

A perspective on MPJ implant arthroplasty.

**The BioPro® MPJ Hemi Implant System:
70+ years of successful clinical use.**



20+ year implant survivorship¹⁴



96% Survivorship¹



97% Patient Satisfaction¹

Pain Relief

Studies show that the BioPro First MPJ Hemi Implant provides for substantial pain-relief.[†]

Immediate Weight-bearing

Based on suggested post-operative protocols.

Improved ROM

On average 21° improvement in post-operative range of motion has been reported.[†]

Choosing the right patient

When used on the right patient, the BioPro First MPJ Hemi Implant offers many advantages over other treatment options; including improved motion, long-term survivorship, and pain relief.¹⁻¹⁴ While the implant has been successfully used on a wide variety of patients, we recommend all factors be considered prior to surgery including stage of disease, patient age, patient activity level, any co-morbidities, and patient expectations.

BioPro recommends the First MPJ Hemi Implant for Stage II and III Hallux Limitus/Rigidus patients. The implant has been successfully used on Stage IV patients¹³, however we recommend this at the surgeon's discretion only. Additionally, the implant can be easily combined with distal metatarsal osteotomies for treating co-morbidities such as Hallux Valgus, Elevatus, DMAA/PASA, or a long first metatarsal.

While each surgeon's ideal patient will vary, we recommend the implant for low to moderate demand stage II/III patients, 50+ years of age³, who wish to maintain motion in their first MTP joint. The implant is particularly popular among women wishing to retain the ability to wear shoes with heels.

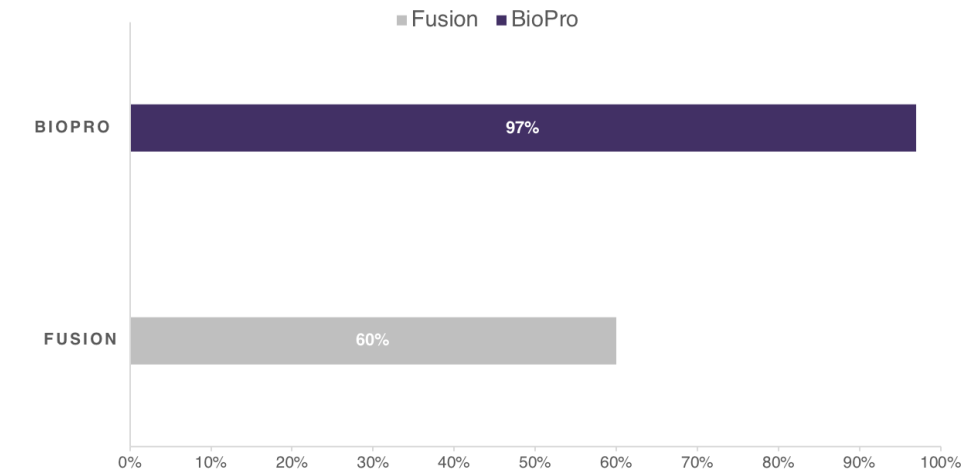
When evaluating joint condition, note it is not necessary to maintain metatarsal head cartilage as the implant is shown to still provide pain relief and motion with most to all of the metatarsal head cartilage missing¹³. It is, however, necessary to remodel the head to provide a smooth, round articulating surface for the implant to glide against.

BioPro vs Fusion Data

A recent study was published comparing long-term results (average 8.3 years) of the BioPro Implant hemiarthroplasty procedure to fusion. A total of 78 procedures performed from 2005 to 2011 were reviewed (31 hemiarthroplasty and 47 fusion). The data revealed that hemiarthroplasty provided better functional outcomes with considerably more satisfied patients.¹³

The following charts highlight some key findings.

