Preliminary Radiographic Findings and Sizing Implications on Patients Undergoing Bioabsorbable Subtalar Arthroereisis

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Metallic subtalar arthroereisis implants can require removal. Similarly configured bioabsorbable "interference screws" placed alternatively to metal implants may obviate removal. Radiographic imaging may show the location and sizing of the implant, and evaluate for implant degradation. Patients undergoing subtalar arthroereisis were evaluated with magnetic resonance imaging (computed tomography in one patient) to measure the size of the tarsal canal. The tarsal canal length, along with medial height and lateral height, were assessed. The patient's actual implant size was also noted as well as any signs of implant degradation, bony deformation, granulomas, and so forth. Six patients met the inclusion criteria. The range of implants used was 9 to 12 mm. The radiographic measurements of the tarsal canal were as follows: medial to lateral length, 12.8 ± 3.4 mm; medial height, 7.3 ± 2.5 mm; and lateral height, 8.0 ± 1.7 mm. Two patients underwent implant removal. No cystic or degenerative changes were noted on plain radiographs with bioabsorbable implants. Bioabsorbable interference screws for subtalar arthroereisis placed in the tarsal canal may still require removal, although no detrimental changes were noted radiographically to the surrounding bony structures. The size of the current metallic implants on the market appears larger than the tarsal canal configuration. (The Journal of Foot & Ankle Surgery 46(3):175–180, 2007)

Key words: arthroereisis, bioabsorbable, flexible flatfoot, posterior tibial tendon dysfunction

Flatfoot deformity can cause significant disability in some patients, which necessitates surgery. Many surgical procedures have been described to reconstruct flatfoot deformity and reduce posterior tibial tendon dysfunction. Common surgical procedures include osteotomies, arthrodeses, and subtalar arthroereisis ("joint blocking") (1–13). The latter procedure, developed more than 30 years ago, involves placing various shaped implants beneath the talus. It has been touted as less invasive and revisable, and allows for additional surgery in the future (1–3, 10, 12, 14–28).

There has been a recent influx of various United States Federal Drug Administration–approved implants and prostheses, including some off-label Federal Drug Administration–approved interference screws for subtalar arthroereisis (10). The indications for any of these procedures vary, partly because of the postoperative convalescence time frame, that is, non–weight-bearing, casting, and immobilization. Furthermore, the actual benefit regarding improved function and activity levels has rarely been documented, despite that there are several implants currently on the market. One company's market analysis (KMI, San Diego, CA) shows that 6000 subtalar arthroereisis procedures are performed annually.

To date, there exist at least 5 cylindrical metallic implants designed to be placed under the talus in the tarsal canal and sinus tarsi region (Fig 1). They range in width from 6 to 14 mm and 12 to 18 mm in length. Bioabsorbable anterior cruciate ligament "interference" screws are similarly configured. Size configuration correlation with anatomical features should be studied to properly determine implant construct. This may decrease the need for subtalar implant removal and possibly improve the perceived results of subtalar arthroereisis. Furthermore, the effectiveness of bioabsorbable implants should be assessed, which may possibly obviate the need for removal.

The goal of this study is to retrospectively review patients who underwent subtalar arthroereisis surgery and their radiographic findings. We wanted to evaluate whether bioabsorbable subtalar arthroereisis implants' sizing configures with radiographic measurements noted on magnetic resonance imaging (MRI). Postoperatively, MRIs and radiographs of patients who had previously undergone a bioabsorbable subtalar arthroereisis procedure were studied. These studies were evaluated for sterile abscess and granuloma formation, along with degenerative changes of the hindfoot. The purpose of this study is not to assess the

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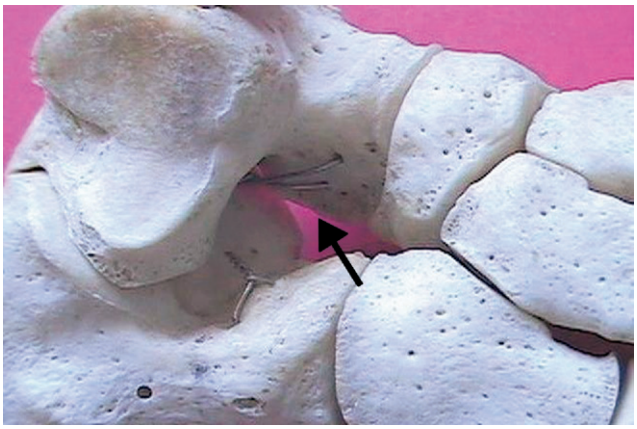

FIGURE 1 Tarsal canal (*arrow*).

outcomes of subtalar arthroereisis because this is the focus of an even larger prospective study being conducted.

