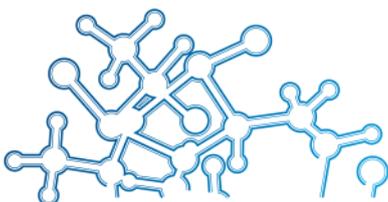


First Metatarsophalangeal Joint Arthrodesis Using ActivaScrew™ Cannulated

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Abstract

Arthrodesis of the first metatarsophalangeal joint with two crossing interfragmental screws, a locking plate, or a plate with a compression screw is a commonly used surgical method to treat hallux valgus and hallux rigidus. This case report describes the first metatarsophalangeal joint arthrodesis using bioabsorbable cannulated screws as a viable alternative method.

Keywords: First metatarsophalangeal, arthrodesis, bioabsorbable, screw, hallux valgus

1 Introduction

Hallux valgus with arthritis and hallux rigidus are two of the most common conditions that require first metatarsophalangeal (MTP-1) joint arthrodesis [1]. Arthrodesis of MTP-1 can reliably reduce pain related to hallux rigidus and improve foot function to allow a certain level of activity. Multiple arthrodesis techniques are described in the literature, such as cannulated screw fixation or plate and screw fixation [2-4]. Ideally the fixation method should be reproducible, lead to a high rate of fusion, and have a low incidence of complications. This article describes a case of MTP-1 arthrodesis using two bioabsorbable screws as an alternative to fixation with a plate and metal screws.

2 Case Presentation

The patient was a 58-year-old woman with arterial hypertension and hypercholesterolemia for which she was prescribed 2.5 mg ramipril once daily and 10 mg simvastatin once daily, respectively. She worked as a chef (standing work) and walked approximately 5 to 10 kilometers three to four times per week. The patient had a hallux valgus deformity on the right extremity with persistent pain and swelling for years. During the last few years, the pain increased and suitable shoes were difficult to find, thus decreasing the patient's quality of life and reducing her walking distance. Non-surgical treatments, such as anti-inflammatory medication, shoe modifications, silicone brace, and physiotherapy, were ineffective. Because these conservative measures failed, operative treatment was chosen.

The MTP-1 was swollen and erythematous, but the skin was intact. The movement of MTP-1 produced crepitation and was limited and painful. Dorsiflexion was 15° and plantarflexion was 20° . X-rays revealed MTP-1 arthrosis. The hallux valgus angle was 33° and the intermetatarsal angle was 22° (Figs. 1,2). The preoperative AOFAS- Hallux Metatarsophalangeal Interphalangeal score was 47.



Figure 1 Preoperative photograph of the foot



Figure 2 Preoperative X-ray.

3 Materials and Operative Technique

We used bioabsorbable screws manufactured from poly(L-lactide-co-glycolide) (85L/15G). According to the manufacturer, the implants gradually lose their strength over an 18 to 46-week period while bone healing occurs. The strength of the implant is completely lost in 6 to 9 months, and bioabsorption takes place over 2 to 4 years.

After spinal anesthesia, a tourniquet was applied to the patient's right leg. Intravenous cefuroxime 1.5 g was administered preoperatively. A dorsomedial incision was made, and the MTP-1 capsule was incised (Fig. 3). The dorsal digital nerve was identified and protected. MTP-1 was exposed and clear arthrosis was observed. The bony bunion was resected with an oscillating saw. Cartilage tissue and subchondral bone were resected with a chisel and bone rongeur to expose trabecular bone on both sides of the arthrodesis site. Multiple drill holes to both sides of the arthrodesis site were made using a 1.0-mm Kirschner wire to enhance mobilization of ossification-promoting bone growth factors. The arthrodesis was temporarily fixed with two Kirschner wires. A cannulated 2.7-mm drill was used to drill the holes for screws. The holes were tapped with a cannulated instrument to form threads. Two bioabsorbable cannulated screws (30 mm and 35 mm) were screwed into the bone (Fig. 3). The capsule, subcutis, and skin were closed in layers.



Figure 3 Bioabsorbable screw insertion

A cast boot with an 8° ankle dorsiflexion outsole to transfer walking pressure to the rear foot was used for 6 weeks postoperatively. Full weight-bearing was allowed immediately. The stitches were removed 14 days after surgery and ibuprofen and paracetamol were used as painkillers.



Figure 4 Postoperative X-ray

4 Outcome

At 6 weeks after surgery, palpation of the distal scar and tapping of the arthrodesis area produced some pain. X-rays showed signs of bony fusion. The patient returned for follow-up 3 months after surgery. At this time, she had returned to work and used ibuprofen as a painkiller only occasionally. She had no limitations in using ordinary shoes or walking. She felt some foot pain and swelling in the arthrodesis region after work. The tapping of the arthrodesis area produced no pain at 3 months. At the 6-month follow-up visit, the patient was satisfied (Figs. 5,6). There were no signs of complications and the patient used ibuprofen only occasionally. Her AOFAS - Hallux Metatarsophalangeal-Interphalangeal score was 62 at the 6-month visit. The AOFAS score was 76 at the 12-month visit and remained as 76 at the 24-month follow-up.



Figure 5 X-ray 6 months after surgery



Figure 6 Photograph 6 months after surgery



Figure 7 X-ray 12 months after surgery



Figure 8 X-ray 24 months after surgery

5 Discussion

This case report indicates that poly(L-lactide-co-glycolide) cannulated screws are an alternative choice for surgical treatment of MTP-1 arthrodesis. The cannulated screws allow for technically easy fixation with Kirschner wires. A second procedure to remove the implant can be avoided by using bioabsorbable screw fixation. A prospective clinical study is underway to compare bioabsorbable screw fixation and titanium screw fixation for MTP1 arthrodesis.

Conflict of interest: We confirm that there are no conflicts of interest related to this research.

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6 Contact Information Concerning the Case

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