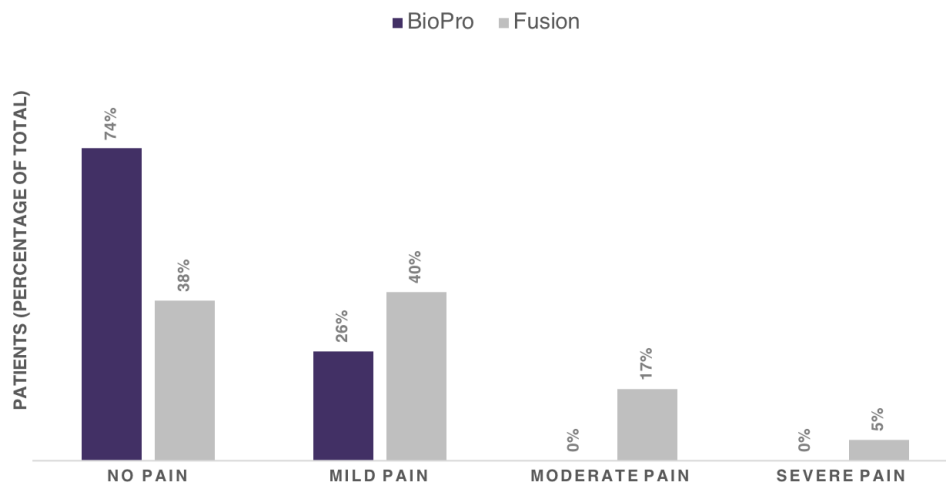
PATIENT SATISFACTION



Beekhuizen, Stefan R. et al. The Journal of Foot and Ankle Surgery. 2018;57:445-450

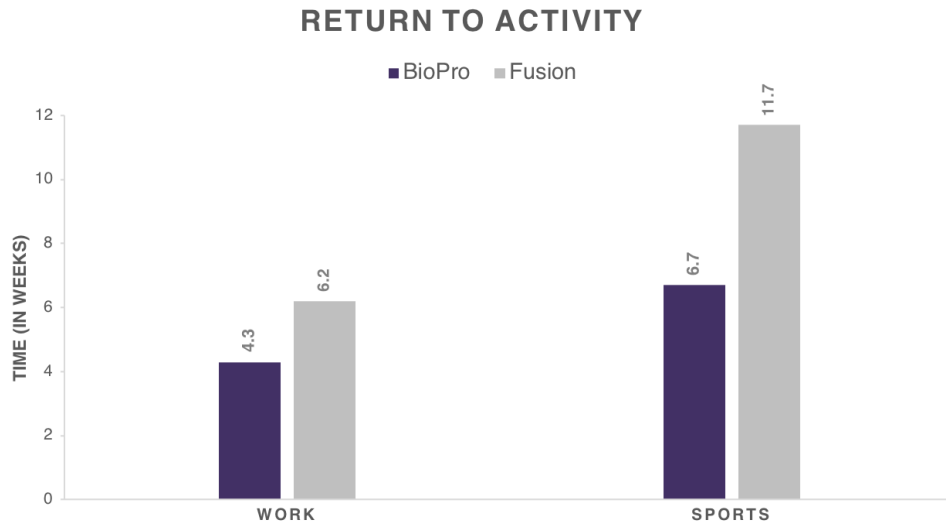
97% of the patients that received the BioPro Implant were satisfied with the procedure compared to 60% that underwent fusion.

PAIN SCORES



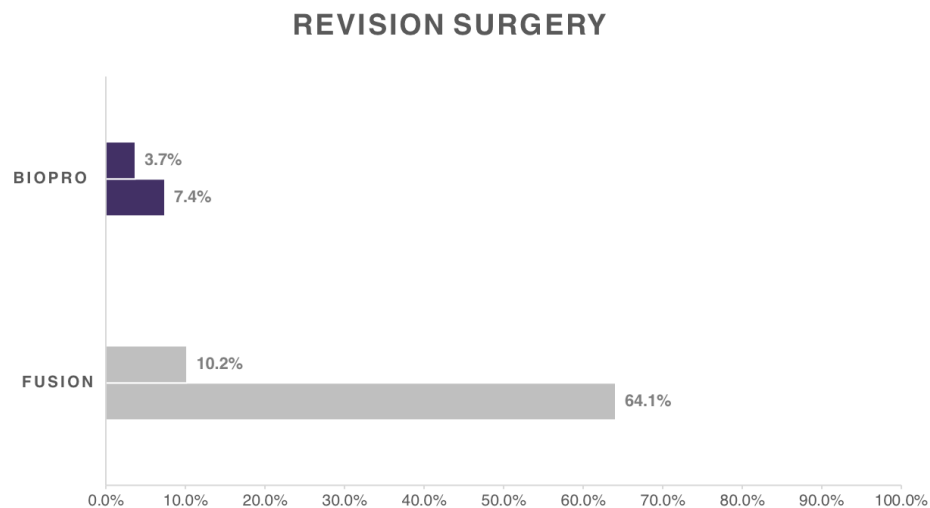
Beekhuizen, Stefan R. et al. The Journal of Foot and Ankle Surgery. 2018;57:445-450

No patients that received the BioPro Implant reported moderate or severe pain, compared to 22% that underwent fusion.



