

# PATIENTS' RECOVERY OUTCOME AFTER TOTAL HIP ARTHROPLASTY – PRELIMINARY RESULTS

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## Introduction

Following total hip arthroplasty (THA) independent of the surgical approach, an improvement for patients' hip flexion-extension range of motion is apparent, but a return to physiological gait is typically not achieved [Foucher, 2006; Manovani, 2012]. The introduction of the antero-lateral invasive (Watson-Jones) minimally approach (MIS) expected a more physiological gait pattern than the standard lateral transgluteal (Bauer/Hardinge) approach (SLT). Furthermore, the MIS suggest causing less damage to muscles and soft tissues surrounding the hip joint [Howell, 2004]. However, despite clinical advantages the functional merits for patients receiving MIS are controversial discussed [Foucher, 2006; Manovani, 2012]. The current study aimed to identify approach-related differences in the recovery gait patterns.

## Methods

In an ongoing prospective randomized controlled study 27 patients (in total  $n=60$  patients) scheduling THA (Metha<sup>®</sup>, Aesculap AG) were randomized to either the MIS ( $n=16$ ) or the SLT ( $n=11$ ) approach. Three dimensional gait analysis (Vicon Plug-in Gait, barefoot, self-selected walking speed) was performed pre-op (T0), and 3 months (T3) and 6 months (T6) post-op. Spatio-temporal parameters, sagittal plane joint motion of the pelvis, hip, and knee; as well as 3D ground reaction forces (GRFs; normalized to BW) of five trials (operated limb) were averaged for each patient. The waveforms of the kinematic and GRF variables were analyzed using principal component (PC) analysis [Nüesch, 2012]. The first  $k$  PC-scores (>90% cumulative variance) were tested for (A) time (Friedman test incl. Bonferroni post-hoc (Wilcoxon's test),  $p < .017$ ) and (B) for surgical approach (Mann-Whitney-U-test,  $p < .05$ ) effects. For each waveform, the PC with the largest percentage variability with at least one significant difference was reported.

## Preliminary Results

Significant inter-approach differences were only found in PC2 for the pelvis sagittal angle at T3 ( $p = .034$ ) and in PC1 for the medio-lateral GRF at T6 ( $p = .003$ ). For all variables investigated, recovery of physiological patterns was mainly completed by T3. From T0 to T3, peak hip and knee extension, peak to peak antero-posterior GRF and the 1<sup>st</sup> and 2<sup>nd</sup> peak of the vertical GRF increased, and the pelvis was less anteriorly tilted for both approaches. At all three time points, MIS showed higher peak lateral and lower medial GRFs when compared to SLT (Fig. 1). No significant time- and approach-related changes were identified in discrete spatio-temporal parameters.

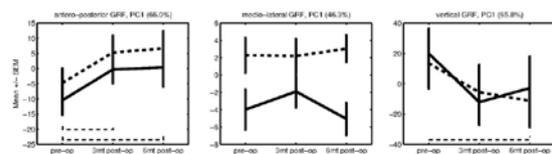


Figure 1: PC-score means with standard error of the mean (SEM) for the three GRFs for SLT (solid) and MIS (dashed) at three time points. Dashed horizontal lines indicate significant differences between time points ( $p < .017$ ).

## Discussion

Our results suggest that although there are clinical advantages in conducting the MIS approach, there are trends to reduced functional benefits at the hip and at neighboring joints for these patients' recovery gait pattern compared to the SLT approach. Despite enhanced post-op hip and knee mobility, spatio-temporal gait parameters did not resolve any improvement. Conclusions about the benefits of each approach can only be drawn after completion of the study.

## References

- Foucher *et al*, J Biomech, 44:372-8, 2011.
- Manovani *et al*, J Biomech, 45:2109-15, 2012.
- Howell *et al*, Orthop Clin N Am, 35:153-62, 2004.
- Nüesch *et al*, Clin Biomech, 27:613-618, 2012.