



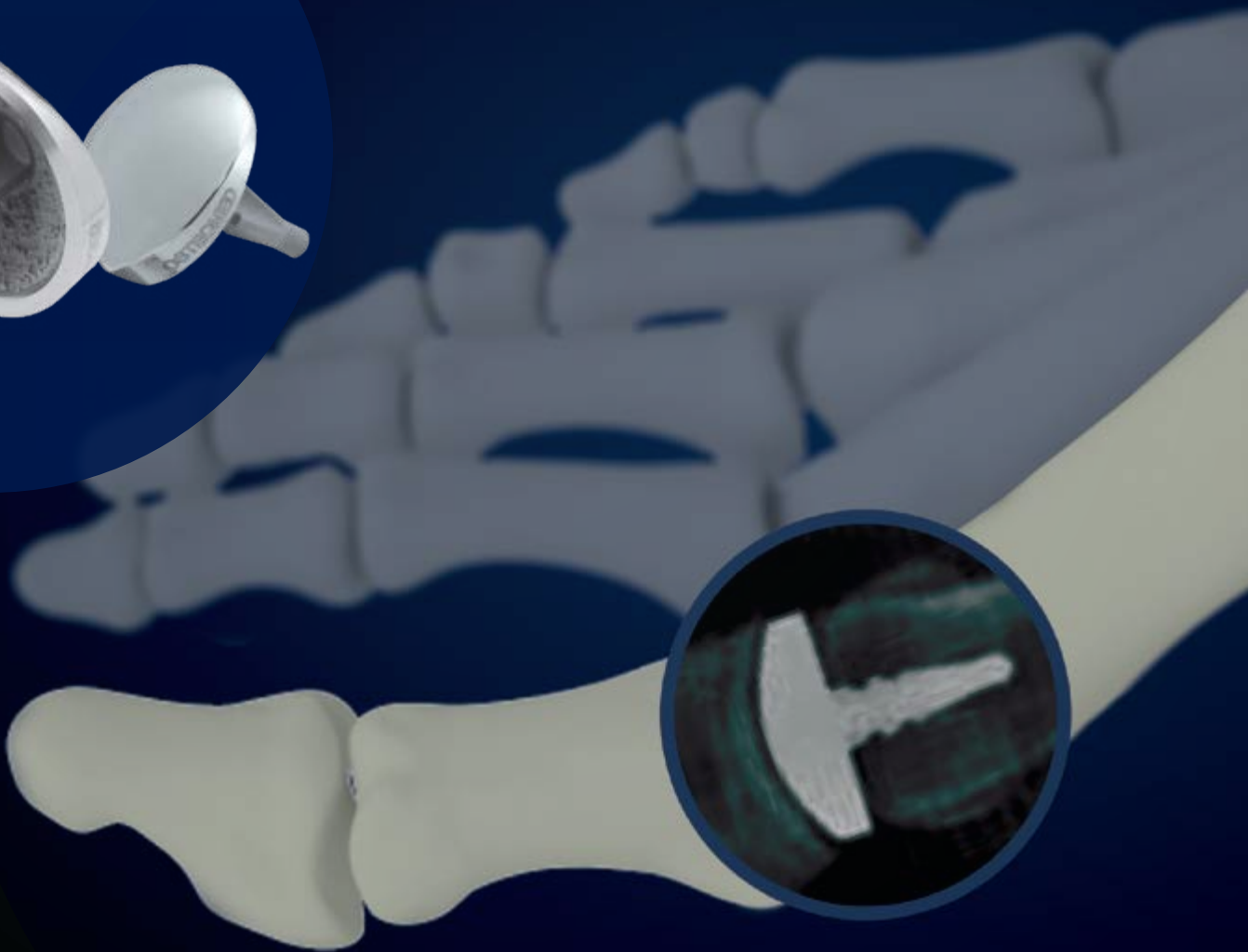
*Rethinking Possibilities, Reshaping Lives*

