CASE STUDY 1:
Failed K-wire Hammertoe Correction Revised With the PRO-TOE® VO Hammertoe Fixation System

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History
This is a 51-year-old, moderately active female with complaint of recurrent hammertoe of the second toe that continues to cause pain. Pain is worse in any closed-toe shoe. She had previous hammertoe correction surgery at another institution 10 months prior. Per her history, she had percutaneous K-wire stabilization for about 5 weeks. She recalled that the toe went crooked again about a month or two after the K-wire was removed. She has tried various toe spacers and pads, as well as taping, to try to keep the toe straight and in line with the other toes. The patient finds it difficult working in a closed-toe shoe, which is required at her job. She expressed interest in surgical correction of the problem and was hopeful that there is another way to correct the problem permanently and without the use of a K-wire.

The Problem
A condylectomy of the proximal phalanx at the PIP joint of the second toe had previously been performed. There was a failure to achieve a stable fibrous union, or pseudoarthrosis, at the second PIP joint. (Figure 1) When the K-wire was removed, the lack of stabilization allowed the painful deformity to recur. The retrograde buckling of the recurrent hammertoe and a relatively long second metatarsal were also causing sub-second metatarsal head pain. No signs of plantar plate tear or MTP dislocation were present.

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The Solution
Revision surgery was performed through a semi-elliptical, transverse incision at the PIP joint. A fresh resection of the distal aspect of the proximal phalanx was performed. Care was taken to keep the cut perpendicular to the long axis of the toe. The base of the middle phalanx within the second PIP joint was prepared using a 6.5 cannulated planar from the reusable PRO-TOE® VO instrument kit. A 10° PRO-TOE® VO implant was selected to offset some of the “floating toe” that occurred due to deformity recurrence. Standard repair of the extensor tendon and capsule was performed with 2-0 absorbable suture, and the skin was closed in standard fashion. (Figures 2, 3) Additionally, a second metatarsal decompression osteotomy was performed to offload the MTP joint. A single twist-off screw was used for fixation.

Postoperative Care
The patient was allowed heel weight-bearing in a surgical shoe for four weeks and then transitioned to a comfortable laced shoe.

Case Technique Comments
• It is important to have a flat resection of the distal aspect of the proximal phalanx as was done in this revision case. As can be seen in the preoperative radiographs, leaving a biased resection will point the toe in that direction.
• It is recommended to resect with a saw on the proximal phalanx. To prepare the middle phalanx, minimal resection of the distal cartilage using a planar is recommended. Leaving the subchondral bone intact will improve implant blade purchase.
• The proximal, screw-based portion of the PRO-TOE® VO implant should ideally be placed dead center in the medullary canal of the phalanx. In some cases, the canal is rather large, and the implant may be undersized. It is recommended to use the largest implant diameter possible to get solid intramedullary purchase. There are multiple sizes of PRO-TOE® VO available to account for the variability in patient anatomy. X-ray templates are available to help appropriately size the implant.
• The surgical goal is to correct deformity and get a stable toe. Unlike K-wire, which is removed after about 6 weeks, the implant remains within the toe and imparts lasting stability. In some cases (as in this one), a bony fusion occurs. This may be desirable in some instances but is not necessary.