Materials and Methods

Adult patients who underwent surgical treatment from 2001 to 2004 for flexible flatfoot deformity and posterior tibial tendon dysfunction via subtalar arthroereisis were retrospectively reviewed with MRI and weight-bearing radiographs. These patients had continued symptoms despite nonsurgical care such as functional foot orthoses, bracing, and, in some cases, immobilization. During this time, 26 subtalar arthroereisis procedures were performed; 10 patients were adults with bioabsorbable implants. Because of findings from Bergsma et al and Caminear et al that bioabsorbable implants start to degrade after 9 months, we set the minimum postsurgical radiographic evaluation period of the implant to be 10 months (29, 30). Funding for the radiographic studies was obtained from Arthrex, Inc. (Naples, FL) for up to 10 patients who fulfilled the inclusion criteria. Two patients moved out of the area, which left 8 surgeries that met the inclusion criteria. Two patients declined to take part in the study but had their implants remaining and were functional. This yielded 6 patients who fulfilled minimum postsurgical criteria to undergo analysis with MRI and computed tomography (CT) by a single radiologist. A separate parallel study was conducted to compare actual preoperative and postoperative plain radiograph findings, which will be reported on later because of a desired larger cohort and follow-up.

All of the patients consented to the procedures after a thorough review of their options and informed consent. The indication for subtalar arthroereisis was a flexible deformity, minimal hindfoot arthrosis, and the inability to not be non–weight-bearing or have prolonged immobilization.

Because the configuration of bioabsorbable "interference" screws closely resembles subtalar implants, patients were allowed to consider 2 options: a traditional metal implant versus a bioabsorbable "off-label" implant. This bioabsorbable implant was an anterior cruciate ligament interference screw made out of poly-L-lactic acid (Arthrex, Inc.) (Fig 2). Institutional review board research and ethics committee testing were obtained.

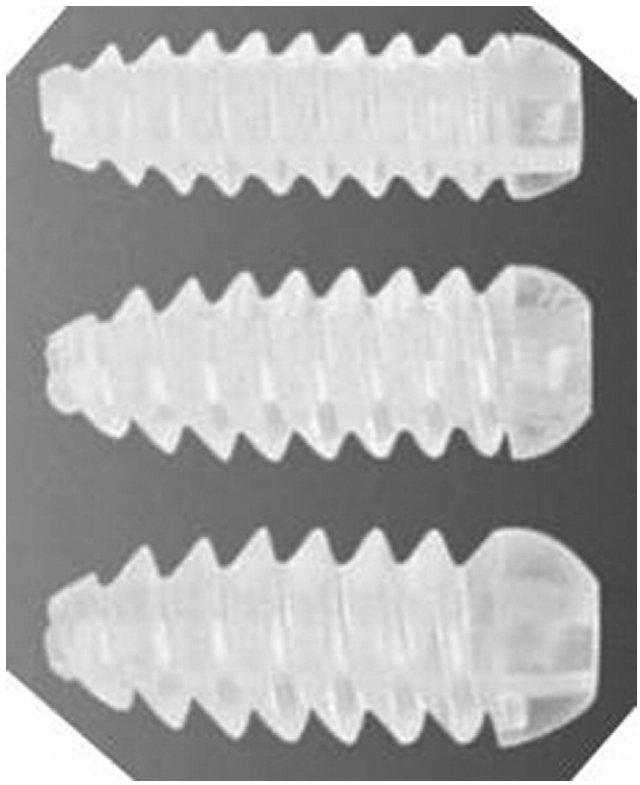

FIGURE 2 Bioabsorbable interference screws to be used for subtalar arthroereisis.

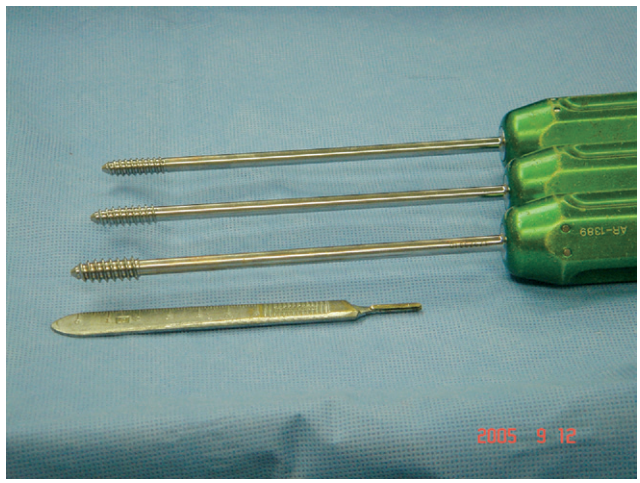

FIGURE 3 Cannulated "punches" ranging from 7 to 9 mm in diameter.