

# Distal First Metatarsal Osteotomies And Orthosorb<sup>®</sup> Fixation

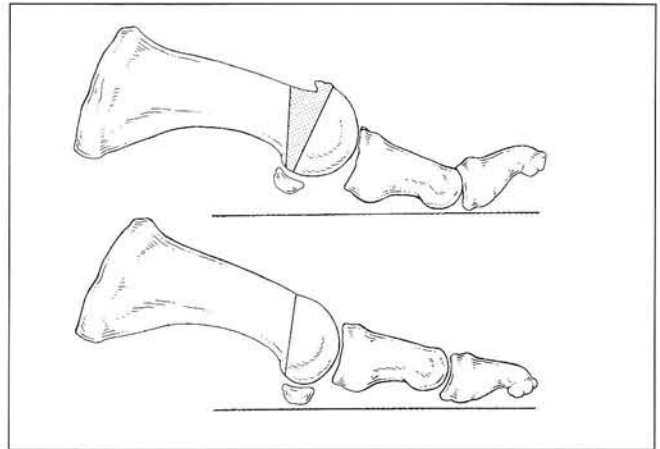
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Orthosorb<sup>®</sup> (Johnson & Johnson Orthopedics, New Brunswick, NJ) is an absorbable fixation pin made from poly-p-dioxanon and stained with D+C violet #2. These absorbable fixation rods are actual bound strands of PDS<sup>®</sup> suture (Ethicon, Inc., Somerville, NJ). Orthosorb pins are available in 1.3 mm. and 2.0 mm. diameter (40 mm in length), with a special application set, or as a tapered pin attached to a Kirschner wire. These pins provide stability to the osteotomized bone against shear and rotational forces during the period of initial bone healing. The pins undergo gradual resorption by hydrolysis, which allows for progressive transfer of stresses to the healing bone as bone healing proceeds in a unified manner. The pins significantly lose tensile strength between three and six weeks post implantation, with complete hydrolysis in approximately six months.

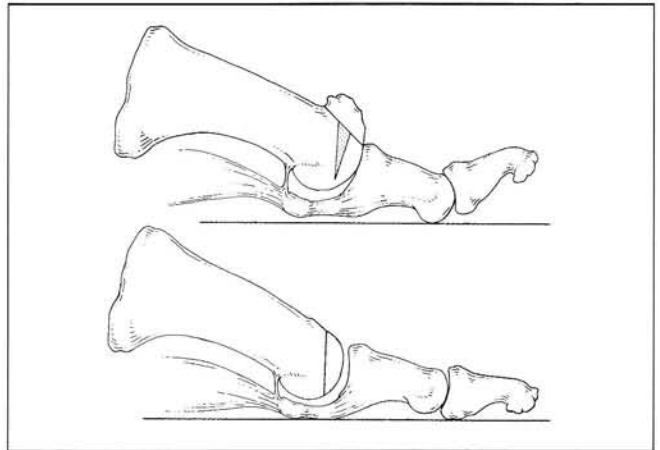
Patton et al.<sup>1</sup>, in 1990, reported on 58 digits in which Orthosorb pin fixation was used, and found no abnormal radiographic or clinical findings throughout his period of follow-up. Brunetti et al.<sup>2</sup>, in 1991, reported on 30 Austin bunionectomies fixated with two Orthosorb pins inserted from dorsal-distal to plantar-proximal, and again found acceptable radiographic and clinical findings throughout healing. In 1992, Gerbert<sup>3</sup>, studied 25 feet treated with Orthosorb fixation following Austin bunionectomy utilizing the 1.3 mm. diameter rod. He also found no clinical or radiographic complication following the use of Orthosorb. No dislocation of the capital fragment was documented throughout the period of bone healing.

The author has used Orthosorb pins for fixation of the Reverdin osteotomy, as well as the Watermann osteotomy with excellent results. In both instances, the hinges were left intact whenever possible (Figs. 1-3).

