THE DIGITAL COMPRESSION SCREW
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Introduction

The patented BioPro® Digital Compression Screw is the only 1.5mm screw available on the market for the fusion of the lesser toes. The Digital Compression Screw provides the patient with compressive forces which speed the fusion process. The screw is beneath the skin, allowing the patient to wash their feet with no exposed k-wires, eliminating the potential for pin tract infections. The Digital Compression Screw is easily removed during an in office visit. Features of the stainless steel screw include 1.5mm and 1.8mm diameters in 20mm to 55mm lengths; a thin, flat head; a tapered guide extension; and self cutting threads.

Features and Benefits

1.5mm and 1.8mm Diameters Available

The Digital Compression Screw is available in both 1.5mm and 1.8mm diameters in lengths from 20mm to 55mm in 5mm increments.

Why is this important? The phalanges of the lesser digits are extremely small bones, which require small hardware for proper fixation. The 1.5mm and 1.8mm diameter options of the Digital Compression Screw provide secure fixation with minimal disruption to bone stock. This allows for apposition of maximum surface area, leading to quicker and more reliable fusions.

Thread Diameters Match K-wire Diameters

The 1.5mm outer thread diameter is equal to a 0.062 K-wire and the 1.8mm outer thread diameter is equal to a 0.072 K-wire.

Why is this important? Overdrilling the distal phalanx allows the lag effect of the Distal Compression Screw to provide compression across the joint being fused. Utilizing standard k-wires for this overdrilling simplifies the procedure, lowers overall costs and helps ensure availability of the necessary items for a successful case.

Compressive, Buried Fixation

The Digital Compression Screw offers compression across the joint being fused, while also being implanted under the patient’s skin.

Why is this important? It is a well-documented fact that compression speeds fusion and greatly increases the likelihood of a successful arthrodesis. The lag design of the Digital Compression Screw produces compression across the joint to be fused while the technique buries the screw under the patient’s skin, eliminating any risks related to pin tract infections or other complications.
Fuse the DIPJ, PIPJ or Both

The Digital Compression Screw surgical technique allows for fusion of the DIPJ, PIPJ or both joints.

**Why is this important?** The Digital Compression Screw is designed to be implanted as temporary fixation and removed once a successful fusion has been achieved. This, combined with lengths from 20mm to 55mm, allows the screw to cross the DIPJ to fuse it alone, to fuse it with the PIPJ, or to fuse the PIPJ, but still retain motion at the DIPJ once the screw is removed. This follows the same principles as K-wire fixation with the addition of compression.

Easily Removed

The Digital Compression Screw technique allows for easy in-office removal once successful fusion has been achieved.

**Why is this important?** Once fusion has been achieved, the technique allows for screw removal with only minor soft tissue disturbance and no bone disturbance, as opposed to intramedullary devices that require significant disturbance to bone, should removal be necessary.
Ordering Information

The Digital Compression Screw is manufactured from stainless steel and is available in two diameters; 1.5mm and 1.8mm. Each diameter comes in lengths starting at 20mm up to 55mm in 5mm increments. The device comes sterile packed with its own Tracker device.

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Digital Compression Screw Instruments

DC Screw Remover

DC Screw Driver Instrument

Retractable Screw Retainer

Screw Length Etchings
**Indications**

- Digital fusion for the correction of hammertoe deformities in the foot and osteoarthritis, degenerative arthritis and posttraumatic arthritis
- Digital fusion in the hand for osteoarthritis, rheumatoid arthritis, degenerative arthritis, post traumatic arthritis and chronic mallet finger

**Contra-indications**

- A general health problem that might pose a significant threat to the life of the patient if subjected to a major surgical procedure
- An active infection or a previous infection that has not been quiescent for at least six months
- A local or systemic infection
- Significant deficiency in the vascular supply to the extremity
Surgical Technique

The following is the step-by-step technique using the BioPro® Digital Compression Screw. This example describes a proximal interphalangeal joint fusion, however the same principles also apply to distal interphalangeal joint fusions.

Step One

A skin incision of choice is made over the proximal interphalangeal joint and all soft tissue dissection is performed to expose the articular surface of the head of the proximal phalanx and base of the intermediate phalanx. The cartilaginous surfaces are removed (remove cartilage only and maintain subchondral bone) using either a sagittal or oscillating saw. (Fig 1)

Step Two

Using an 0.045 in. K-wire, a hole is drilled through the center of the intermediate phalanx continuing through the center of the distal phalanx out through the end of the toe. (Fig 2)

Step Three

Using an 0.062 in. K-wire, the previous hole is now overdrilled with the larger K-wire through the intermediate and distal phalanx out through the end of the toe. (Fig 3)

Note regarding the use of the 1.8mm screw: If you choose to step up to the 1.8mm screw during the procedure, the 0.062 in. hole must be overdrilled again using a 1.8mm drill bit. This will accommodate the larger outer thread diameter of the 1.8mm screw. (All hospitals should have a 1.8mm drill bit in their screw sets.) A 2.0mm Steinmann pin can also be used.

