THE KIDNER PROCEDURE REVISITED

Gerard V. Yu, DPM

The accessory navicular bone is considered by many to be the largest and most significant supernumerary bone of the foot. The terms os tibiale externum and navicular secundarium have been used to describe this entity. The accessory navicular bone may be present as a completely separate ossicle within the body of the tibialis posterior tendon, partially attached to the navicular bone or completely ossified to the navicular bone, in which case it presents as a large tuberosity.

The painful accessory navicular bone is not an uncommon problem. It is often associated with pain, erythema, and localized edema. There may be soft tissue inflammation in the area. Symptoms are often aggravated by weight bearing, prolonged ambulation and weight bearing, ill-fitting shoes, and increased exertional activity such as participation in sports. Direct trauma to the area may be a major contributing factor, and may result in a fracture in cases where an incomplete union already exists. The accessory navicular may present as a unilateral or bilateral condition.

The diagnosis is readily established on conventional x-rays. In cases where there is a question as to the cause of the pain, a bone scan may prove beneficial, especially after ossification of the foot is complete. Rarely are other specialized studies necessary to confirm the diagnosis.

The source of symptomatology may be one of two things. The obvious osseous enlargement in this area can irritate the overlying soft tissues. Symptoms are aggravated by shoe pressure, which results in increased pressure to the area. In some cases, a bursal sac may form.

In other cases, the pain is due to a disturbance of the union between the accessory bone and the navicular bone itself. The tibialis posterior tendon, which inserts into this area, generates additional tension and shear against the ossicle, and may also cause disturbance of the union site during the gait cycle. Trauma to the area is a common contributing factor.

Conservative treatment usually consists of symptomatic modalities such as shoe modifications, orthotic devices, short leg casting, heel wedges, anti-inflammatory medications, and various physical therapy modalities. When conservative treatment fails, surgical intervention is indicated.

THE KIDNER PROCEDURE

In 1929 and 1933, Kidner described a relationship of the accessory navicular bone to a pes planus deformity. In addition, he described a surgical technique which consisted of removal of the ossicle with a complete transection of the tibialis posterior tendon and reattachment of the tendon to the plantar surface of the navicular bone. The procedure was designed to eliminate pain while simultaneously increasing the height of the medial arch.

More current literature indicates that there is no correlation between the presence of an accessory navicular and the development or correction, of a pes planus deformity. Veitch, in a review of patients having undergone the Kidner procedure, felt that symptomatic improvement was due to the removal of the ossicle rather than repositioning of the tendon itself. Patients with an accompanying flatfoot deformity did not show medial arch improvement based upon radiographic and photographic analysis. Sullivan and Miller assessed the calcaneal metatarsal angle and found no

correlation between the presence of a pes planus deformity and an accessory navicular bone.

In another study by Macnicol and Voutsinas, 47 patients with accessory navicular bones were studied to compare the results of the Kidner procedure to simple excision of the accessory ossicle. They included, in both procedures, patients with a normal medial arch and those with varying degrees of flatfoot. They concluded that the Kidner procedure did not provide any distinct advantages over simple excision with medial navicular recontouring. Both procedures were found to be equally effective in providing symptomatic relief. Postoperative recovery, however, was more involved and complicated with the Kidner procedure. Although medial arch improvement was noted in some of the adolescent patients, the authors did not attribute this to the surgical correction, but to the normal development of the growing foot.

In patients with symptoms attributable only to the presence of an accessory navicular bone, simple excision should prove satisfactory in providing relief. In addition to the standard excision, remodeling of the medial aspect of the navicular tuberosity may be necessary.

In patients with symptoms attributable to a flatfoot deformity in combination with an accessory navicular bone, additional surgical procedures should be considered. Patients with significant underlying equinus deformity may require gastrocnemius recession, tendo Achillis lengthening, and/or ankle arthroplasty. Additional flatfoot procedures in conjunction with a Kidner procedure may consist of subtalar joint arthroereisis, lateral column lengthening by means of an Evans calcaneal osteotomy, displacement osteotomies of the calcaneus, and/or reconstruction of the medial arch by a Young's or modified Young's tenosuspension technique. If degenerative arthritic changes are present, single or multiple joint fusions may be necessary.

