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1st metatarso-phalangeal joint arthroplasty with ROTO-glide implant

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ABSTRACT

Background: Total joint replacement of the 1st metatarso-phalangeal Joint (MTPJ) has been controversial as arthrodesis remains a good option for patients with end stage 1st MTPJ arthritis. We present a multi centre service evaluation of the ROTO-glide device

Methods: 33 ROTO-glide procedures were carried out in 30 patients across 7 sites within the UK. Exclusion criteria — hallux valgus and arthritis, age below 45 years and over 80 years, inflammatory joint disease. Patient assessed pre and post operatively with AOFAS and Oxford forefoot (MOXFQ) scores and plain radiographs. All patients carried out the same post operative protocol

Results: Average age at patients was 58.6 years (45–77). Follow up average was 16.9 months (12–29). Pre-op AOFAS scores average 41.4 (17–67) and post op average 76 (29–100) and the MOXFQ summary index decreased from an average of 43 (20–64) pre op to an average of 17 (0–51) post op. Average total range of motion pre operatively was 32° and post operatively was 61°. There were 2 post operative complications but no revisions were necessary.

Conclusions: The early results of this multi centre service evaluation of the ROTO-glide 1st MTPJ replacement support its continued use and evaluation of the prosthesis further

1. Introduction

The main standard treatment for arthritis of the 1st metatarso-phalangeal Joint (MTPJ) has been arthrodesis. Advantages are a strong weight-bearing 1st ray, generally good abolition of symptoms and an operation, which, if successful, does not require late revision. The disadvantages are loss of movement, inability to wear high heels and the potential for malunion and non union causing symptoms. It has also been shown to change the biomechanics of the foot and ankle leading to shorter step length and loading time on the hallux and can affect the ankle joint leading to a reduction of ankle power and torque at push off [1]. Late arthritis of the Interphalangeal Joint (IPJ) of the hallux may also occur and fusion of both joints is not ideal.

Alternatives to arthrodesis include cheilectomy, which is only suitable for dorsal impingement pain, Keller's procedure, which can cause transfer metatarsalgia and is mainly limited to older patients with lower physical demands due to the loss of the great toe's supporting function [2], and joint replacement. Keller's procedure has been shown to be useful but with high reported rates of disappointing post operative cosmetic results and up to 25% of patients not being completely satisfied [3]. Joint replacement has included silastic replacements, which may be suitable for low demand elderly patients but may cause silastic granulomas, which then make revision difficult [4]. Other metal or ceramic/polyethylene replacements have caused problems either by their bulk or high rates of loosening [5]. Joint replacements also eventually require revision.

The need therefore exists for an effective 1st MTPJ replacement which will allow adequate pain free movement, be low profile, not cause sesamoid problems, allow good weight-bearing through the 1st ray and have a low revision rate.

1st MTPJ replacement was approved by NICE in 2005 [6] for use in patients with Hallux rigidus or Hallux valgus with 1st MTPJ degeneration. It advises its use is restricted to patients in whom conservative measures have been exhausted and also for patients

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to be informed of the uncertainties of the place of this procedure in comparison with other methods of surgical treatment.

Many implants are available on the market at present and the newer implants lack the long term outcome data of the older devices.

The ROTO-glide MTP Great toe system was designed and launched by Professor Hakon Kofoed of Denmark in 1999. Since then Professor Kofoed has implanted over 130 prostheses with no record of aseptic loosening of the prosthesis and with good pain relief and continuation of normal daily activities but it has not, until now, been used routinely in the UK [7].

We present a multi centre service evaluation of the ROTO-glide 1st MTPJ replacement to determine the efficacy of this new implant, prior to its wider use.

2. Method

This was a prospective, multi centre service evaluation involving 7 centres across the UK.

Inclusion criteria — Patients with Hallux rigidus/arthritis sufficient to have arthrodesis or replacement who had exhausted all conservative methods of treatment.

Exclusion criteria — Hallux valgus and arthritis, generalised inflammatory joint disease, aged under 45 or over 80 years and diabetics.