Step Four

Using an 0.035 in. K-wire, a hole is drilled centered in the proximal phalanx approximately 3mm to 4mm in length. (Fig 4) This drill hole acts as a guide path for the screw.

Caution: Failure to perform the proper pre-drilling and over-drilling can result in tight screw fit. The additional interference in the cortical bone can cause difficulty in screw insertion, potentially resulting in screw heads torqued off due to the excessive force required and malpositioning of the screw.
Step Five

A small transverse incision (approximately 5mm) is made at the end of the toe using the identifiable K-wire hole as the center of the incision. (Fig 5) The soft tissue is dissected about the distal tuft.

Step Six

While approximating the proximal and intermediate phalanx in its final position, place the top of the laser encrypted measuring device (screwdriver) on top of the toe, abutting the inside of the handle against the end of the toe, to find the desired screw length. (Fig 6) Choosing the correct screw length is very important to obtain optimal thread purchase and tightness.

For preferred positioning of threads: measure the screw so the threads are in the joint itself or just past the joint. (Fig 7) This allows more threads to grab the subchondral and metaphyseal bone. Since the distal bone has been overdrilled this will still produce the lag effect.

Step Seven

Once the proper screw length is determined, open the sterile packaged screw and remove the enclosed Tracker device. Pass the Tracker through the base of the intermediate phalanx out through the end of the toe. (Fig 8) The screw tip is inserted into the Tracker (Fig 9) and with combined pressure, the Tracker allows the screw to find the drill hole easily and as the screw is implanted, the Tracker is retrograded out of the surgical site. (Fig 10)
**Step Eight**

Once the guide extension is visible through the base of the intermediate phalanx (Fig 11) the guide extension is inserted into the glide hole in the center of the proximal phalanx and the screw is tightened using two finger tightening. (Fig 12)

Note: Care should be taken not to overtighten the screw. Some force may be required for the screw to seat well, however, if excess force is required to tighten the screw the alignment of the holes or size of the predrilling should be evaluated. Overtightening can result in stripping the screw or screw breakage.

Note: It is always recommended to start with the 1.5mm screw diameter. In the event the screw is stripped during implantation, transition to the same length of 1.8mm screw.

**Step Nine**

Closure of the surgical wounds with suture of choice including the distal incision.

Important Note: To avoid bending or breaking the screw, patient must remain in an approved post-operative surgical shoe during all weight bearing until screw removal. Indicated for 2nd, 3rd and 4th digits only.

Note: During the surgical procedure it may be advantageous to use a mini C-Arm to verify screw placement and bone apposition. Postoperative management follows the same procedure as if K-wires were used. This includes serial x-rays over the healing phase and the use of an approved surgical shoe during all weight-bearing.
Surgical Suggestion for Positional Mallet Toe

If the surgeon is fusing the PIPJ and has an accompanying positional mallet toe deformity, an intra-articular flexor tenotomy can be done prior to all K-wire drilling, to align the DIPJ. After the screw is in place the soft tissue will heal in the new position.

Suggestion for Structural Mallet Toe without PIPJ Fusion

Measure the screw length so that the threads are centered in the PIPJ. This will allow excellent purchase and tightness encompassing the subchondral and metaphyseal bone from the proximal and intermediate phalanx. Even though the screw traverses a non-fused joint, this is no different than when a K-Wire is used and passes through the PIPJ. For easier screw positioning and placement for DIPJ fusion, use a 0.045 K-wire to drill the guide hole (through the intermediate phalanx) into the PIPJ.
Removal Procedure

The Digital Compression Screw is a non-permanent fixative device which should normally be removed in six to eight weeks. Removal is an easy surgical procedure that may be performed in a hospital, surgery center, or an in-office setting. The following is an example of an in-office procedure:

1. A digital block is performed with anesthetic of choice.
2. A penrose drain may be used for hemostasis.
3. A prep is performed or Betadine paint at the end of the toe.
4. To identify the incision location, often times the screw head can be palpated, or identify the previous incision line.
5. A small transverse incision is made and soft tissue is dissected free about the screw head and its grooves.
6. Using the BioPro® Removal Screwdriver, the screw is retrograded from the site. If the screw just turns, use pick-ups to pry behind the screwhead, causing retrograde pressure assisting the screwdriver.
7. One nylon suture may be used, followed by a sterile dressing.
8. Suture may be removed at the first week post-op.

Sample in office screw removal pack:

BioPro® Removal Screwdriver, #3 handle, hemostat, 1/2 pick-up, half-curved pick-up (not required), suture scissor, needle holder.