SURGICAL TECHNIQUE

A linear incision is placed along the superior margin of the tibialis posterior tendon, centered over the talonavicular joint. If necessary, the incision can be extended proximally or distally to incorporate additional procedures when primary flatfoot surgery is performed. The incision is deepened through the subcutaneous tissues and appropriate hemostasis obtained.

The deep fascia and tendon sheath of the tibialis posterior are identified. To ensure proper placement of the deep fascial incision, a puncture can be made proximally along the course of the tendon. A tendon passer, or similar blunt instrument, can then be passed along the course of the tendon sheath to the insertion of the tendon at the navicular tuberosity. The deep fascia and tendon sheath are then incised and reflected, exposing the tibialis posterior tendon and its insertion into the navicular tuberosity. The incision should extend to the level of the naviculocuneiform joint in order to provide adequate exposure to the entire navicular bone.

The foot is then manipulated while inspecting the talonavicular joint. At this point, the os tibiale externum can usually be identified. The tendon is most commonly found to lie deep to the tibialis posterior tendon, and may vary in its relationship to the navicular tuberosity. In some cases, the large ossicle will actually be found at the insertion of the tendon itself. In other cases, the accessory bone will be found just proximal to the insertion of the tendon into the navicular tuberosity.

The tendon is retracted inferiorly and, if necessary, partially detached. The accessory navicular bone is then excised *in toto* utilizing sharp dissection, with particular care taken to avoid accidental transection of the main tendon fibers.

If the navicular tuberosity is determined to be enlarged, the tendon should be reflected from its insertion and the navicular tuberosity remodeled, utilizing an osteotome and mallet or a power burr. Recontouring of the bone should be done in a very precise manner so as to create a navicular tuberosity with a normal osseous configuration. Unless exposure of both the talonavicular joint and naviculocuneiform joint has been achieved, one is likely to leave several undesirable osseous ledges or ridges dorsally, plantarly, proximally or distally. With proper exposure, these areas can be carefully contoured and smoothed to eliminate any sharp projections of bone.

Depending on the extent of release of the tendon from its insertion, a tendon reattachment device may be necessary. The conventional technique consists of one or two drill holes through

the navicular tuberosity to encompass the reattached tendon. Newer techniques involve the use of any one of a number of various tendon reattachment devices, including the Zimmer Mini-Statak® or one of several Mitek anchoring devices. Generally, the tendon is reattached to the plantar medial aspect of the navicular tuberosity. If desired, one may advance the tendon distally to provide increased tension along the course of the tendon as well as plication of the spring ligament. The procedure can also be combined with a modified Young's tenosuspension in cases of flatfoot reconstruction.

Following the secure reattachment of the tendon, layered closure is performed, including the deep fascia/tendon sheath, subcutaneous tissue, and skin. Wound closure strips are applied for additional support, followed by a dry sterile dressing.

CLINICALLY ILLUSTRATED TECHNIQUE
CASE I

Figure 1. Typical appearance of a patient with a large os tibiale externum in conjunction with a hypertrophic navicular tuberosity.

Figure 2. Bilateral dorsoplantar x-ray demonstrating a large os tibiale externum.

