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Original article

Results of Toccata® resurfacing PIP joint arthroplasty. A series of 32 cases at a mean follow-up of 5.9 years

Résultats de la prothèse interphalangienne proximale de resurfaçage Toccata® sur arthrose à un recul moyen de 5,9 ans. À propos de 32 cas

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ABSTRACT

The objective of this study was to evaluate the long-term results of proximal interphalangeal (PIP) resurfacing arthroplasty for treating osteoarthritis: the PIP Toccata implant®. This was a retrospective study of 32 out of 33 PIP arthroplasty cases performed with a dorsolateral or a Chamay approach by two surgeons after a minimum follow-up of 24 months. Patients were reviewed using a standardized assessment of pain, function, mobility and radiological changes. The average follow-up was 5.9 years. The mean active range of motion was 67° (15–95). Radiographic analysis found osteointegration of the implant in all patients except one, in whom distal migration had no clinical consequence. Heterotopic ossifications (HO) developed in 10 of the 20 cases where the implant was inserted through a lateral approach. Intra-articular bone debris was identified in the first postoperative X-ray in most of these cases. The presence of HO was significantly correlated with decreased range of motion ($P < 0.05$). Six patients required surgical revision and two needed implant removal and arthrodesis. Our results are comparable to other published studies of PIP resurfacing arthroplasty. It is important to remove all bone debris when using the dorsolateral approach. The PIP Toccata® implant is a reliable solution for treating PIP osteoarthritis but this arthroplasty procedure is demanding.

Mots clés :
Prothèse de resurfaçage
Articulation interphalangienne proximale
Arthrose

RÉSUMÉ

L'objectif de ce travail était d'évaluer les résultats à long terme de l'utilisation d'une prothèse interphalangienne proximale (IPP) de resurfaçage dans le traitement de l'arthrose : l'implant Toccata IPP®. Il s'agissait d'une étude rétrospective de 32 prothèses IPP sur 33 mises en place par voie dorsolatérale ou par voie de Chamay par 2 opérateurs avec un recul minimum de 24 mois. Les patients ont été revus selon une fiche standardisée évaluant la douleur, la fonction, la mobilité et les modifications radiologiques. Le recul moyen était de 5,9 ans. L'arc moyen de mobilité active était de 67° (15–95). L'analyse radiographique a montré une ostéointégration de l'implant chez tous les patients sauf un cas d'enfoncement de l'implant distal sans retentissement clinique. Il a été mis en évidence pour les prothèses implantées par voie latérale la formation d'ossifications périprothétiques plus ou moins volumineuses dans 10 cas sur 20. Il a été retrouvé dans la plupart des cas ayant développé des ossifications la présence de débris osseux intra-articulaires sur les radiographies postopératoires immédiates. La présence d'ossifications était corrélée de façon statistiquement significative à une diminution de l'arc moyen de mobilité ($p < 0,05$). Six cas ont nécessité une reprise chirurgicale et il a été

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réalisé pour 2 d'entre eux une dépose de l'implant et une arthrodèse. Nos résultats sont comparables à ceux des séries d'autres prothèses de resurfaçage. Il est important de retirer tous ces débris si l'on utilise la voie latérale afin de diminuer cette complication. L'arthroplastie par prothèse Toccata® est une solution fiable dans le traitement de l'arthrose IPP, mais nécessite une technique de pose rigoureuse.

1. Introduction

The proximal interphalangeal (PIP) joint is the cornerstone of the finger chain and the most important one functionally [1]. While it is vital to finger stability and mobility, its role differs depending on the ray: mobility is essential for the ulnar-sided fingers that ensure grip locking, and stability is primordial for the index PIP during pinch grip.

Osteoarthritis, either primary or posttraumatic, is common in the PIP joint. When conservative treatment is no longer effective, one of the surgical options is arthroplasty. Various implants have been developed for this purpose [2]. The objective of this study was to evaluate the medium-term results of the Toccata® (SEM, Créteil, France), a joint resurfacing implant.