Beekhuizen, Stefan R. et al. The Journal of Foot and Ankle Surgery. 2018;57:445-450

It was observed that patients that received the BioPro implant returned to work on average almost 2 weeks faster and returned to sports 5 weeks faster than fusion patients.



Beekhuizen, Stefan R. et al. The Journal of Foot and Ankle Surgery. 2018;57:445-450

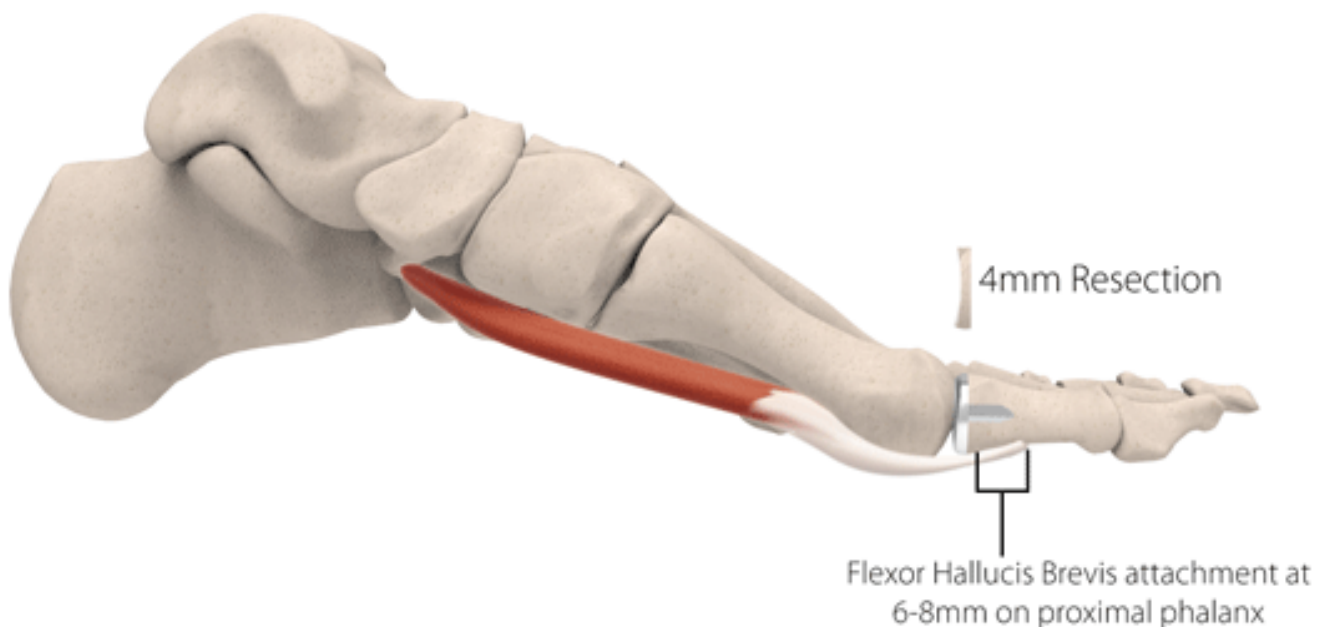
3.7% of patients that received the BioPro Implant required revision to fusion, though an additional 7.4% did undergo repeat surgery due to joint stiffness. A total of 10.2% of fusion patients required revision due to nonunion and another 64.1% underwent repeat surgery for hardware removal.

Why resurface the phalanx?

When treating an arthritic MTP joint, it is important to look at the joint's biomechanics. The First MTP joint is not a direct weight-bearing joint, however, it is subjected to high compression forces produced by muscle action and movement.⁶

