The Journal of Foot & Ankle Surgery 53 (2014) 120–123

Contents lists available at ScienceDirect

The Journal of Foot & Ankle Surgery

journal homepage: www.jfas.org

# A Useful Surgical Technique for Retrieval of a Broken Guide Pin in the Midfoot

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ARTICLE INFO

*Keywords:*
complication
device removal
equipment failure
instrument breakage
Lisfranc joint

ABSTRACT

Perioperative instrument breakage is not an infrequent occurrence, even for experienced surgeons. The most commonly reported instrument breaks in orthopedic procedures are drill bits, followed by Kirschner wires and cannulated guide pins. The reasons for failure include improper technique and repetitive use. The retrieval of broken hardware can be technically challenging, particularly if the fragment has become embedded in bone. Retrieval methods have been described for cannulated guide pin fragments in the hip; however, no specific techniques have been described for the retrieval of guide pin fragments embedded in the bones of the foot. In the present report, we describe a technique we have found useful for retrieval of a guide pin fragment that had broken off during a Lisfranc fracture repair 6 weeks earlier. The technique was used in a delayed situation; however, we believe it would be even easier to use during an intraoperative breakage.



Failure or breakage of orthopedic instruments such as Kirschner wires and guide pins is not infrequent and has been reported in various clinical settings (1–4). Drill bits, followed by Kirschner wires and guide pins, have been the most commonly reported instruments to break during orthopedic procedures (2). These instrument fragments can require removal if they are located near nerves, vessels, or joint surfaces (2). Furthermore, intra-articular wires or pins can cause cartilage damage if left in situ. A major reason for guide pin breakage is repeated usage, which causes deformation, leading to reduced flexibility and decreased torsion strength (5) (Fig. 1). The guide pin direction can also be deformed when passing through bones of differing densities or during transition through a joint in which movement of the joint during fixation, or pin deflection crossing the joint space, creates a slight change in direction. This change of direction can hamper smooth passage of the drill bit over the guide pin and can erode the pin, creating a stress riser in the pin that results in breakage.

Retrieving broken guide pins for cannulated screw systems is technically demanding, because the pin fragments have usually been embedded in bone. Several techniques have been reported for the retrieval of broken Kirschner wires and guide pins; however, most of these techniques have been limited to the hip joint and have involved wires or pins that had been advanced through the joint and subsequently anchored within the acetabulum or were protruding into the pelvis (1,4,6). A search of the Medline database using PubMed and Embase through May 2013 did not yield any studies on

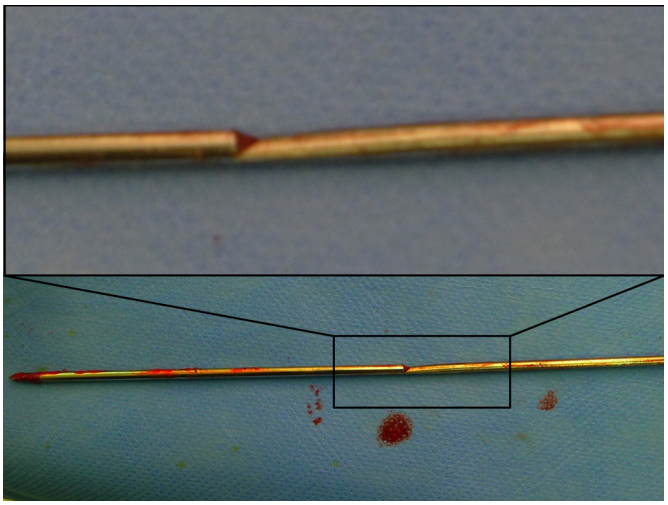

**Fig. 1.** Photograph of guide pin damaged by erosion from cannulated drill bit.

**Financial Disclosure:** None reported.
**Conflict of Interest:** None reported.

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http://dx.doi.org/10.1053/j.jfas.2013.06.005


**Fig. 2.** Anteroposterior and lateral radiographic views showing the guide pin fragment retained within midtarsal bone.

the topic of removal of broken guide pins specifically from the extremity distal to the knee. It is a different scenario, however, when the wire or pin fragments have been buried deep to the cortical bone surface. In such cases, the surgical technique requires a balance between gaining access to the fragment and minimizing damage to the bone. Removal after an interval of time has passed since the index surgery is even more demanding owing to obliteration of the wire or drill channel through the adjacent soft tissues and bone.

In practice, we have sometimes encountered inadvertent withdrawal of guide pins along with the drill bits, in particular, when the drill bits have been passed along the full length of the pins. Such instances of inadvertent withdrawal of the guide pin have most likely been caused by insufficient pin–bone grip strength. The guide pin could also have been trapped, together with bone debris, within the lumen of the cannulated drill bit. In 2 case reports, the investigators applied this principle for removal of broken guide pins from the hip. In both cases, they used cannulated drill bits and a triple reamer to retrieve the broken pin (5,7). In the present case report, we present our technique for retrieving a fragment of a guide pin from a 3.5-mm cannulated screw system.

## Surgical Technique

Our case involved a 20-year-old woman who had undergone internal fixation with 3.5-mm cannulated screws (Synthes, Oberdorf, Switzerland) for a Lisfranc joint complex injury of her right foot. The surgery was performed on an emergency basis. During the index operation, the surgeon broke the 1.25-mm guide pin as he was drilling through the base of the second metatarsal into the intermediate cuneiform. The guide pin fragment was embedded in the intermediate cuneiform with the sharp, threaded end having passed through the naviculocuneiform joint to lodge in the navicular (Fig. 2). The patient was referred to our clinic for an opinion on the broken guide pin 2 weeks after the index surgery. We planned to remove the broken guide pin as it crossed the naviculocuneiform joint, because this segment of the pin was at high risk of breakage and it was inhibiting naviculocuneiform motion. Furthermore, leaving the guide pin fragment in situ had the potential of causing damage to the articular cartilage of the naviculocuneiform joint. A minimally invasive approach for removal of the fragment was chosen to minimize damage to the joint and adjacent osseous and soft tissue structures. The removal was scheduled for 6 weeks after the initial operation, because this was the earliest reasonable time for removal of the Lisfranc screws without compromising bone healing after the emergency surgery to repair the Lisfranc joint injury.

The patient was positioned supine with the foot at the edge of the operating table to provide adequate space for use of fluoroscopy. The C-arm fluoroscope (OEC Fluorostar 7900, GE Healthcare, Waukesha, WI) was placed perpendicular to the operating table such that both anteroposterior and lateral images could be obtained by rotating the C-arm and by tilting its axis. This technique ensured perpendicular positioning of the C-arm in relation to the foot without interfering with the limb position or the operating surgeon's hand position while targeting the guide pin. The operation was performed with the