Free Gracilis Interposition Arthroplasty for Severe Hallux Rigidus

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Abstract

Surgery for the management of hallux rigidus aims to relieve pain and improve function. Arthrodesis, though reliable in terms of pain relief, may encounter some resistance from patients reluctant to have a fusion. Results of other techniques, such as silastic implants, may give poor long-term results. Excisional arthroplasty and cheilectomy are also routinely used. Interposition arthroplasty has been used with some success in other joints. We describe a technique of autologous interposition arthroplasty using a free ipsilateral gracilis tendon graft for patients with severe hallux rigidus with moderate to high activity levels and who do not wish to undergo fusion.

Surgical management of severe hallux rigidus is controversial. Many procedures have been described, but few yield good long-term results. Arthrodesis seems to give the most reliable long-term results. Some patients, however, are unhappy with the restricted motion and with the fact that, if female, they may not be able to wear high heel shoes.

Other techniques have been described. Excision arthroplasty is normally undertaken in elderly or sedentary patients, given the loss of flexion strength of the first metatarsophalangeal joint and the possibility of transfer metatarsalgia in active patients. Silastic implants may produce synovitis, and implant failure has been described. Cheilectomy has had some success, but results are better with less severe hallux rigidus.

Interposition arthroplasty has been described in other joints with good long-term results, especially in the hand. In hallux rigidus, interposition with the capsule and a portion of flexor hallucis brevis and extensor digitorum brevis tendons has been described. Coughlin described soft tissue interposition for hallux rigidus in a group of seven patients. The aims of the technique are to decompress the joint, provide a stable arthroplasty, retain plantar intrinsic attachment, and preserve digit strength. Range of motion is also improved.

Indications and Contraindications

We use this technique to correct severe hallux rigidus in active biologically young patients with severe hallux rigidus.

Preoperative Planning

Complete past medical history and physical and radiographic examinations are necessary. Standard radiographs, including anteroposterior and lateral weightbearing views of the forefoot, allow the assessment of the severity of degenerative joint disease.

Technique

The operation is performed using the anaesthetic technique of choice with the patient supine. The whole of the lower limb is prepared in the standard fashion and exsanguinated. A thigh tourniquet is used. A dorsal longitudinal skin incision is used over the first metatarsophalangeal (MTP) joint (Fig. 1A). The incision is deepened through the skin, subcutaneous tissue, and through the medial aspect of the extensor hallucis longus tendon. The first MTP joint is then exposed (Fig. 1B).
Osteophytes are removed (Fig. 1C and D) and a 1.6 mm Kirschner wire is inserted distally along the medullary canal of the proximal phalanx (Fig. 1E). A small joint Ostek reamer (Hillsborough, Oregon, USA; 16, 20, or 24 mm according to the diameter of the first metatarsal head and base of the proximal phalanx) is then used to produce a convex surface at the base of the proximal phalanx of the hallux (Fig. 1F). The Kirschner wire is then removed and inserted into the medullary canal of the first metatarsal in a distal to proximal direction (Fig. 1G). A concave surface of equal size is then produced using the small joint reamer (Fig. 1H). The wire is then removed and the area debrided, taking care to leave the plantar intrinsic ligaments intact.

The tendon of gracilis is harvested through a vertical 2.5 cm incision over the pes anserinus (Fig. 2A). The sartorius fascia is identified and incised between the gracilis and the semitendinosus in line with their fibers. The sartorius fascia is then dissected off the surface of the semitendinosus and the gracilis. The insertion of the gracilis on the tibia is identified, and a clamp is placed on the distal end of the tendon. The tendon is then pulled with the clamp to deliver as much of the tendon outside the wound.

The tendon is then palpated proximally to make sure that there is no remaining attachments or adhesions. The tendon stripper is passed in line with the tendon. The tendon is then delivered out of the wound, stripped of all muscle tissue and detached from its insertion on the tibia.15

The free graft is then sutured using absorbable suture into a ball about 1.5 cm in diameter (Fig. 2B). This is then inserted into the first metatarsophalangeal joint, and acts as a biological spacer (Fig. 2C and D). The capsule

Figure 1 A. Preoperative: 55-year-old patient with severe hallux rigidus. Only minimal painful dorsiflexion was possible both actively and passively. B. Dorsal incision over first metatarsophalangeal joint and retraction of extensor hallucis longus medially. C. Dorsal cheilectomy. D. Medial exostectomy. E. Kirschner wire inserted into metatarsal medullary canal in a distal to proximal direction. F. A Power Ostek reamer creates a convex proximal surface to first metatarsal. G. Kirschner wire inserted into proximal phalanx in a proximal distal direction. H. Concave surface created on proximal phalanx with power reamers.
is sutured to the graft and the capsule closed. The skin is closed with absorbable suture (Fig. 2G).

**Postoperative Management**

At the end of the operation, a compressive bandage is applied. Walking is allowed immediately and the patient is advised to walk on his heel. Foot elevation is advised when at rest.

**Complications**

Deep vein thrombosis is prevented by early mobilization. Mild transfer metatarsalgia and cock-up deformity may be encountered. Donor site morbidity is also possible.

**Conclusions**

This technique can be used for the management of severe hallux rigidus in active patients and for patients who are concerned with maintaining the active motion of the first metatarsophalangeal joint.

**References**


