CHAPTER **19**

HALLUX ABDUCTOVALGUS CORRECTION USING THE OPUS MAGNUM ANCHOR SYSTEM

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INTRODUCTION

The mild to moderate flexible hallux abducto valgus (HAV) deformity requires addressing both the soft tissue and osseous components for adequate correction. Most commonly, this is achieved with a soft tissue rebalancing and an osteotomy of the distal first metatarsal. Although the risk is low, complications of osteotomies include a delayed or nonunion, shortening of the metatarsal and subsequent transfer of pressure, and avascular necrosis. Patient factors also contribute to the choice of procedure, including age, activity level, and bone quality. We present an alternative to a distal osteotomy for correction of a mild to moderate flexible HAV deformity with a combination of a soft tissue rebalancing and a bone anchor system to reduce the intermetatarsal angle.

It is important to test the flexibility of the deformity while the patient is weight bearing. This should be assessed clinically, but can also be analyzed radiographically. Figure 1 shows a dorsoplantar (DP) weight-bearing radiograph of a typical moderate HAV deformity. Figure 2 is the same patient with manual reduction of the deformity by applying lateral pressure against the medial aspect of the first metatarsal head while also applying medially directed pressure to the lateral aspect of the distal hallux. The reducibility and flexibility is easily appreciated. It is also important that there is no structural deformity at the first metatarsal cuneiform joint. Figures 3 and 4 show the increased space between the medial cuneiform and second metatarsal base and the subsequent decrease of this space after the manual reduction is performed.

In recent years there has been an increasing popularity of HAV correction utilizing the Mini Tightrope system (Arthrex, Naples, FL). Use of this system requires a 2.7 mm drill hole through the neck of the second metatarsal. Although initial results seemed promising, some surgeons are reporting stress fractures in the second metatarsal post-operatively, especially in the osteopenic population. With use of the Arthrocare Opus Magnum bone anchor system (Arthrocare, Sunnyvale, CA) a strong wire suture (Magnum

Figure 1. DP radiograph demonstrates a moderate HAV deformity.

Figure 2. Manual reduction of the same patient while weight bearing demonstrates the flexible nature of the deformity.

Figure 3. A closer look at the metatarsocuneiform joint before manual reduction.

Figure 4. The metatarsocuneiform joint after manual reduction.

Figure 5. Typical incision placement is just medial to the extensor hallucis longus tendon, slightly more lateral than the usual HAV incision.

wire) is looped around the second metatarsal rather than through it to close a flexible first intermetatarsal space. Although the stress to the second metatarsal may be reduced with this procedure, it should be avoided in patients with significant osteopenia to prevent any stress reaction to the second metatarsal.

CASE PRESENTATION

A 70-year old relatively active woman presented with a painful bunion deformity. The patient had difficulty finding comfortable shoegear. She also had pain with range of motion of the hallux. Due to the radiographic and clinical reducibility of the deformity, as well as the radiographic appearance of good bone stock, it was determined that she was a good candidate for correction of the HAV with the Opus Magnum anchor system (Arthrocare). The patient was a low demand patient physically. This procedure would also allow the patient to be fullly weight bearing immediately and return her to full activity and normal shoe gear sooner than other procedures would allow.

A 6-cm dorsal incision was made over the first metatarasophalangeal joint (MPJ) just medial to the extensor tendon (Figure 5). This is slightly lateral to the typical bunion incision used by the senior author (TB), which allows for ease of access to the second metatarsal without stressing the surrounding soft tissues. The procedure continues with a standard release of the first interspace used by the Podiatry Institute and an exostectomy of the medial eminence of the first metatarsal head.