Once anatomic reduction of the osteotomy is achieved along with adequate correction of the deformity, fixation is accomplished in a stepwise and purposeful fashion.



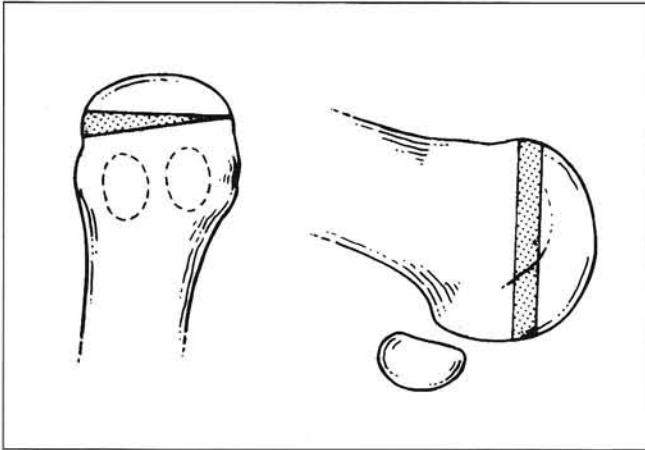
**Figure 1.** The original Watermann osteotomy involved dorsally-based trapezoidal wedge osteotomy of the first metatarsal head and neck for correction of hallux limitus deformity.



**Figure 2.** The Modified Watermann osteotomy which is performed just proximal to the effective articular cartilage. Less displacement force is produced with this design.

The osteotomy is held impacted with direct digital compression, and three pins are placed across the osteotomy in a specific sequence.

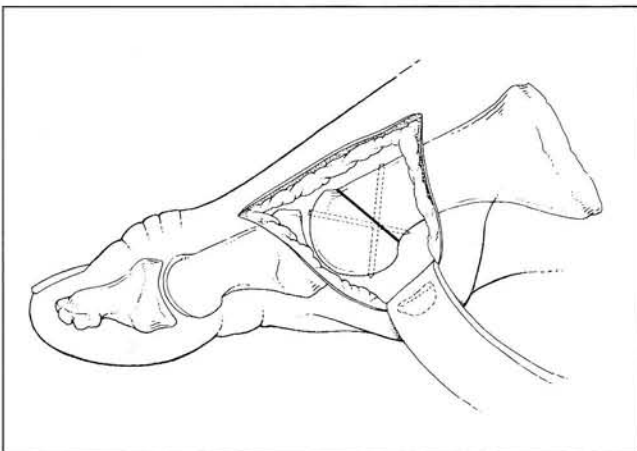
For the Reverdin osteotomy, the first pin is placed laterally and centrally within the metatarsal head's cartilage, passing linearly into the metatarsal shaft across the osteotomy. This pin serves to reinforce the articular hinge. The pin will maintain the hinge should fracture occur intraoperatively, or in



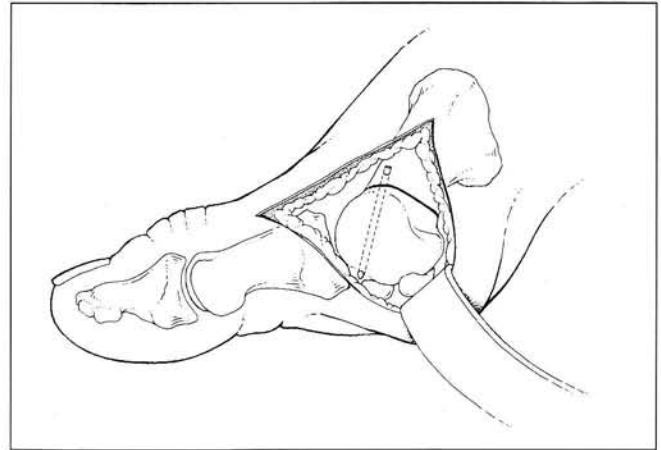
**Figure 3.** The Reverdin osteotomy. A medially-based wedge is removed from the metatarsal head just proximal to the distal articular cartilage. Both cuts are parallel to one another, however, perpendicular to the weight-bearing plane. The osteotomy is quite distal. This results in derotation of the effective articular cartilage.

the postoperative period. Medially, two pins are crossed over one another. Cross-pin fixation provides excellent stability medially at the base of the osteotomy. The pins are placed from distal to proximal, therefore always maintaining compression across the osteotomy (Figs. 4-6).

