Interphalangeal Arthrodesis of the Toe with a New Radiolucent Intramedullary Implant

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My disclosure is in the Final AOFAS Mobile App. I have no potential conflicts with this presentation.
ABSTRACT

**Background**: Interphalangeal arthrodesis is a very common surgical treatment of rigid hammer toe and claw toe deformities. The K-wires habitually used in this procedure are sometimes complicated by pin tract infection, migration, discomfort and breakage. The aim of this study is to evaluate the results of an interphalangeal arthrodesis with a new radiolucent angled intramedullary implant.

**Methods**: 377 implants were placed in 297 patients between October 1st 2011 and October 1st 2012. In this study 157 patients had more than one year follow up and 142 patients were reviewed. The operation technique is explained in detail.

**Results**: This intramedullary device offers a good immediate mechanical stability, adequate deformity correction, and a high rate of consolidation (83%). The satisfaction rate of patients in this series was 94%.

**Conclusions**: This study demonstrates good results with a new generation of radiolucent implants.
MATERIAL AND METHODS

This retrospective study with one year follow-up reviews 180 implants in 142 patients. Mean age at the time of surgery was 61 years (range 28-85 years). There were 128 patients with a stiff and flexed PIP and 14 patients with a too long second toe in front of the first toe pathology. Surgeries involved 142 second toe (79%), 30 third toe (17%), 7 fourth toe (4%) and only in one case the fifth toe. In 70% of the patients, surgical treatment of associated pathology of the first ray (hallux valgus, hallux rigidus) was needed. Eleven cases were a revision surgery after a failed operation. A rigid PIP joint was the indication of surgery in 90% of the cases. For 10% the joint was flexible and the joint arthrodesis was dictated by an excessive toe length. The 297 patients were operated by senior surgeons trained in foot surgery. Surgeries involved 142 second toe (79%), 30 third toe (17%), 7 fourth toe (4%) and only in one case the fifth toe. In 70% of the patients, surgical treatment of associated pathology of the first ray (hallux valgus, hallux rigidus) was needed. Eleven cases were a revision surgery after a failed operation. A rigid PIP joint was the indication of surgery in 90% of the cases. For 10% the joint was flexible and the joint arthrodesis was dictated by an excessive toe length.
The implant: Toegrip
SURGICAL TECHNIQUE

A mid-dorsal incision of the proximal interphalangeal (PIP) joint is performed, removing a roughly wedge-shaped piece of the hyperkeratosis. The extensor apparatus is then incised. It is very important to completely free the last centimeter of the first phalanx (P1) and the base of the second phalanx (P2). The preparation must release the collateral ligaments, medial and lateral and the plantar and dorsal capsule. The condyles of the first phalanx (P1) are cut with an oscillating saw to avoid any breakage. The cutting line followed the angle of the implant. P1 is prepared first. A 2 mm pin is used to mark the center of the intramedullar canal. Preparation is continued using reamers with increasing size until an optimal cortical fit is found. The last reamer defines the final size of the implant. The angle of the implant is defined by the positions of the adjacent toes. The longer part of the implant is inserted into the proximal phalanx with the appropriate holder. The holder is removed and the middle phalanx is positioned over the shorter part of the implant to ensure a close contact between the two bone sections. We designed a special “fork” extremely helpful for the reduction. Bone contact is checked by freeing the extensor apparatus, if necessary, and avoiding any rotation of the toe. The extensor tendon is then sutured, followed by the skin. A tenotomy at the level of the MP joint may also be performed to prevent a toe-to-ground contact insufficiency, tested by a push up test.
RESULTS

After one year 142 patients were available for follow up. 133 patients (94%) were satisfied, 137 patients (97%) had no pain and 5 patients (3%) reported a moderate pain. The VAS score was 0.1 (0 to 3) really improved from the pre operating statement. 10% of the toes had some swelling, this was significant in 1% of the toes.

On the one year x-ray control, 83% of the PIP arthrodesis were completely fused.

We noted a radiolucency around the implant in 5% of the cases. The function of the toes was estimated normal by 97% of the patients with a correct pulp ground contact. All the patients estimated that the toes were fitting better in the shoe wear with no limitation in walking ability.

There was no recurrency of the claw toe. The axis of the toe was estimated as good in 97% sagitally or frontally.
Interphalangeal Arthrodesis of the Toe with a New Radiolucent Intramedullary Implant (TOEGRIP®)

IPP fused (83%)

fibrous pseudarthrosis aligned (17%)

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AVANTAGES

The intramedullary implants offer several advantages. The absence of exposed hardware minimizes the risk of digital infection. No removal of hardware is needed which decreases anxiety and improves satisfaction. Because hardware is retained, there is far less recurrence of the hammertoe deformity or other misalignments (25). Some breakages were noted on x-rays which are moreover at the origin of patients’ complaints. Although Alvine and Garvin reported a fusion rate of 97% in a series of seventy-three toes, they had an 87% patient satisfaction (26). Ellington published the results of a 2-piece intramedullary fusion device (24). They reported a complication rate of 55.3%, including nonunions, with 3 hardware failures and 3 intraoperative fractures. The revision rate was 7.9%. An intramedullary implant decreased the possible malrotation position of the toe which is not controlled by a pin fixation (34).

No infections developed in this toegrip series. No breakage of the implant occurred. None of the patients had major complaints about transfer metatarsalgia, floppiness of the toes. None of the patients demonstrated malrotation.
CONCLUSION

Lesser toe deformities are very common and the surgical management of these deformities are comprised between 28% and 46% of all forefoot surgery (28). PIP joint arthrodesis is a good solution for the treatment of toe PIP deformities. The implant used in this series represents a new generation of intramedullar devices offering good immediate mechanical stability, adequate deformity correction, and a high rate of consolidation with no short-term or long-term tolerance issues. In addition it can be easily used in revision surgery.
REFERENCES (1/2)


REFERENCES (2/2)