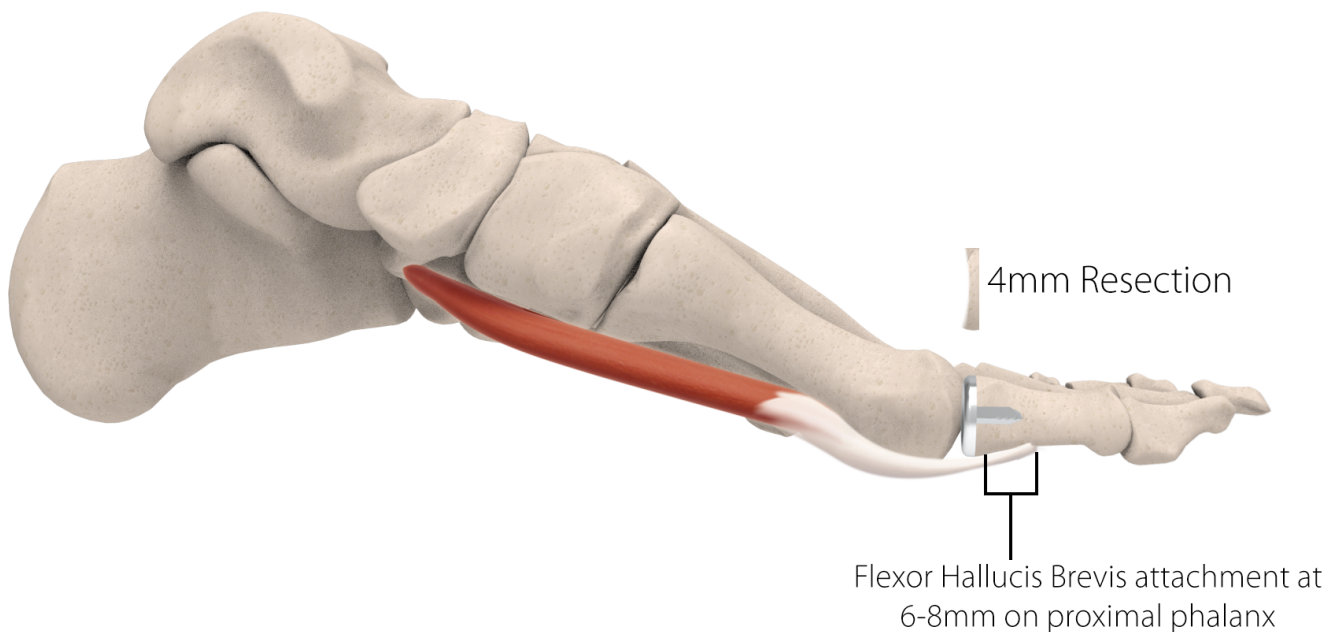
The concern with any implant placed on the metatarsal head is the combination of compression forces and shear stresses. Studies show that during gait, the metatarsal head is subjected to forces up to 119% of the patient's body weight, while the force on the joint is only subject to 29%.¹⁵ As a result of these forces, implants placed on the metatarsal head have seen subsidence rates of up to 50%.¹⁶

When placed on the phalanx in patients with 70% or more of metatarsal head cartilage missing, significant improvement is still observed.⁸



Minimal bone resection

The BioPro First MPJ Hemi Implant is a low profile implant, approximately 2mm thick. This allows for a minimal bone removal technique that helps preserve the maximum amount of the patient's natural bone stock. Additionally, this minimal resection technique helps to preserve the attachment of the flexor hallucis brevis, which typically attaches to the base of the proximal phalanx approximately 6 to 8mm from the base. Preservation of the flexor brevis is extremely important for normal foot function and essential for plantar flexion and toe off. A recommended technique suggests resecting approximately double the thickness of the implant (4mm) for decompression.



Adjunctive Procedures



Cheilectomy + Implant

The BioPro First MPJ Hemi Implant can be utilized either after or in conjunction with a full or partial cheilectomy.

The implant still adds a highly polished articulating surface to remove bone on bone contact which provides pain relief and improved motion.



Distal Metatarsal Osteotomy + Implant

The BioPro First MPJ Hemi Implant surgical procedure can be easily combined with a distal metatarsal osteotomy for correction of any accompanied pathologies. These osteotomies can correct related pathologies such as elevatus, long first metatarsal, and distal metatarsal articular angles.

Implant Options

BioPro offers a full line of hemi implants for the MTP joint.

Multiple Sizes

The First MPJ Hemi Implant is available in five standard sizes. These range from a small implant that is 17mm wide to a large that is 23mm wide. The implant thickness is consistent between all sizes.

Non-Porous or Porous Coated

The First MPJ Hemi Implant is available in non-porous coated or porous coated. The porous coated implant allows for improved stem fixation and stability (Fig 1).

Cobalt Chrome or Titanium

The standard implant is manufactured from Cobalt Chrome, which offers excellent biocompatibility and wear surface. Due to the small percentage of Nickel found in Cobalt Chrome, BioPro also offers a titanium version of the implant. If you're unsure about a patient's potential metal allergy, BioPro recommends the MELISA blood test, one of the few accurate methods to determine a metal allergy. For more information visit www.melisatest.com.