Access is then obtained to the second metatarsal through the first interspace. Blunt dissection is utilized to expose the second metatarsal neck, being careful to safely retract the soft tissues within the first and second interspaces. The periosteum is left intact. Miniature

Hohmann retractors can be used on the medial and lateral aspects of the metatarsal at the level of the neck to safely retract the soft tissue and avoid neurovascular damage (Figure 6). The Magnum wire is then passed around the second metatarsal from the medial aspect of the bone from plantar to dorsal. The wire is then looped around itself and pulled taut (Figure 7). We recommend using a small right angle clamp to pass the wire plantar and lateral and using a small mosquito hemostat to grab the wire from the right angle clamp to finish the loop dorsally.

A 3.0 mm drill hole is then made from lateral to medial in the first metatarsal, perpendicular to the bone, just proximal to the sesamoid apparatus. This should be angled approximately 45 degrees in the sagittal plane from dorsolateral to plantar medial (Figure 8). This will increase the pull out strength of the bone anchor. The free ends of the suture are then inserted into the Opus Magnum device as recommended by Arthrocare (Figure 9). The device is then placed into the drill hole until the laser line is at the bone surface. The anchor is then deployed as recommended by Arthrocare (Figure 10). It is put under tension by the surgeon to check for adequate purchase in the first metatarsal. The wire is then tightened against the bone anchor using the Opus device, which will cause a lateral pull of the first metatarsal. This is performed under fluoroscopy until the desired correction of the first interspace is attained (Figures 11 and 12). Note the reduction of the first interspace as well as the realignment of the fibular sesamoid. Once the desired correction is achieved, the magnum wire is cut flush and the Opus device is removed from the field (Figure 13).

The wound is closed in a layered manner and a sterile dressing is applied. The postoperative course consists of full weight bearing in a surgical shoe for 6 days until the first dressing change. At this time a light dressing and Ace wrap are applied to help control postoperative edema. The

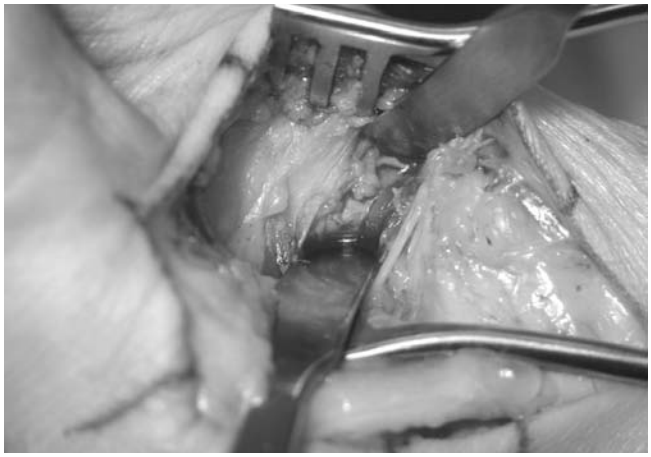

Figure 6. Exposure of the second metatarsal is gained through the first interspace, staying above the periosteum and taking care to avoid neurovascular damage in both the first and second interspaces.

Figure 7. Magnum wire is passed around the second metatarsal and the wire is looped around itself and pulled taut against the second metatarsal.

Figure 8. The drill hole for the anchor is then made in the first metatarsal, angled from dorsolateral to plantar medial, just proximal to the sesamoid apparatus.

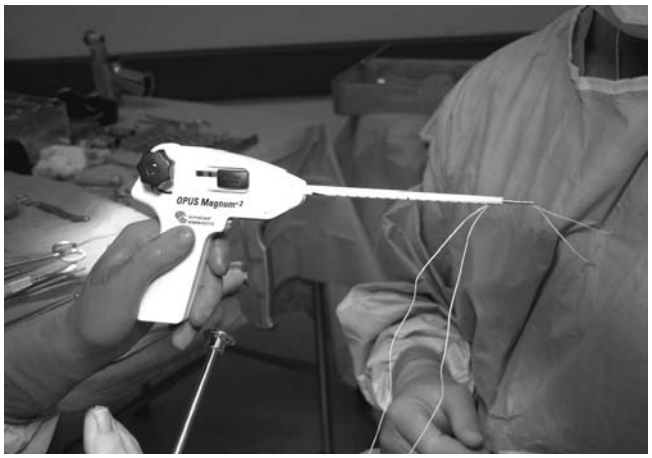

Figure 9. The Magnum wire is then inserted into the Opus Magnum system as recommended by Arthrocare.