2. Patients and methods

2.1. Toccata® implant

The Toccata® prosthesis is a semiconstrained sliding implant with conical and angular shapes that is anchored by press-fit (cementless) impaction in the medullary canal. Stability is ensured by a metaphyseal hydroxyapatite coating; the diaphyseal part is not coated to prevent distal anchoring and make it easier to remove the implant during revision cases (Fig. 1). The implant has a metal–polyethylene bearing: cobalt-chrome (ISO 5834-12) for the proximal component and polyethylene (ISO 5834-2) for the insert impacted and pinned into the distal component. The PIP articulation has a single degree of freedom; rotation is limited and has a 90° arc. Frontal stabilization is ensured by a distal mid-line crest embedded in a proximal groove. The prosthesis is available in four sizes: XS, S, M and L. All the parts of the prosthesis must be the same size.

3. Methods

We performed a retrospective cohort study of patients operated by two surgeons at two hospitals. The inclusion criteria were all patients with idiopathic or posttraumatic PIP osteoarthritis operated with a Toccata® implant between November 2004 and March 2013. Exclusion criteria were an inflammatory disease or prosthesis revision.

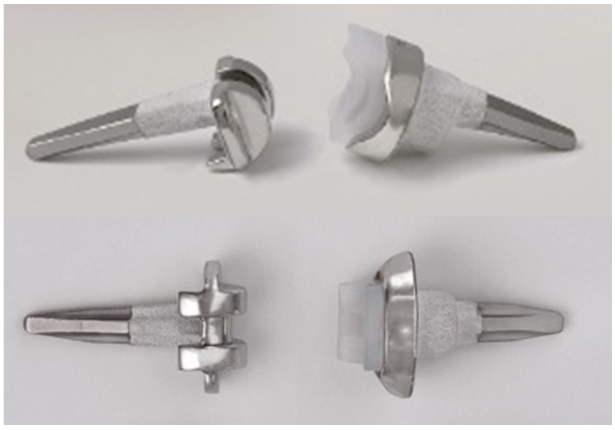

Fig. 1. Toccata® proximal interphalangeal (PIP) implant.

Every patient was invited to return to the clinic for a clinical examination and standard (AP, lateral) X-rays of the finger in question. The clinical examination was performed using a standardized form including an evaluation of pain, function, work capacity, active and passive range of motion, grip and pinch strength, and satisfaction. Pain and function were evaluated using 10-point numeric analog scales. Work capacity was evaluated subjectively by the patients using the Single Assessment Numeric Evaluation [3]. A goniometer and grip and pinch Jamar dynamometers were used to measure range of motion and strength.

X-rays were used to evaluate joint congruency and implant integration, and to look for any deviations, subsidence or heterotopic ossification (HO).

Preoperative and surgical data were also gathered: pain, function, preoperative and immediate postoperative mobility, surgical approach, postoperative outcome.

The statistical analysis was performed with SPSS Statistics 20 software (IBM). Means were compared using the Mann–Whitney test. Implant survival was determined using the Kaplan–Meier method.

3.1. Study population

Between November 2004 and March 2013, 33 Toccata® implants were inserted in 30 patients (23 women and 7 men). The mean age at the time of the procedure was 65.7 years (45–84). The mean follow-up at the time of review was 71 months (24–124), which is 5.9 years. We reviewed 29 of these 30 patients; one patient died.

The indication for arthroplasty was idiopathic osteoarthritis in 30 cases and posttraumatic osteoarthritis in 3 cases. One patient received the implant in four PIP joints: three in the right hand and one in the left hand.

All the patients were right-handed. Arthroplasty was performed on the right (dominant) hand in 23 cases and on the left (nondominant) hand in 10 cases. The third ray was implanted in 16 cases (49%), the fourth ray in 10 cases (30%) and the second ray in 7 cases (21%). A dorsolateral approach was used in 21 cases and a dorsal transtendinous Chamay-type approach in 12 cases. In cases with the dorsolateral approach, the collateral ligament on the side of the approach was detached proximally as needed to expose the articular surfaces. A small implant was used in 4 cases, a medium implant in 25 cases and a large implant in 4 cases.

4. Results

4.1. Postoperative subjective clinical results

Subjective evaluation of the outcome on 32 implants found 15 very good results, 7 good results, 5 average results, 1 unsatisfactory result and 4 failures, thus 68% of the results were good or very good. The failures (namely two cases in which the implant was removed) were not included in the remainder of the analysis.

The mean pain level on a 10-point scale went from 8 preoperatively to 2.6 postoperatively, a 5.4-point reduction. The operated

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