Original Article

Bioabsorbable magnesium versus standard titanium compression screws for fixation of distal metatarsal osteotomies — 3 year results of a randomized clinical trial ☆

Christian Plaass [a, *], Christian von Falck [b], Sarah Ettinger [a], Lena Sonnow [b], Franco Calderone [d], Andreas Weizbauer [e], Janin Reifenrath [e], Leif Claassen [a], Hazibullah Waizy [c], Kiriakos Daniilidis [a], Christina Stukenborg-Colsman [a], Henning Windhagen [a]

[a] Orthopedic Clinic in Diakovere Annastift, Hannover Medical School, Anna-von-Borries Strasse 1-7, 30625 Hannover, Germany
[b] Institute for Radiology, Hannover Medical School, Carl-Neuberg-Strasse 1, 30625 Hannover, Germany
[c] Clinic for Foot and Ankle Surgery, Hessing Foundation, Augsburg, Germany
[d] Radiological Practice, Schwarzer Baer, Anna-von-Borries Strasse 1-7, 30625 Hannover, Germany
[e] CrossBIT, Centre for Biocompatibility and Implant-Immunology, Department of Orthopedic Surgery, Hannover Medical School, Feodor-Lynen-Straße 31, 30625, Hannover, Germany

ARTICLE INFO

ABSTRACT

Background: For the treatment of hallux valgus commonly distal metatarsal osteotomies are performed. Persistent problems due to the hardware and the necessity of hardware removal has led to the development of absorbable implants. To overcome the limitations of formerly used materials for biodegradable implants, recently magnesium has been introduced as a novel implant material. This is the first study showing mid-term clinical and radiological (MRI) data after using magnesium implants for fixation of distal metatarsal osteotomies.

Material and methods: 26 patients with symptomatic hallux valgus were included in the study. They were randomly selected to be treated with a magnesium or standard titanium screw for fixation of a modified distal metatarsal osteotomy. The patients had a standardized clinical follow up and MRI investigation 3 years' post-surgery. The clinical tests included the range of motion of the MTP 1, the AOFAS, FAAM and SF-36 scores. Further on the pain was evaluated on a VAS.

Results: Eight patients of the magnesium group and 6 of the titanium group had a full clinical and MRI follow up 3 years postoperatively. One patient was lost to follow-up. All other patients could be interviewed, but denied full study participation. There was a significant improvement for all tested clinical scores (AOFAS, SF-36, FAAM, Pain-NRS) from pre-to postoperative investigation, but no statistically relevant difference between the groups. Magnesium implants showed significantly less artifacts in the MRI, no implant related cysts were found and the implant was under degradation three years postoperatively.

Conclusion: In this study, bioabsorbable magnesium implants showed comparable clinical results to titanium standard implants 3 years after distal modified metatarsal osteotomy and were more suitable for radiologic analysis.

Level of evidence: 2.

© 2017 Published by Elsevier B.V. on behalf of The Japanese Orthopaedic Association.

1. Background

For hallux valgus deformities, commonly distal metatarsal osteotomies (DMO) are performed. The chevron osteotomy was initially described for mild to moderate deformities by Corless and later Austin [1]. Generally good clinical results are achieved with