

MIGRATION OF MEDIAL-PIVOT AND POSTERIOR STABILIZED IMPLANTS

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INTRODUCTION

The fixation of the tibial component of a total knee replacement is critical to long-term function of the joint and is indicative of the success of the implant design and surgical technique. The pattern of implant migration, as measured by radiostereometric analysis (RSA), in the first two post-operative years has been shown to be predictive of the long-term fixation of the implant [1]. The purpose of this study was to compare the migration of the new ADVANCE® Medial-Pivot knee to the existing ADVANCE® Posterior Stabilized implant (Wright Medical Technology, Inc., Arlington, TN). There is evidence that in normal knees the lateral condyle pivots about the medial condyle in flexion and extension; the Medial-Pivot implant is designed to replicate this function [2].

METHODS

Radiostereometric analysis (RSA) is an accurate radiographic technique for measuring relative motion between an implant and bone [3]. Tantalum beads inserted in the tibia and implant polyethylene component during surgery are highly visible in bi-planar x-rays taken during follow-up exams. Using a calibration box, the 3D co-ordinates of the beads define the positions and orientations of the implant and bone. Comparing the relative positions of the implant and bone in successive exams identifies movement of the implant with respect to the bone. The migration of the implant can be represented as the maximum total point motion (MTPM) of the prosthetic bead that moved the most, indicating the magnitude of migration without direction [1]. Commercial software (RSA-CMS, MEDIS, Leiden, The Netherlands) was used to determine the bead 3D co-ordinates from the stereo x-rays.

Sixty-six patients (48 female) with osteoarthritis were randomized to receive either a Medial-Pivot (MP) or Posterior Stabilized (PS) implant. Surgeries were performed by three surgeons following a standard protocol of PCL resection, patellar resurfacing, and RSA bead placement. Stereo x-rays were taken within 4 days post-operatively and at 6 and 12 months. General health and disease-specific health questionnaires, including WOMAC and KSS, were administered to all patients pre-operatively and at 6, and 12 months post-operatively.

RESULTS AND DISCUSSION

The subject characteristics and did not significantly differ between groups (Table 1).

Table 1. Subject characteristics. Mean ± SD.

| Subject Characteristic | MP (n=32) | PS (n=24) | p value |
|------------------------|--------------|-------------|---------|
| Age (years) | 65.4 ± 7.4 | 65.9 ± 8.2 | 0.813 |
| Weight (kg) | 88.7 ± 17.4 | 86.4 ± 15.8 | 0.622 |
| Height (cm) | 163.8 ± 10.1 | 165.3 ± 7.3 | 0.535 |
| BMI | 33.0 ± 5.9 | 31.9 ± 5.5 | 0.453 |

The results of the health outcome questionnaires differed significantly between groups only for the KSS knee scores (Table 2).

Table 2. Health outcome questionnaire results. All scores out of 100, 100 being ideal. Mean ± SD.

| Questionnaire | MP (n=28) | PS (n=22) | between group p-value |
|---------------------------|-------------|-------------|-----------------------|
| Womac | | | |
| pre-op | 43.9 ± 20.4 | 41.7 ± 13.1 | 0.105 |
| 6 months post-op | 76.4 ± 15.9 | 91.3 ± 6.0 | |
| 12 months post-op | 78.7 ± 18.1 | 87.4 ± 9.4 | |
| KSS Knee Score | | | |
| pre-op | 38.7 ± 21.1 | 50.9 ± 21.7 | 0.005 |
| 6 months post-op | 68.0 ± 25.4 | 71.9 ± 18.8 | |
| 12 months post-op | 64.5 ± 21.8 | 72.4 ± 21.8 | |
| KSS Function Score | | | |
| pre-op | 43.8 ± 25.0 | 50.7 ± 15.0 | 0.293 |
| 6 months post-op | 65.5 ± 14.8 | 74.3 ± 14.7 | |
| 12 months post-op | 69.4 ± 24.2 | 71.0 ± 22.7 | |

The migration of the MP and PS groups were not different at the time points measured (Figure 1). The consistent level of migration at 6 and 12 months indicates favourable tibial component fixation and long-term success.

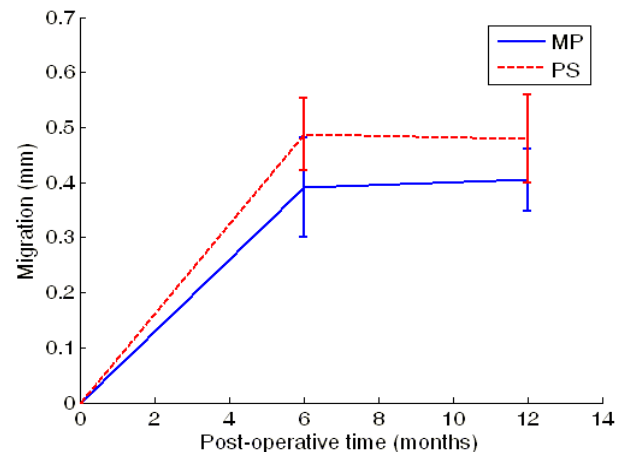


Figure 1. Maximum Total Point Motion (MTPM) of MP and PS implants at 6 and 12 months post-op for analyzed RSA cases to date (nMP=8, nPS=14). Mean and standard error of the mean shown. Between group p-value = 0.482.

CONCLUSIONS

The similar migration pattern for the Medial Pivot implant to the accepted functional Posterior Stabilized implant supports the use of this implant in total knee arthroplasties. Long-term monitoring will continue to confirm the results to date.

REFERENCES

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