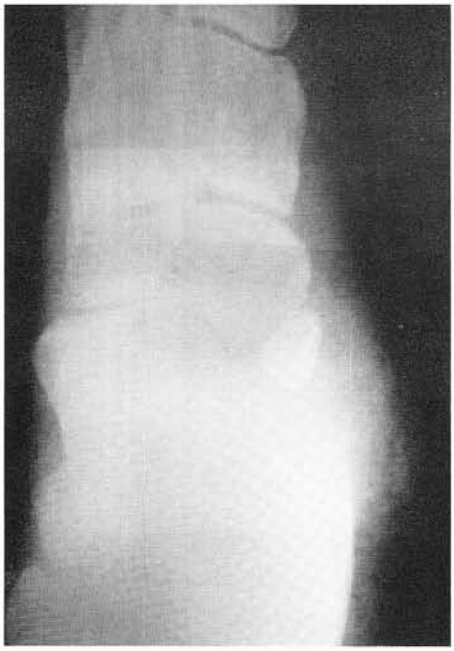

Figure 3. A lateral oblique x-ray is used to enhance the visualization of a suspected os tibiale externum which is not easily seen on dorsoplantar x-ray.

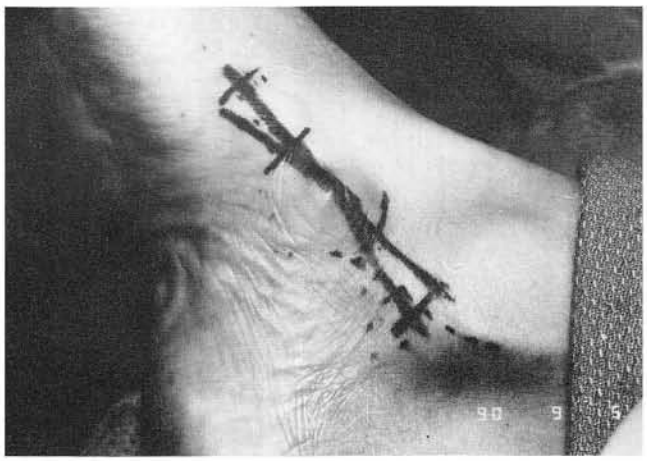

Figure 4. Proper incision planning for execution of a modified Kidner procedure. Note the relationship of the incisional approach to the tibialis posterior tendon. Placement of the incision on the superior aspect of the tendon may help prevent postoperative incision line irritation.

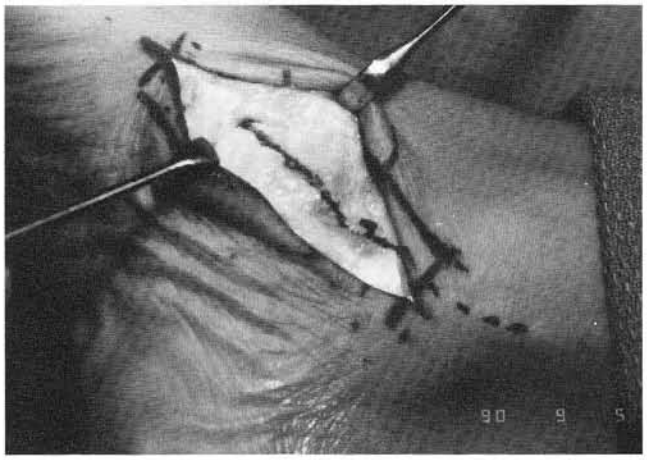

Figure 5. Dissection through the subcutaneous tissues to the level of the deep fascia and periosteum. The deep fascia, periosteum, and capsular tissues are incised in a linear manner along the superior border of the tendon.

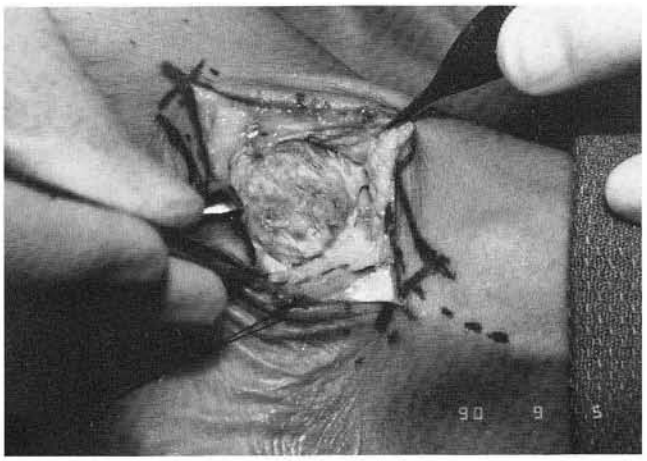

Figure 6. Completion of subperiosteal and subcapsular dissection exposing the entire navicular tuberosity. The os tibiale externum is the lower portion of the navicular tuberosity. The tendon has been reflected medially and inferiorly.

