The Role of Polyvinyl Alcohol in Cartilage Repair of the Ankle and First Metatarsophalangeal Joint

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KEYWORDS

• Cartiva implant • Polyvinyl alcohol • First metatarsophalangeal joint

KEY POINTS

- The Cartiva implant (Cartiva, Alpharetta, GA) is an exciting option in dramatically diminishing patient symptoms in advanced stages of hallux rigidus as well as allowing continued joint motion.
- The procedure does not burn many bridges in case a future revision to an arthrodesis is necessary.
- This advantage is in contradistinction to other current implants whereby more bone resection is required for implant placement.

Since July 2016, there has been an exciting new option in treating patients with hallux rigidus in a foot and ankle practice. Clearly, cheilectomy and first metatarsophalangeal joint (MPJ) fusions have been the standard approach for hallux rigidus. In addition to these two orthopedic standards, osteotomies and implants (both hemi and total option) have been popularized within the literature. There have also been a variety of first MPJ hemi and total implants, which are also discussed. Although all of these have been reported in literature, there is still a concern with the long-term success of first MPJ implants in general. The more predictable option seems to be a fusion of this joint, but there are clearly patients who desire and choose to maintain their motion. We understand first MPJ fusions to be fully functional with good long-term outcomes, yet patients are limited to a 1-in heel in their shoe wear.

Although used for years in Europe and Canada, the Cartiva implant (Cartiva, Alpharetta, GA) was recently approved by the Food and Drug Administration (FDA) for use in the United States last July.

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The material is polyvinyl alcohol and is classified as a hydrogel. There is no silicone within this device, so concerns of silicone inflammatory changes are not present. This material is used in contact lenses and has undergone extensive cyclical testing studies. The studies have loaded the implant under rotational dorsiflexion and plantar flexion movements with greater than 5 million cycles without showing any dramatic wear on the implant.

The Cartiva implant is an exciting option in dramatically diminishing patient symptoms in advanced stages of hallux rigidus as well as allowing continued joint motion. It is a procedure that also does not burn many bridges in case a future revision to an arthrodesis is necessary. This advantage is in contradistinction to other current implants whereby more bone resection is required for implant placement (**Fig 1**).

There are currently 2 published prospective studies that report on short and intermediate outcomes with this implant. In the Motion Study, authored by Baumhauer and colleagues,[1,2] this was conducted at 12 sites within the United Kingdom and Canada. Patients were randomized into either a first MPJ fusion group or a Cartiva group. A total of 236 patients were initially enrolled. The patients were surgically treated in Canada and England and have been followed up for 2 and 5 years, respectively. The functional outcome scores and visual analog scale (VAS) parameters and pain scales were all comparable, as a joint fusion and the Cartiva implant were used in a side-to-side comparison. This study was pivotal in the FDA approval in the early months of 2016. At the 5-year follow-up on this same patient pool, 29 patients were included in this article. Pain VAS and functional outcome scores continued to improve clinically to statistically significant levels. Radiographically, there were no findings of movement or implant wear or subsidence. One implant was removed and converted successfully to a fusion 2 years after surgery.

The implant is part of the cheilectomy procedure. There is a standard dorsomedial incision on the first MPJ. Dissection is carried down to the joint capsule, and then the first MPJ is exposed. A dorsal, medial, and lateral resection of bone spurs is carried out on the metatarsal head. The base of the phalanx is also inspected, and any

Fig. 1. Radiograph of the Cartiva in place within the first metatarsal head. There is no loss of metatarsal length.

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