patient is returned to a "comfortable" shoe and regular activity as tolerated. Postoperative radiographs at 4 weeks show a maintained reduction of the first intermetatarsal angle with no evidence of stress reaction in either the first or second metatarsal (Figure 14). Clinically, the patient has minimal pain and swelling, as well as adequate maintenance of the bunion correction (Figure 15).

DISCUSSION

There is a select group of patients with painful HAV that may be amenable to correction of the deformity with a combination of soft tissue rebalancing and reduction of the intermetatarsal angle with the Opus Magnum bone anchor system. It is important that these patients have a mild to moderate deformity with an intermetatarsal that is reducible. Severe osteopenic bone is an absolute contraindication to this procedure. Adequate bone stock is important to reduce the risk of stress reactions to the second metatarsal and assure good purchase of the bone anchor into the first metatarsal. Other contraindications include open growth plates and athletes. It is also recommended that the procedure be performed in patients with a relatively low demand activity level. In conclusion this procedure offers an alternative to the surgical correction of a flexible HAV deformity without the need for an osteotomy of the first metatarsal or drill hole through the second metatarsal.

Figure 10. The anchor is then deployed in the first metatarsal.

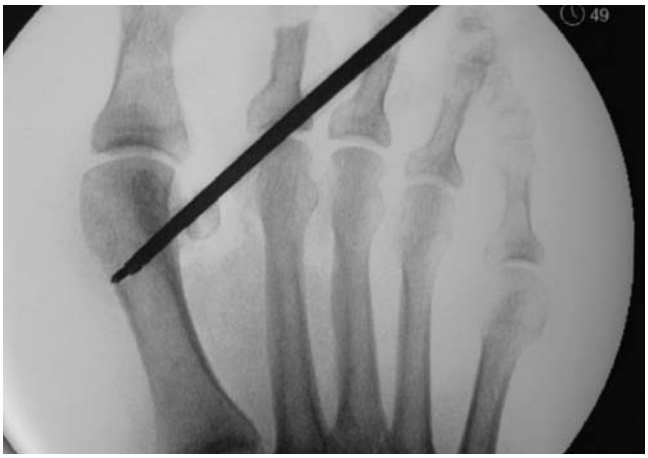

Figure 11. Fluoroscopy can be used while tightening the wire against the anchor until the desired correction is achieved.

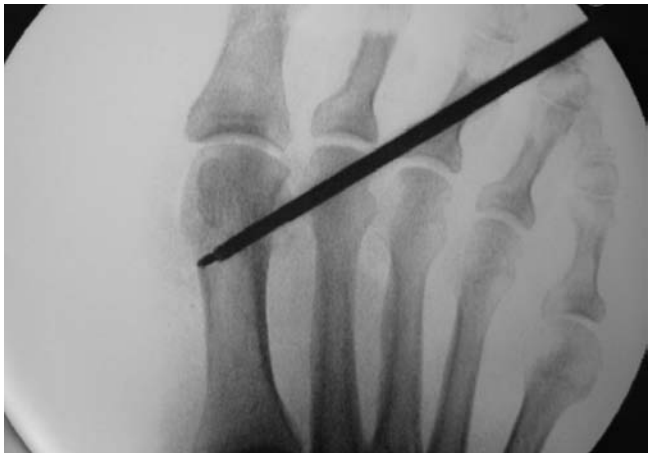

Figure 12. Fluoroscopic visualization.

Figure 13. Final placement of the anchor as well as the decrease of the first intermetatarsal angle can be appreciated.

Figure 14. At postoperative week 4, correction is maintained and well as the position of the anchor.

Figure 15. Clinically, minimal swelling is appreciated at postoperative week 4.