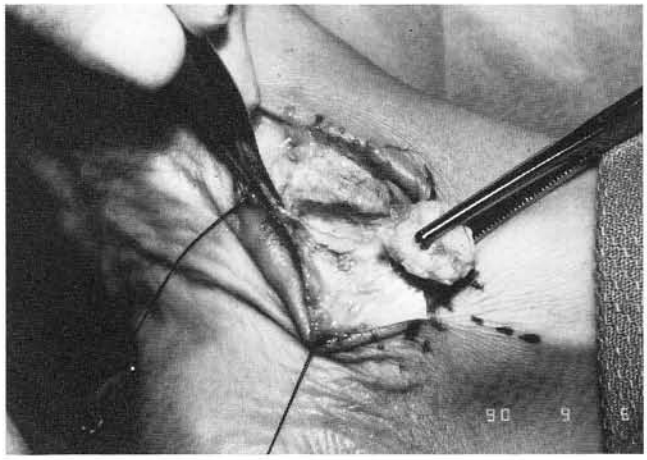

Figure 7. The os tibiale externum has been completely excised. Note its relationship to the remaining portion of the navicular tuberosity shown in Figure 6. The remaining prominence of the navicular tuberosity is removed with an osteotome and mallet and contoured with a power burr.

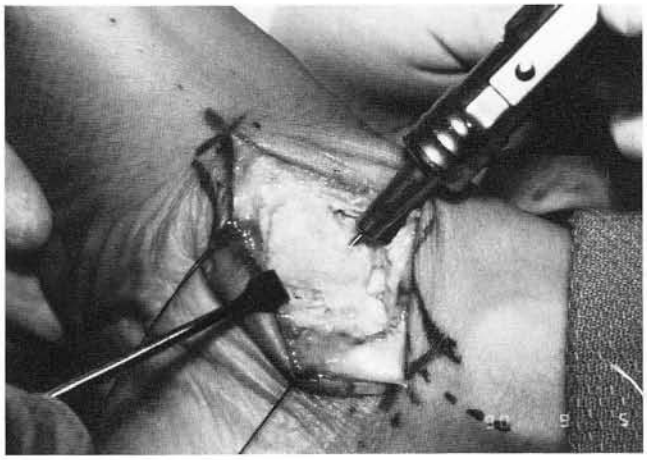

Figure 8. Drill holes are placed through the remaining body of the navicular from dorsal to plantar for reattachment of the tibialis posterior tendon.

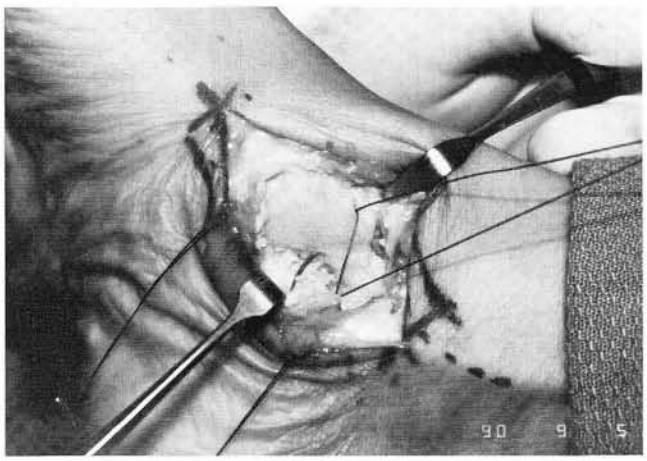

Figure 9. Absorbable or nonabsorbable suture is used to reattach the superficial insertion of the tibialis posterior tendon to the navicular.