In stabilizing the Watermann osteotomy, the initial pin is placed plantar and centrally along the hinge axis. The pin is placed through the articular cartilage, across the osteotomy in a linear fashion, and into the medullary canal of the first metatarsal. This pin stabilizes the hinge-axis. Dorsally, two Orthosorb pins are placed in a crossing fashion from distal to proximal across the osteotomy. They exit through cortical bone. As they cross the osteotomy obliquely, the capital



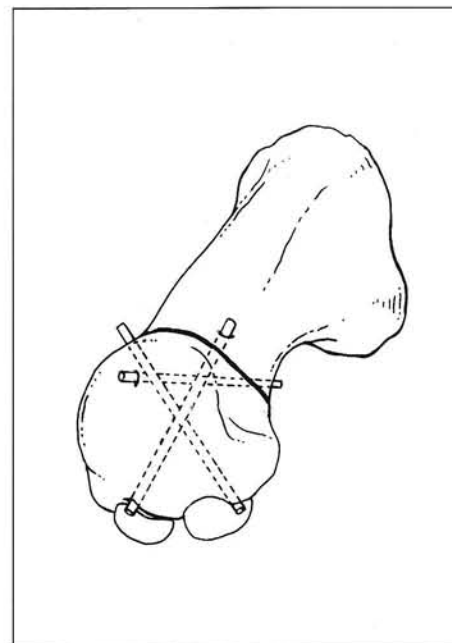
**Figure 5.** Two Orthosorb pins are crossed medially to complete fixation of the osteotomy base. Pins are placed from distal to proximal and predrilling is performed with the provided K-wire. The pins are placed obliquely across the osteotomy, therefore preventing rotation.



**Figure 4.** The first Orthosorb pin is placed laterally and centrally within the first metatarsal head's cartilage, stabilizing the lateral cortical hinge. It passes across the osteotomy linearly into the first metatarsal shaft.

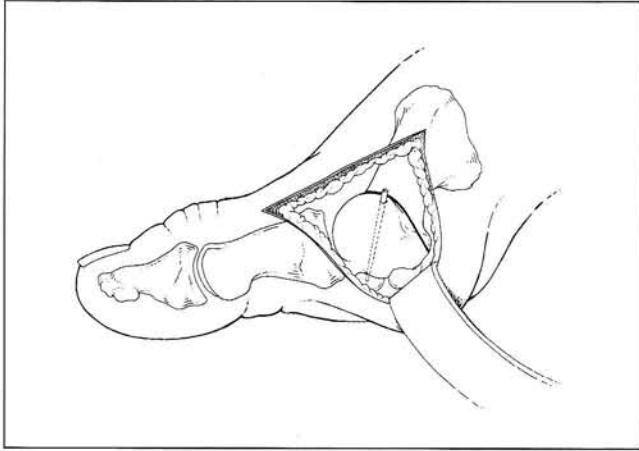
fragment is kept compressed at all times and is therefore locked firmly in place. The pins are cut flush to bone, and full range of motion in dorsiflexion and plantarflexion is immediately available without fear of osteotomy disruption (Figs. 7-9).

