Resurfacing of the Metatarsal Head to Treat Advanced Hallux Rigidus

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KEYWORDS

• Hallux rigidus • Hallux limitus • Arthroplasty • Great toe • HemiCAP • Resurfacing

KEY POINTS

- The HemiCAP prosthesis (Arthrosurface Inc, Franklin, MA, USA) is a novel approach to the treatment of arthritis of the first metatarsophalangeal (MTP) joint because it resurfaces the metatarsal head.
- Impaction of the proximal phalanx on the metatarsal head could be a major cause for pain generation in hallux rigidus.
- Hemiarthroplasty techniques that resurface the proximal phalanx still leave a damaged metatarsal head surface.
- The impaction of the implant onto the remaining damaged metatarsal head could be a major cause for persistent pain with those implants.
- Adequate soft tissue release and achieving appropriate alignment intraoperatively are imperative.

INTRODUCTION

Hallux rigidus is a progressive arthritic disorder of the first MTP joint causing pain, loss of motion, and enlargement of the joint.[1,2] When nonoperative management has failed, surgical procedures such as cheilectomy[3,4] and several osteotomies[5,6] may be suitable for stage 1 and 2 hallux rigidus. However, these procedures are not effective for the treatment of more advanced stages.[7] Resection arthroplasty,[8,9] interpositional arthroplasty,[10–12] hemiarthroplasty,[13,14] total joint arthroplasty,[15,16] and arthrodesis[17–19] have all been used for more advanced stages of the disease. Each of these procedures has its own benefits and deficits.

Hemiarthroplasties, which resurface the proximal phalangeal base, have shown promise, but stiffness, continued joint pain, and prosthetic loosening are the limitations to these techniques.[13,14] Arthrodesis has been advocated by many investigators

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for treating advanced hallux rigidus,[18–20] and a recent study showed outcomes of arthrodesis after 30 months of follow-up to be superior to those of metallic hemiarthroplasties that resurface the phalangeal base with 79.4 months follow-up.[21] However, limitations in shoe wear, transfer metatarsalgia, permanent limitations in activity, prolonged recovery, and complications from malrotation, malpositioning, malunion, or nonunion have made this procedure less attractive to the younger, active patient.[1,2,22–25]

The HemiCAP was introduced to resurface damaged articular surfaces. The concept is to use intraoperative joint mapping and implantation of a matching, congruent resurfacing prosthesis to allow for joint preservation and restoration of the normal geometry. The procedure has been described in the shoulder, hip, and knee with good clinical outcomes.[26–28] Since 2004, this technology has been used to resurface the metatarsal head in the treatment of advanced hallux rigidus (**Fig. 1**). The technique and initial experiences with this implant have been presented and published in the past.[29–31] This article focuses on the techniques, pearls, postoperative management, and results of metatarsal head resurfacing for advanced hallux rigidus.

INDICATIONS

Metatarsal head resurfacing is performed in those patients who have stage 2 or 3 hallux rigidus who have failed conservative treatment and wish to have an active lifestyle. Resurfacing of the metatarsal head will not benefit patients with inflammatory connective tissue diseases (such as rheumatoid arthritis) or crystalline diseases such as gout or pseudogout. Patients with sesamoid arthritis may not benefit from this procedure unless other techniques are also used to address the sesamoid pain (discussed later in the article). Individuals who have clinically significant peripheral neuropathy and lack protective sensation should not have this procedure done. Patients who have stage 1 hallux rigidus with mostly normal cartilage on the metatarsal head are best treated with a cheilectomy or biological procedure. With these exceptions, all others are candidates for metatarsal head resurfacing.

SURGICAL TECHNIQUE

Preoperative Planning

Preoperative disease severity can be graded according to the classification of Hattrup and Johnson[32] (**Table 1**). Standardized weight-bearing anteroposterior, oblique, and lateral radiographs of the foot should be obtained before surgery. The joint should be evaluated for the degree of arthritis including the loss of joint space, the presence

Fig. 1. The HemiCAP dorsiflexion implant for resurfacing the metatarsal head of the first MTP joint. The taper post provides immediate rigid fixation of the implant. (*Courtesy of* Arthrosurface, Franklin, MA.)