Overlapping Rim

The HemiEDGE™ implant incorporates an overlapping edge, which extends around the medial, lateral, and dorsal aspects of the implant (Fig 2). Partially encompassing the cortex of the phalanx ensures more accurate replication of natural joint surface sizing, improves implant stability and reduces the potential of bony overgrowth.

Lesser Digits

Rounding out the BioPro Hemi Implant System is a product offering for the lesser MTP joints. The Lesser MTPJ Hemi Implant is based on the clinically successful design of the First MTPJ Hemi Implant, but designed to accommodate the anatomy of the smaller joints in digits two through five. Available in nine standard sizes, the Lesser MTPJ Implant has a round profile and a narrower, shorter stem. A cannulated version is also available for use in conjunction with hammertoe corrections. Applications for the implant include osteoarthritis and Frieberg's Infracture.

Fig 1

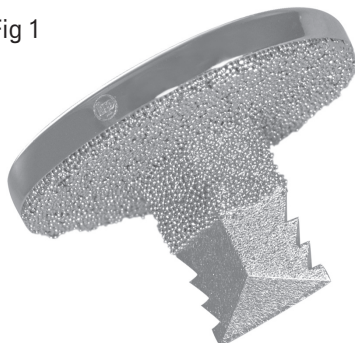
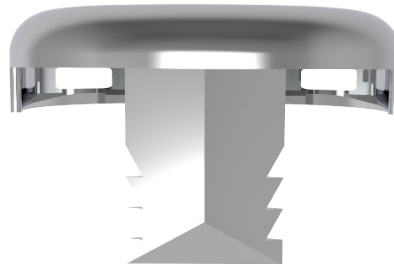


Fig 2



Literature Review

Source	Year	N	Satisfaction	Survivorship	ROM Improvement
Beekhuizen, Stefan R. et al. Long-Term Results of Hemiarthroplasty Compared With Arthrodesis for Osteoarthritis of the First Metatarsophalangeal Joint. The Journal of Foot and Ankle Surgery , Volume 57 , Issue 3 , 445 - 450	2018	31 procedures	97%	96.3%	>10°
Clement, N. D., MacDonald, D., Dall, G. F., Ahmed, I., Duckworth, A. D., Shalaby, H. S., & McKinley, J. (2016). Metallic hemiarthroplasty for the treatment of end-stage hallux rigidus. Bone Joint J, 98-B(7), 945-951.	2016	97 procedures	75%	85.6%	N/A
Karin H. Simons, MD, Pieter van der Woude, MD, Frank W.M. Faber, MD, PhD , Paulien M. van Kampen, PhD , Bregje J.W. Thomassen, PhD. Short-Term Clinical Outcome of Hemiarthroplasty Versus Arthrodesis for End-Stage Hallux Rigidus. The Journal of Foot & Ankle Surgery (2015) 1–4	2015	46 patients	81.6%	95.9%	N/A
Giza, E., Sullivan, M., Ocel, D., Lundeen, G., Mitchell, M., & Frizzell, L. (2010). First metatarsophalangeal hemiarthroplasty for hallux rigidus. International Orthopaedics, 34(8), 1193–1198. http://doi.org/10.1007/s00264-010-1012-x	2010	22 procedures	N/A	90.9%	15°
Christine C. Salonga, DPM, David C. Novicki, DPM, FACFAS , Martin M. Pressman, DPM, FACFAS , D. Scot Malay, DPM, MSCE, FACFAS. A Retrospective Cohort Study of the BioPro Hemiarthroplasty Prosthesis. The Journal of Foot & Ankle Surgery 49 (2010) 331–339	2010	79 procedures	86.08%	98.7%	27°
Charles G. Kissel, DPM, FACFAS, Zeeshan S. Husain, DPM AACFAS, Paul H. Wooley, PhD, Michael Kruger, MS, Mark A. Schumaker, DPM, Michael Sullivan, DPM, and Todd Snoeyink, DPM. A Prospective Investigation of the Biopro® Hemi-Arthroplasty for the First Metatarsophalangeal Joint. The Journal of Foot & Ankle Surgery 47(6):505–509, 2008	2008	23 patients	N/A	100%	47°
Taranow, DO. et al. Contemporary Approaches to Stage II and III Hallux Rigidus: The Role of Metallic Hemiarthroplasty of the Proximal Phalanx. Foot and Ankle Clinics , Volume 10 , Issue 4 , 713 - 728	2005	28 patients	N/A	100%	N/A
Roukis TS, Townley, MD. BIOPRO resurfacing endoprosthesis versus periarticular osteotomy for hallux rigidus: short-term follow-up and analysis. Journal of Foot & Ankle Surgery 2003;42(6):350-8	2003	9 procedures	N/A	100%	7°
Vanore, J.V.: Use of the Biopro First MTP Joint Implant. In Update 2002: Proceedings of the Annual Meeting of the Podiatry Institute, Chapter 26, pp 142-148, The Podiatry Institute Inc., Tucker, GA 2002.	2002	10 procedures	N/A	100%	N/A
Juan C. Goez, DPM, Charles O. Townley MD, Warren Taranow, DO. An Update on the Metallic Hemiarthroplasty Resurfacing Prosthesis for the Hallux. Presented at the 56th Annual Meeting and Scientific Seminar of the American College of Foot and Ankle Surgeons. Orlando FL February 1998	1998	468 procedures	N/A	97.2%	N/A
Townley, MD, Taranow, DO. A metallic hemiarthroplasty resurfacing prosthesis for the hallux metatarsophalangeal joint. Foot & Ankle International 1994;15(11):575-80	1994	279 procedures	95.3%	95.3%	N/A