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# enCompass

Metatarsal Resurfacing Implant



## Abstract:

Hallux rigidus is a painful, progressive arthritic condition of the first metatarsophalangeal joint (MTPJ). As the condition progresses to advanced stages, conservative treatment often fails and surgical intervention is required. Although many surgical procedures can be performed for hallux rigidus, some have limitations and if revision to a 1st MTPJ arthrodesis is required, the use of bone grafts is usually necessary. The author presents two patients with hallux rigidus; one patient had a bilateral joint correction and the other had a unilateral joint correction, both of which utilized the EnCompass metatarsal resurfacing implants for the treatment of hallux rigidus. All patients were able to transition into normal shoe gear within 2 months of surgery and resume their normal activities. All 1st MTPJs had an increase in range of motion in the short-term follow up and the patients experienced complete pain relief without complications. These results are comparable to published 1st metatarsal resurfacing studies, demonstrating the EnCompass Metatarsal Resurfacing Implant (OsteoMed, Addison, TX. USA) is a reliable treatment option for the treatment of hallux rigidus.

## Introduction:

Hallux rigidus of the first metatarsophalangeal joint (MTPJ) is a common form of osteoarthritis of the foot. It is a painful, progressive form of degenerative arthritis which affects the first metatarsophalangeal joint [1]. This degenerative arthritic joint disease is accompanied with decreased hallux dorsiflexion, pain and crepitus with range of motion and osteophyte formation (1,2). Erosive changes to the articular cartilage of the first metatarsal head are common. Conservative treatment includes shoe gear modification, non-steroidal anti-inflammatory medication, rest, corticosteroid injections, and the use of custom orthotics with a Morton's extension. In advance stages surgical intervention may be required. Surgical procedures for late stage hallux rigidus consist of first metatarsal decompressional osteotomies, resection arthroplasty, hemi implants, total implants and 1st metatarsophalangeal arthrodesis. One study indicates resection arthroplasty, hemi implants and arthrodesis are viable surgical treatment options for end stage hallux rigidus (3).

Should any of the aforementioned surgical procedures be unsuccessful in treating hallux rigidus, a revisional arthrodesis is usually necessary. This usually requires the use of a bone graft and additional fixation along with prolonged non-weight bearing. Although some surgeons may consider arthrodesis as the gold standard in treating hallux rigidus, the procedure does not come without limitations. Patients may be limited in the type of shoes they can wear, along with having difficulty performing certain activities such as squatting, kneeling or walking up hills. In addition, malunions or nonunions can occur. The use of 1st metatarsal head resurfacing has shown to be an effective treatment for hallux rigidus in the short, mid, and long term follow up periods with minimal complications (1,2,4). Resurfacing helps to restore 1st metatarsophalangeal range of motion, improve patient biomechanics, and eliminate pain at the 1st MTPJ. Should revisional surgery be required, the 1st MTPJ can be converted to an arthrodesis without the need for bone grafting, which is an added benefit of EnCompass metatarsal head to achieve resurfacing. The partial joint simulating implant design of EnCompass is based on the anatomy and kinematics of the first MTPJ. The procedure removes of the degenerative cartilage at the metatarsal head achieving the appropriate space for the placement of the EnCompass. It consists of a low-profile, one-piece implant that promotes minimal bone resection. The titanium plasma spray and hydroxyapatite coating encourages osseointegration. The aim of the present retrospective study was to evaluate the short-term (< 5 years) results of 1st metatarsal head resurfacing with EnCompass used on two patients. This procedure and evaluation took place between 2012 and 2015.

## Case 1:

A 57-year-old female presented with a painful bunion on her left foot for 2 to 3 years. She had a past medical history of non-insulin dependent diabetes mellitus, hypertension, hyperlipidemia, asthma and hypothyroidism. The left foot pain was improved with non-steroidal anti-inflammatory medication, but the pain increased with ambulation. Changes and modifications in shoe gear did not relieve her pain, and the patient exhausted conservative treatment.

Her pedal neurovascular status was intact. A hallux valgus deformity was not present; however, a prominent left foot first metatarsal head medial eminence was noted along with a 1st metatarsal head dorsal osteophyte. Pain was elicited on palpation of the medial eminence and dorsal osteophyte. First metatarsophalangeal joint (MTPJ) range of motion was decreased and pain was elicited with range of motion. No 1st ray hypermobility was noted.

