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Case Report

Bilateral Second Metatarsal Stress Fractures After Hallux Valgus Correction With the Use of a Tension Wire and Button Fixation System

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ABSTRACT

The pathomechanics and treatments of hallux valgus vary widely by deformity and surgeon, and are extensively described in the orthopedic and podiatric literature. With each newly described treatment, new complications can be encountered. In this report, we describe the case of a 22-year-old woman who underwent bilateral hallux valgus repair with a tension wire and button fixation system, and developed bilateral second metatarsal stress fracture at the point of fixation application during the postoperative period. Although this fixation system has been useful in our practice, like other surgical implants, it conveys a certain amount of risk that should be considered by surgeons using the device.

Hallux abductovalgus (HAV) is the most common pathological entity affecting the great toe, and it is often associated with pain and discomfort (1). A variety of options are available for the treatment of hallux valgus, and surgical intervention is often useful when nonsurgical options fail to provide satisfactory relief. Operative correction can reduce or eliminate symptoms related to hallux valgus, and it has been estimated that more than 200,000 hallux valgus operations are performed in the United States each year (2). Most of the surgical interventions used to repair hallux valgus entail a combination of bone and soft tissue manipulations, and, osseous procedures such as first metatarsal osteotomy, while being powerful in regard to the ability to correct the alignment of the first ray, can be associated with a myriad of complications. Interventions limited to soft tissue manipulations only, while less likely to be associated with bone-healing complications, are often associated with recurrent deformity. A relatively new intervention for the repair of hallux valgus entails the use of a tension wire and button fixation system to tether the first metatarsal to the second, in conjunction with additional soft tissue rebalancing procedures. Because the procedure can be used to correct certain bunion deformities without the need for metatarsal osteotomy, it is often performed bilaterally simultaneously. In this report, we describe the case of a patient who underwent surgical correction of bilateral hallux valgus deformities using the tension wire and button fixation system and went on to develop fracture of the second metatarsal in both feet.

Case Report

A 22-year-old slender, nonsmoking woman presented to the private practice of the senior author (DWM) with a chief concern of painful bunions affecting both feet, insidious in onset and progressively worsening despite the use of wide and soft shoe gear, and avoidance of activities that aggravated her symptoms. Her pain was located primarily at the first metatarsophalangeal joint (MTPJ) and had markedly worsened over the 2 months preceding her presentation. There was no history of trauma, and the pain was worsened by weight-bearing activities. She denied any significant medical or surgical history. She also related that she was nonathletic and that her job required that she stand all day. The remainder of her historical interview and the review of systems were unremarkable. The physical examination was also unremarkable, except for her bilateral bunion deformities, which displayed cutaneous erythema without limitation of motion or joint crepitus. The hallux valgus deformity was greater on the right lower extremity than the left, and the alignment of the first MTPJ was not track bound. Standard radiographic views of each foot revealed findings consistent with HAV and metatarsus primus varus (Figure 1). The first intermetatarsal angle (IMA) measured 11.4° on the right side and 10° on the left, and the hallux abductus angle (HAA) was 20.2° and 15.8° on the right and left, respectively. Hypertrophic bone growth was also noted on the dorsomedial aspect of both first metatarsal heads.

Conservative and surgical treatment plans were discussed with the patient, and further nonsurgical treatments were recommended and

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Fig. 1. Preoperative foot radiographs. (A) Left foot, anteroposterior weight-bearing view. The first intermetatarsal angle measures to 10° with a hallux abductus angle of 15.8°. (B) Right foot, anteroposterior weight-bearing view. The first intermetatarsal angle measures to 11° with a hallux abductus angle of 20°.

Fig. 2. Six days postoperative radiographs of the right foot. (*A*) Anteroposterior weight-bearing view. The oblong and round button are well aligned and against the bone. (*B*) Lateral weight-bearing view. Proper placement of the fixation buttons is confirmed.

included the use of wider shoe gear, topical betamethasone cream applied to the dorsomedial aspect of each first MTPJ, and an injection of a mixture of dexamethasone phosphate and bupivacaine into the first MTPJ, bilaterally. On the follow-up visit, the patient stated she had minimal reduction of pain, and, after further discussion, it was decided to proceed with bilateral surgical intervention combining modified McBride bunionectomies with a tension wire and button fixation system (Mini TightRope™ and #2 FiberWire, Arthrex, Inc., Naples, FL USA). It was also decided to intervene bilaterally, simultaneously, in an effort to optimize the correction of her deformities with her work schedule and her desired course of intervention.

On August 8, 2008, the patient was taken to the operating room, where a linear, longitudinal incision was made medial to the extensor hallucis longus tendon, and the underlying target structures of the first MTPJ were exposed via anatomical layer dissection. A modified McBride bunionectomy, with preservation of the fibular sesamoid after lateral first MTPJ release, was performed. Inspection of the articular surfaces of the first metatarsal and the proximal phalangeal base, and the sesamoids, bilaterally, revealed intact hyaline cartilage.

Using a pneumatic-powered sagittal saw, the medial eminence of the first metatarsal was then resected with preservation of the sagittal groove for articulation with the phalangeal base and the tibial sesamoid. Using image-intensification fluoroscopic guidance, the mid-shaft level of the first metatarsal was identified, and a 1.2-mm guide wire was inserted from the medial aspect of the first metatarsal to the second metatarsal shaft, after which a 2.5-mm drill bit was used to create a tunnel through the first and second metatarsals, for subsequent placement of the tension wire and button fixation system. The guide pin attached to the wire and button device was passed from lateral to medial, through the second metatarsal into the first, after exposing the second metatarsal shaft via soft tissue dissection through the same wound used to perform the modified McBride component of the operation. The round button anchored to the lateral terminal of the wire was secured against the lateral cortical margin of the second metatarsal, while the oblong button, which was passed through the second and first metatarsals, was flipped and oriented so that it was secured, with gradual tension, against the medial cortex of the first metatarsal. Reduction of the first IMA was achieved by means of gradual application of tension in the wire, and the correction was confirmed via fluoroscopic inspection with a mini C-arm image intensifier, and the tension wire and button fixator secured in the corrected position. After layered wound closure, the procedure was then repeated on the contralateral limb without any deviations in the technique. There were no intraoperative complications encountered in either foot, and the wounds were dressed with soft bandages and rigid-soled surgical shoes.

Postoperative management consisted of weight bearing in the surgical shoes. The patient progressed without complication until the soft tissues healed and she was allowed to resume the use of regular shoe gear and to gradually increase her weight-bearing activities. Standard radiographs were taken at her first postoperative visit, which was 6 days after the operations (Figures 2 and 3). Reduction of the first IMA was evident in both feet with good alignment of the tension wire and button fixator. There was no evidence of migration of the buttons, and there was no sign of metatarsal fracture in either foot, although there was mild soft tissue swelling observed in each foot over the first and second metatarsals, distally. The patient related no complaints at the time of the 6-day follow-up visit. The patient was