

Fully Threaded Compression Screw for Fixation of First Metatarsal Osteotomies: A Retrospective

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Introduction

- The treatment of hallux abducto-valgus deformity is a common among practitioners treating the lower extremity.
- While many methods of surgery have been described for the treatment of hallux abducto-valgus deformity, the 1st metatarsal osteotomy remains the most popular.¹
- The use of fixation, especially screw fixation, in first metatarsal osteotomies is commonplace and can be considered the standard of care. Screw fixation offers good bone-to-bone contact with interfragmental compression, allows early range of motion and primary bone healing.²⁻⁶
- While many types and styles of screws remain available, headless compression varieties have gained in popularity.⁷
- Wheeler and McLoughlin demonstrated that a fully threaded compression screw (Acutrak®; from Acumed LLC: Hillsboro, OR) is capable of producing and maintaining compression between bone fracture fragments. In addition, the Acutrak® screw was shown to have superior mechanical characteristics than other headless screws in every mode tested.⁸



Discussion

- The results of this retrospective investigation demonstrate that fully threaded headless compression screws (Acutrak®; from Acumed LLC: Hillsboro, OR) are effective as a primary form of fixation for first metatarsal osteotomies.
- Of the three screws removed in this study only one was removed because of pain associated with the hardware. In review of this case, the screw had been left proud and as such caused irritation. Surgeon error was the cause for extraction, and not hardware failure. The other screws were removed for infection and per patient request (no pain reported).
- While many complications have been reported associated with hallux valgus surgery, hardware irritation or failures have been largely ignored. Removal of hardware has been reported in up to 7% of the cases.¹⁰ In our investigation we found only 2% of the screws required removal with no failure of fixation noted.
- Acutrak® screws offer the surgeon an alternative to conventional hardware. They have previously demonstrated superior compression and we have demonstrated less screw irritation requiring removal. Compression is achieved through two key features that work together - the variable thread pitch and tapered profile. The wider thread pitch at the tip of the screw penetrates the bone faster than the finer trailing threads, compressing the two fragments gradually as the screw is advanced. The tapered profile allows the threads to purchase new bone with each turn, gaining compression and maximizing pullout strength along its entire length.
- It is also important to note that all patients were allowed to ambulate immediately post-op in a post-operative shoe. All osteotomies demonstrated successful union.
- Further investigations are warranted.

Study Design

- We retrospectively identified patients by diagnosis code with hallux abducto valgus or hallux rigidus with the following inclusion criteria:
 1. 1st metatarsal osteotomy using Acutrak® screw fixation (at least one year post-op).
 2. A complete medical record.
 3. Pre-operative and healed post-operative weight-bearing radiographs.
- The patient records were reviewed for the following:
 1. Radiographic healing of the osteotomy.
 2. Complications associated with the screw, or other problems requiring removal of hardware.
 3. Measurements of pre and post-operative intermetatarsal angle using the Mitchell method.⁹
 4. Post-op infections.
 5. Total number of office visits from the date of surgery to discharge.
 6. Patient age, and body mass index (BMI).

Results

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| Total Charts Reviewed: | | .316 |
| Total Charts Meeting Inclusion Criteria: | | .124 |
| Total Complete Radiographic Union: | | .124 |
| Average Pre-op IM Angle: | | .13 |
| Average Post-op IM Angle: | | .8 |
| Total Screw Removed: | | .3 |
| Total Other Hardware Removed: | | .5 |
| Total Post-op Infections: | | .3 |
| Average # of Visits: | | 10 |
| Average Age: | | 53 |
| Average BMI: | | 28 |
| Male: | | 12 |
| Female: | | 112 |



The Acutrak® screw is a headless screw intended for the fixation of fractures where a screw is placed either through cartilage or in an area of poor soft tissue coverage.

- ✓ Compression-Unique variable pitch design creates gradual compression across the fracture with each turn of the screw.
- ✓ Headless- Allows the screw to be implanted "sub-surface."
- ✓ Cannulated- Screws are cannulated. Nitinol wires are used for accurate placement and minimum wire distortion.
- ✓ Fully Threaded-Maximizes purchase and allows for fracture fixation almost anywhere along the screw.
- ✓ Highly Polished-Aids in removal.
- ✓ "Strip-Out" Resistance-Tapered shape allows the threads to fully purchase new bone.

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