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2. Beekhuizen, Stefan R. et al. Long-Term Results of Hemiarthroplasty Compared With Arthrodesis for Osteoarthritis of the First Metatarsophalangeal Joint. *The Journal of Foot and Ankle Surgery* , Volume 57 , Issue 3 , 445 - 450
3. Timothy Voskuijl, MD, Ron Onstenk, MD. Operative Treatment for Osteoarthritis of the First Metatarsophalangeal Joint: Arthrodesis Versus Hemiarthroplasty. *The Journal of Foot & Ankle Surgery* (2015) 1–4
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5. Karin H. Simons, MD, Pieter van der Woude, MD, Frank W.M. Faber, MD, PhD , Paulien M. van Kampen, PhD , Bregje J.W. Thomassen, PhD. Short-Term Clinical Outcome of Hemiarthroplasty Versus Arthrodesis for End-Stage Hallux Rigidus. *The Journal of Foot & Ankle Surgery* (2015) 1–4
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7. Giza, E., Sullivan, M., Ocel, D., Lundeen, G., Mitchell, M., & Frizzell, L. (2010). First metatarsophalangeal hemiarthroplasty for hallux rigidus. *International Orthopaedics*, 34(8), 1193–1198. <http://doi.org/10.1007/s00264-010-1012-x>
8. Christine C. Salonga, DPM, David C. Novicki, DPM, FACFAS , Martin M. Pressman, DPM, FACFAS , D. Scot Malay, DPM, MSCE, FACFAS. A Retrospective Cohort Study of the BioPro Hemiarthroplasty Prosthesis. *The Journal of Foot & Ankle Surgery* 49 (2010) 331–339
9. Charles G. Kissel, DPM, FACFAS, Zeeshan S. Husain, DPM AACFAS, Paul H. Wooley, PhD, Michael Kruger, MS, Mark A. Schumaker, DPM, Michael Sullivan, DPM, and Todd Snoeyink, DPM. A Prospective Investigation of the Biopro® Hemi-Arthroplasty for the First Metatarsophalangeal Joint. *The Journal of Foot & Ankle Surgery* 47(6):505–509, 2008
10. Taranow, DO. et al. Contemporary Approaches to Stage II and III Hallux Rigidus: The Role of Metallic Hemiarthroplasty of the Proximal Phalanx. *Foot and Ankle Clinics* , Volume 10 , Issue 4 , 713 - 728
11. Roukis TS, Townley, MD. BIOPRO resurfacing endoprosthesis versus periarticular osteotomy for hallux rigidus: short-term follow-up and analysis. *Journal of Foot & Ankle Surgery* 2003;42(6):350-8
12. Vanore, J.V.: Use of the Biopro First MTP Joint Implant. In *Update 2002: Proceedings of the Annual Meeting of the Podiatry Institute*, Chapter 26, pp 142-148, The Podiatry Institute Inc., Tucker, GA 2002.
13. Juan C. Goetz, DPM, Charles O. Townley MD, Warren Taranow, DO. An Update on the Metallic Hemiarthroplasty Resurfacing Prosthesis for the Hallux. Presented at the 56th Annual Meeting and Scientific Seminar of the American College of Foot and Ankle Surgeons. Orlando FL February 1998
14. Taranow, DO , Townley, MD. Metallic proximal phalangeal hemiarthroplasty for hallux rigidus. *Operative Techniques in Orthopaedics* 1999;9(1):33
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