CASE II

Figure 10. A patient with severe bilateral end stage pes valgoplanus deformity.

Figure 11. Posterior weight-bearing attitude, at angle and base of gait, demonstrating significant abduction and valgus alignment of the foot.

Figure 12. Weight bearing DP x-ray demonstrating abduction of the midfoot on the rearfoot.

Figure 13. Lateral x-rays of the same patient. Note the presence of an os tibiale externum, and the severe pes planus deformity.

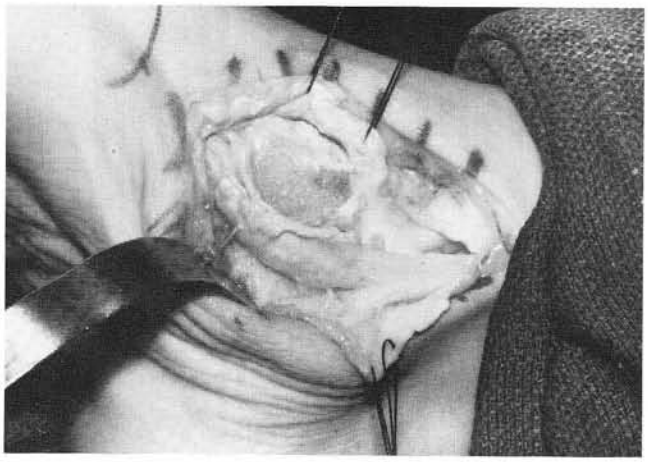

Figure 14. Dissection of the entire medial arch for excision of an os tibiale externum and remodeling of a large cornuate navicular tuberosity. The tibialis posterior tendon has been completely reflected inferiorly.

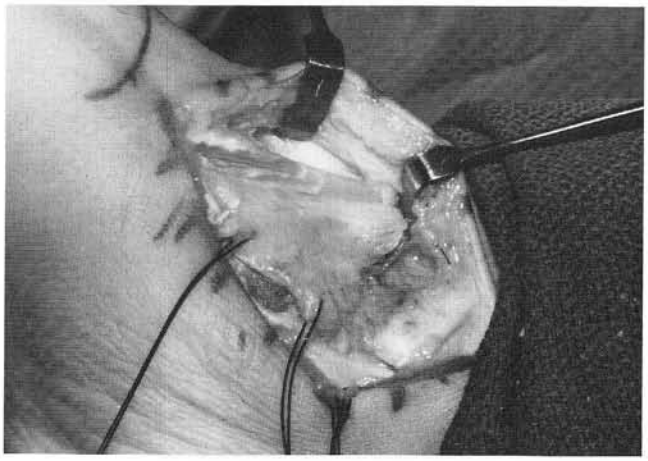

Figure 15. Exposure of the tibialis anterior tendon prior to transfer via a modified Young's tenosuspension, which was performed in conjunction with a modified Kidner procedure.

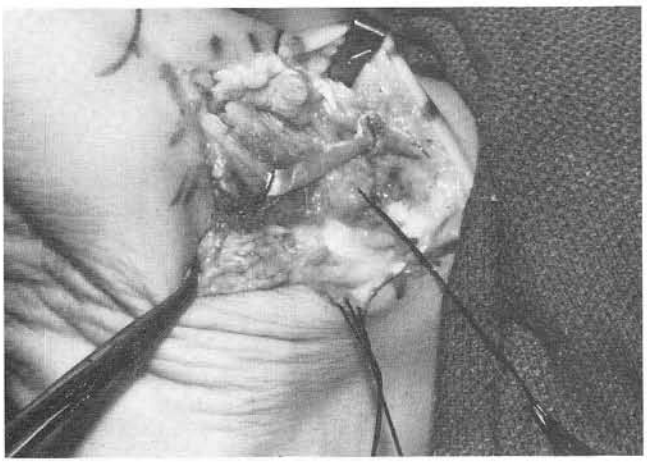

Figure 16. The split portion of the tibialis anterior tendon has been attached to the body of the navicular by use of a small Richards scaphoid staple. The tibialis posterior tendon is advanced inferiorly, plantarly, and distally, and reattached by use of a Mitek Quick Anchor device.

