.0 x 12
110018450*	HCS Screw 3.0 x 14
110018451*	HCS Screw 3.0 x 16
110018452*	HCS Screw 3.0 x 18
110018453*	HCS Screw 3.0 x 20
110018454*	HCS Screw 3.0 x 22
110018455*	HCS Screw 3.0 x 24
110018456*	HCS Screw 3.0 x 26
110018457*	HCS Screw 3.0 x 28
110018458*	HCS Screw 3.0 x 30
110018459*	HCS Screw 3.0 x 32
110018460*	HCS Screw 3.0 x 34
110018461	HCS Screw 3.0 x 36
110018462	HCS Screw 3.0 x 38
110018463	HCS Screw 3.0 x 40

*Included in tray

2.5 mm Screws, Partially Threaded

Non-Sterile	Description
110018424	HCS Screw 2.5 x 28 PT
110018425	HCS Screw 2.5 x 30 PT
110018426	HCS Screw 2.5 x 32 PT
110018427	HCS Screw 2.5 x 34 PT
110018428	HCS Screw 2.5 x 36 PT
110018429	HCS Screw 2.5 x 38 PT
110018430	HCS Screw 2.5 x 40 PT

Ordering Information

Implants – Twist-Off Screws

2.0 mm Twist-Off Screws (Cortical)

Non-Sterile	Description
110018481	Twist-Off Screw 2.0 x 8
110018482	Twist-Off Screw 2.0 x 9
110018483*	Twist-Off Screw 2.0 x 10
110018484*	Twist-Off Screw 2.0 x 11
110018485*	Twist-Off Screw 2.0 x 12
110018486*	Twist-Off Screw 2.0 x 13
110018487*	Twist-Off Screw 2.0 x 14
110018488*	Twist-Off Screw 2.0 x 15

*Included in tray

2.7 mm Twist-Off Screws (Cancellous)

Non-Sterile	Description
110018498	Twist-Off Screw 2.7 x 8
110018499	Twist-Off Screw 2.7 x 9
110018500*	Twist-Off Screw 2.7 x 10
110018501*	Twist-Off Screw 2.7 x 11
110018502*	Twist-Off Screw 2.7 x 12
110018503*	Twist-Off Screw 2.7 x 13
110018504*	Twist-Off Screw 2.7 x 14
110018505*	Twist-Off Screw 2.7 x 15
110018506*	Twist-Off Screw 2.7 x 16
110018508*	Twist-Off Screw 2.7 x 18
110018509*	Twist-Off Screw 2.7 x 20
110018510*	Twist-Off Screw 2.7 x 22
110018511*	Twist-Off Screw 2.7 x 24

*Included in tray

Instruments & Disposables

Instruments

Non-Sterile	Description
110038661	T7 Driver Cannulated AO
110018535	Depth Gauge
PA017†	Screw Forceps
110018537	T/O Finishing Driver AO
110038662	T7 Driver Solid AO
PA720	Osteotomy Clamp
110017406	Mini 4 Sided Ratchet Handle, Secure AO
110018539	Implant and Instrument Case
110018538	Implant and Instrument Lid
110018561	HCS Screw Caddy
110018562	Twist-Off Screw Caddy

†Item is sterile packed only

Disposables

Non-Sterile	Description
110018526	0.9 x 70 mm K-wire
110018532†	2.0 x 80 mm Cann Drill Bit AO
110027744	2.0 x 65 mm Cann Drill Bit AO
110027746	2.5 mm Head Relief Drill AO
110027747	3.0 mm Head Relief Drill AO
110025493†	0.9 x 105 mm Sterile K-wire
164206135†	0.9 x 152 mm Trocar Sterile K-wire

Indications and Contraindications

INDICATIONS

The Zimmer Biomet Headless Compression Screws and Twist-Off Screws are indicated for fixation of bone fractures, fusion of a joint (arthrodesis) or bone reconstruction (osteotomy) of the mid-foot bones, metatarsal and phalanges of the foot or the phalanges, metacarpals and carpals of the hand. In the foot, these include procedures to correct Hallux Valgus (bunions), Hallux Varus and Hallux Rigidus, Hammer toe, Claw toe and Mallet toe.

CONTRAINDICATIONS

1. Infections.
2. Patient conditions including blood supply limitations, insufficient quantity or quality of bone.
3. Patients with mental or neurologic conditions who are unwilling or incapable of following postoperative care instructions.
4. Foreign body sensitivity where material sensitivity is suspected, testing is to be completed prior to implantation of the device.

References

1. FRS® Update (FRS and Twist-Off screws) Design Rationale. Biomet. FX000090 Rev. C. Bending strength analysis is not necessarily indicative of clinical performance.

For complete product information, including indications, contraindications, warnings, precautions, and potential adverse effects, see the package insert and www.zimmerbiomet.com.

Zimmer Biomet does not practice medicine. This technique was developed in conjunction with health care professionals. This document is intended for surgeons and is not intended for laypersons. Each surgeon should exercise his or her own independent judgment in the diagnosis and treatment of an individual patient, and this information does not purport to replace the comprehensive training surgeons have received. As with all surgical procedures, the technique used in each case will depend on the surgeon's medical judgment as the best treatment for each patient. Results will vary based on health, weight, activity and other variables. Not all patients are candidates for this product and/or procedure. Caution: Federal (USA) law restricts this device to sale by or on the order of a surgeon. Rx only.

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