These techniques have been performed with much success. The end result is a stable capital

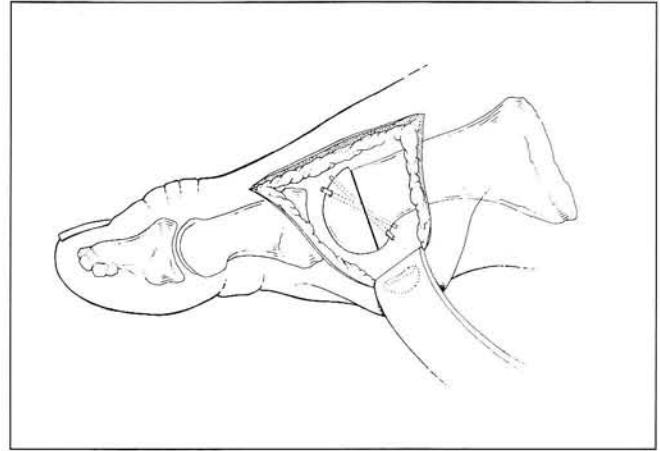


**Figure 6.** Completed fixation is demonstrated with Orthosorb ends cut flush to bone. Excellent osseous stability is noted.

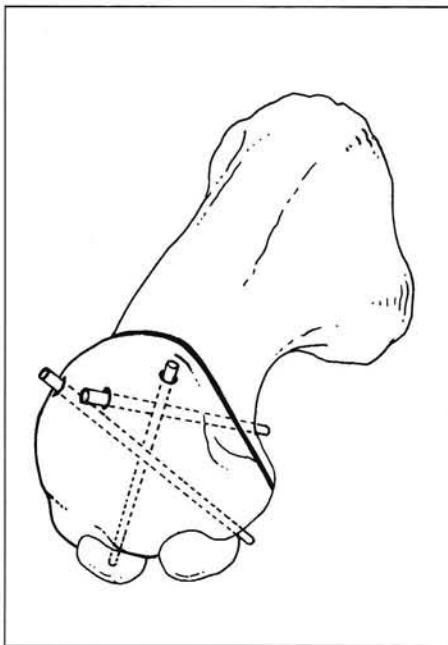
fragment without any fear of dislocation throughout the postoperative period. Immediate range-of-motion exercises are instituted following surgery and the



**Figure 7.** The first Orthosorb pin is placed centrally and plantarly along the hinge axis of the Watermann osteotomy. It passes through the articular cartilage, through the osteotomy, and then longitudinally into the first metatarsal shaft. This secures the hinge.



**Figure 8.** Two Orthosorb pins are crossed dorsally across the osteotomy to complete fixation over the base of the osteotomy. Predrilling is performed with a K-wire, and pins are placed from distal to proximal, obliquely across the osteotomy. This effectively locks the osteotomy so that no shear or rotational forces can disrupt the capital fragment.



**Figure 9.** Completion of three-pin fixation across the osteotomy. This results in excellent osseous stability, with immediate full range of motion, without the risk of capital fragment dislocation or fracture.

patient is maintained in a wooden-soled shoe initially, followed by progression into a flexible-sole surgical shoe, once osteotomy stability is noted radiographically. This generally occurs at four weeks postoperative.

No complications have been observed utilizing Orthosorb fixation in this manner. There have been no abscesses noted or radiographic evidence of osseous cyst formation, nor have there been any clinical abnormalities noted.

## CONCLUSION

Orthosorb fixation of these distally-based osteotomies has been met with much success. Firm osteosynthesis of the osteotomy has been noted intraoperatively and no postoperative disruption of the osteotomy has occurred to date.

## REFERENCES

1. Patton GW, Shaffer MW, Kostakos DP: Absorbable Pin: A New Method of Fixation For Digital Arthrodesis. *J Foot Surg* 29:122, 1990.
2. Brunetti VA, Trepal MJ, Jules KT: Fixation of Austin Osteotomy with Bioresorbable Pins. *J Foot Surg* 30:56, 1991.
3. Cavaliere RG: The Reverdin Osteotomy with Orthosorb Fixation. In Camasta CA, Vickers NS, Ruch JA (eds) *Reconstructive Surgery of the Foot and Leg, Update 93* Tucker, GA, Podiatry Institute Publishing, 1993, pp. 347 - 354.