Radiographs of the patient's left foot revealed severe 1st MTPJ osteoarthritis with subchondral cystic degeneration, and a large osteophyte across the dorsal aspect of the first metatarsal head. (Figure 1)

The patient underwent first metatarsal head resurfacing with a 17 mm EnCompass implant. At four weeks post-operative, her 1st MTPJ dorsiflexion was 20 degrees. By 8 weeks post-operative, the patient was able to ambulate in sneakers. Left foot x-rays taken at 1 month post-operative reveal a well-placed EnCompass implant without loosening and the 1st MTPJ joint space maintained. (Figure 2)

At ten weeks post-operative, the patient had 0 out of 10 pain on a visual analog scale for pain and her 1st MTPJ dorsiflexion was 28 degrees. In addition, the patient did not experience pain or crepitus with passive 1st MTPJ motion and had returned to her normal activities of daily living.



**Figure 1A-B:** Pre-operative x-rays revealing 1st MTPJ arthritis with subchondral cyst formation and 1st metatarsal head dorsal osteophytes.



**Figure 2A-B:** 1 month post-operative. Well aligned 17mm EnCompass implant.

## Case 2:

A 61-year-old female presented with bilateral 1st metatarsophalangeal joint (MTPJ) pain for the past 3 to 4 years. She denied trauma and stated the pain increases with ambulation. She had a past medical history of hypertension and hypothyroidism. She attempted changes in shoe gear and conservative treatment without improvement of her symptoms and requested surgical intervention to relieve her pain. Her pain at the time of her initial presentation was 8 out of 10 bilaterally.

The patient's pedal neurovascular status was intact bilaterally. There was a decrease in 1st MTPJ range of motion bilaterally along with pain and crepitus elicited with range of motion. No first ray hypermobility was appreciated. Bilateral foot radiographs revealed severe 1st MTPJ joint space narrowing, sclerosis of the bone of the proximal phalanx base and 1st metatarsal head along with 1st metatarsal head dorsal osteophyte formation. (Figure 3)

The patient elected to stage the surgical procedures and have the left foot surgery performed first. An 18 mm EnCompass resurfacing implant was utilized to resurface her left 1st metatarsal head after joint decompression following the surgical technique guide. The patient healed uneventfully, at one week post-operative, her pain was 5 out of 10 and decreased to 0 out of 10 by 1 month post-operative. The passive dorsiflexion of her 1st MTPJ at 1 month post-operative was 70 degrees and she continued to be pain free at 2 months. Radiographs taken at 2 months post-operative revealed a well aligned EnCompass implant with the joint space remaining maintained and no signs of loosening. (Figure 4)



**Figure 3(A-D):**A-B: left foot, c-d: right foot. Severe 1st MTPJ joint space narrowing with arthritic changes, including sclerosis and 1st metatarsal head dorsal osteophyte formation bilaterally.

Approximately 4 months after the left foot surgery, the patient elected to undergo resurfacing of her right 1st metatarsal head for correction of the right hallux rigidus deformity. Again an 18 mm EnCompass implant was utilized and the post-operative course was unremarkable. At 3 weeks post-operative the patient's right foot pain was 0 out of 10 and she remained pain free at 2 months post-operative. Right foot radiographs at 2 months post-operative again revealed a well aligned EnCompass implant without loosening, although the joint space did narrow slightly from initial post-operative radiographs. (Figure 5)

At the patient's last follow up visit 2 months post-operative for the right foot and 6 months post-operative for the left foot, she was pain free bilaterally. The total 1st MTPJ range of motion on the right was 60 degrees with 30 degrees of dorsiflexion and on the left was 80 degrees with 50 degrees of dorsiflexion. The patient was able to transition into normal shoe gear within 2 months following each operation and return to her normal activities.



**Figure 4A-B:** Left foot 2 months post-operative. Well aligned 18mm EnCompass implant without signs of loosening.



**Figure 5A-B:** Right foot 2 months post-operative. Well aligned 18mm EnCompass implant.

## Discussion:

Hallux rigidus can be a painful debilitating deformity of the 1st metatarsophalangeal joint (MTPJ). Whether the etiology of the hallux rigidus is biomechanical, traumatic, rheumatological or iatrogenic, as the arthritic changes to the joint become more severe conservative treatment often fails and surgical intervention is required to provide relief of pain while improving the range of motion.