Patients were assessed pre operatively with plain radiographs and were assessed for range of movement using two scoring systems — the AOFAS hallux score and the Oxford Forefoot score (MOXFQ). The MOXFQ scores are represented as an index summary score as this has been shown to be a simple, effective way of representing the full score [8]. The AOFAS hallux score is split into 3 parts — pain, function and alignment. Within the functional part of the score is an assessment of the MTPJ motion (dorsiflexion plus plantarflexion) and we have represented this by dividing the motion into three categories based on how they are scored within the scoring system — normal or mild restriction (>75°), Moderate restriction (30–74°) or severe restriction (<30°). We have also evaluated total range of motion (full dorsiflexion to full plantarflexion) both pre- and post operatively.

Post operatively patients were mobilised in a post operative shoe, started immediately with physiotherapy and also taught how to mobilise the 1st MTPJ themselves. X-rays were performed post operatively and then at 6 weeks and 1 year. Patients were clinically assessed, scored, range of movement recorded and any complications noted.

The ROTO-glide is a cobalt chrome prosthesis coated with plasma deposited titanium powder crowned with a layer of hydroxyapatite. The prosthesis is inserted cementless with an Ultra High Molecular weight polyethylene (UHMWPE) meniscal insert in between. The surgical approach is medial with resection of the medial eminence and then a jigged resection of the metatarsal articular surface and base of the proximal phalanx. The prosthesis is left and right sided and comes in 3 different metatarsal and 4 phalangeal sizes with 3 meniscal thicknesses available. The meniscus is available in both standard and anatomical, the latter designed to compensate for minor valgus/varus malalignment (Fig. 1).

3. Results

40 patient were recruited who underwent 43 joint replacements. Data collection for all patients was not complete as in one centre complete range of motion data was not collected therefore we report on 30 patients undergoing 33 joint replacement for whom full range of motion data was available.

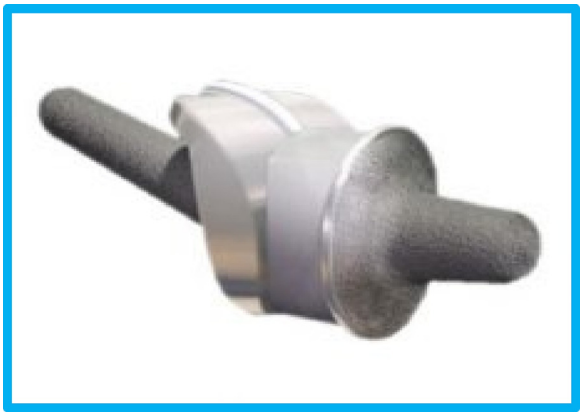

Fig. 1. Rotoglide implant.

3 patient had bilateral replacements, 2 of which were done in the same sitting and one was staged. 2 patients had had previous surgery — cheilectomy and revision of a loose MOJE replacement.

21 patients were female and 9 male and age ranged from 45 to 77 years (58.6 average). Follow up ranged from 12 to 29 months with an average of 16.9 (Figs. 2 and 3).

3 patients dropped one AOFAS MTPJ motion grade post operatively otherwise grades either remained static or increased. 3 moved up two grades, 16 moved up one grade and 11 stayed static. This shows generally increased range of movement (ROM) post operatively following this procedure (Fig. 4).

This shows that even in the group who showed no change in AOFAS grade showed good improvement in overall range of motion and this effect is magnified as increase in AOFAS grade rises.

2 post operative complications were recorded. These were sesamoiditis which resolved over time and a stress fracture of the 1st metatarsal which healed with no intervention and went on to have a good outcome with no increased stiffness following fracture

	Pre operative	Post operative
AOFAS total score (100 max)	17-67 (41.4)	29-100 (76)
MOXFQ index summary score (0 max)	20-64 (43)	0-51 (17)
Total range of motion (degrees)	10-50 (31)	20-90 (61)

Fig. 2. Pre and post-operative score results.

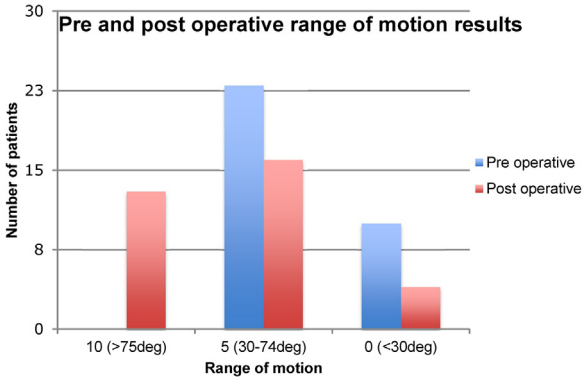

Fig. 3. Pre and post operative ranges of motion results.

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