Figure 18. Correction of the flatfoot deformity is appreciated on the postoperative lateral x-ray. An increase in the calcaneal inclination angle, restoration of the talonavicular joint, rearticulation of the subtalar joint, and correction of the medial column faulting have all been achieved.

Figure 20. Posterior view at six months postoperative demonstrates realignment of the valgus heel and rectus attitude of the forefoot.

Figure 17. Postoperative x-rays of the same patient following completed flat-foot reconstruction. The procedure also consisted of a gastrocnemius recession and an Evans calcaneal osteotomy with insertion of a bone graft.

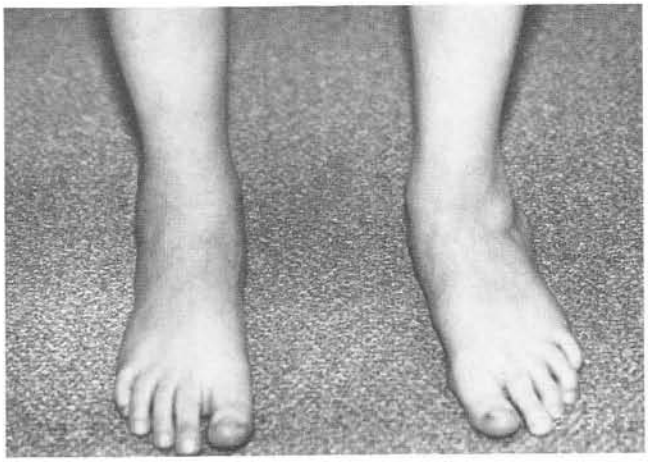

Figure 19. Anterior view of the right foot six months postoperatively. A significant improvement in the alignment and position of the foot is seen. The same procedures were performed with similar success on the opposite extremity 1 year later.

POSTOPERATIVE CARE

Postoperative x-rays are taken to confirm the resection of the accessory bone and remodeling of the navicular bone. The length and type of immobilization will vary depending on the extent of release of the tibialis posterior tendon from its insertion, as well as other concomitant procedures. Typically, patients are permitted to be partial-weight bearing in a surgical shoe. In cases where a complete detachment of the tendon was necessary and/or other osseous or tendon suspension procedures have been performed, nonweight bearing cast immobilization is recommended for 4 to 8 weeks.

Physical therapy is instituted to help decrease fibrosis and restore range of motion and muscle strength. An appropriate orthotic device should be constructed as necessary.

BIBLIOGRAPHY

Kidner FC: The pre-hallux (accessory scaphoid) in its relationship to flatfoot. *J Bone Joint Surg* 511:831, 1929.

Kidner FC: The pre-hallux in relation to flatfoot. *JAMA* 101:1539, 1933.

Macnicol NF, Voutsinas S: Surgical treatment of the symptomatic accessory navicular. *J Bone Joint Surg* 66(B):218, 1984.

Smith TF: Common Pedal Prominences. In McGlamry ED (ed) *Comprehensive Textbook of Foot Surgery* Baltimore, MD, Williams & Wilkins, 1987, pp. 252-258.

Sullivan JA, Miller WA: The relationship of the accessory navicular to the development of a flatfoot. *Clin Orthop Rel Res* 144:233, 1979.

Veitch JM: Evaluation of the Kidner procedure in the treatment of symptomatic accessory tarsal scaphoid. *Clin Orthop Rel Res* 131:210, 1978.