In this case study the author presents three joints in two patients which were treated with an EnCompass resurfacing implant. The short term results reveal complete relief of pain and restoration of function with full return to activities. In addition, the range of motion for each 1st MTPJ increased from pre-operative findings and no loosening of the press-fit implant was noted. Although a small series is examined, the results are comparable to published studies. Kline and Hasselman reported significant improvement in range of motion, American Orthopedic Foot and Ankle Society (AOFAS) and Short Form 36 Health Survey scores in 30 resurfacing implants at 27 months post-operative with an increase in passive range of motion from 28.0 to 66.3 degrees. In addition, at 5 years post-operative, all patients reported excellent satisfaction and would repeat the procedures. (5)

At a mean of 22.3 months post-operative in 12 patients with hallux rigidus treated with a resurfacing implant, Circi, et al reported an increase in AOFAS score from 49.2 pre-operative to 80.8. The mean 1st MTPJ range of motion also improved from 16.3 degrees pre-operative to 45.4 degrees. (6) Similarly, at 24.2 months post-operative, Meric, et al found an increase in range of motion from 22.8 degrees pre-operative to 69.6 degrees. In addition, the visual analog scale (VAS) for pain score in their 14 patients improved from 8.4 to 1.21 along with an AOFAS hallux metatarsophalangeal scale improvement from 33.9 to 81.6. (7) Finally, in a comparison study by Mernerakaya and Adli, there were no significant differences between two groups treated with either a metatarsal head resurfacing implant or total joint implant for hallux rigidus. However, there were significant improvements in AOFAS and VAS scores for each group. (8)

Based on these findings the, EnCompass Resurfacing Implant is a reliable option for the surgical treatment of hallux rigidus. The simple surgical technique has been shown to eliminate pain and restore function for patients suffering from hallux rigidus. In addition, should the need arise, a revisional arthrodesis can be performed without the need for bone grafting as is required with other surgical procedures.

*Keith D. Cook, DPM, FACFAS is a paid consultant of OsteoMed, LLC*

**Sources:**

1. Hilario H, Garrett A, Motley T, et al. Ten-year follow-up of metatarsal head resurfacing implants for treatment of hallux rigidus. *J Foot Ankle Surg* 56:1052-1057, 2017.
2. Erdil M, Bilsel K, Imren Y, et al. Metatarsal head resurfacing hemiarthroplasty in the treatment of advanced stage hallux rigidus: outcomes in the short-ter. *Acta Orthop Traumatol Turc* 46:281-285, 2012.
3. Kim P, Hatch D, DiDomenico LA, et al. A multicenter retrospective review of outcomes for arthrodesis, hemi-metallic joint implant, and resectional arthroplasty in the surgical treatment of end-stage hallux rigidus. *J Foot Ankle Surg* 51:50-56, 2012.
4. Carpenter B, Smith J, Motley T, et al. Surgical treatment of hallux rigidus using a metatarsal head resurfacing implant: mid-term follow-up. *J Foot Ankle Surg* 49:321-325, 2010.
5. Kline AJ, Hasselman CT. Metatarsal head resurfacing for advanced hallux rigidus. *Foot Ankle Int* 34:716-725, 2013.
6. Circi E, Tuzuner T, Sukur E, et al. Metatarsal head resurfacing arthroplasty in the treatment of hallux rigidus: is it reliable treatment option? *Musculoskelet Surg* 100:139-144, 2016.
7. Meric G, Erduran M, Atik A, et al. Short-term clinical outcomes after first metatarsal head resurfacing hemiarthroplasty for late stage hallux rigidus. *J Foot Ankle Surg* 54:173-178, 2015. 8. Mermerkaya MU, Adli H. A comparison between metatarsal head-resurfacing hemiarthroplasty and total metatarsophalangeal joint arthroplasty as surgical treatments for hallux rigidus: a retrospective study with short- to midterm follow-up. *Clin Interv Aging* 11:1805-1813, 2016.



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