

# Total hip replacement: results of a continuous cohort study

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In this paper we present the results of 321 non-cemented navigated THR from a continuous series performed between February 2004 and October 2009 on 306 patients. The results presented here include the comparison between the pre-surgery aims and the surgery outcome as well as instability and the failure rate.

The study sample comprised 199 females (65%) and the mean age at surgery was 60.3 years, ranging from 18 to 87 years. Eighteen patients (5.9%) could not be contacted for follow-ups, including 5 deaths not related to this surgery. The average follow-up time was 30 months ranging from 3 to 73.3 months.

Total hip replacements were mainly lead by two surgeons, one performing 281 THR (87.5%) while the other did 36 (11%). All THR were achieved using a Surgetics® navigation station from Praxim®. Chronologically, the first software in use was Hiplogics® then replaced by THS®, representing 34% and 66% of THR, respectively. The hip implants used for these surgeries were mainly manufactured by Depuy® and Ceraver®, representing 78.8% and 15.7%, respectively.

The first parameter of interest was the variation of femur length. The median lengthening of femur segments was 4 mm, ranging from -28 to 29 mm and resulting in 83.3% of surgery outcomes being comprised within  $\pm 5$  mm of the length aim.

The second parameter investigated was the lateralisation: its median was found to be -1 mm (from -18 to 29 mm) with a 0 mm goal. 88.7% of PTH reached the lateralisation goal that was set to be within  $\pm 10$  mm.

The anterior-posterior displacement's median was equal to 1.5 mm and show a rather important patient-to-patient spread (from -14.5 to 26.5 mm) and resulted in reaching to objective to be within  $\pm 5$  mm in only 42% of cases.

The last parameters of interest were cotyle inclination and anteversion. The medians [ranges] for these parameters were, according to the navigation station: 21° [-7°; 41°] and 41° [19°; 61°] for PTH aims of 25° and 40°, for the anteverision and inclination, respectively.

It could be expected from navigated surgery higher rates of success regarding the femur length; the rate observed in this study is mainly due to the use of non-cemented prosthesis. Indeed, such prosthesis imply to reach a stable position, rather than creating one with cemented implants, that can prevent the surgeon from reaching the lengthening objective.

The lateralisation objective is of importance to maintain the mobility of the hip [Charles et al., 2004] and navigation gives the possibility to monitor the femoral offset in real time during surgery. As a consequence, it has been observed in our series a more important use of modular implant reaching more than 50% for some implants while the nationwide rate is around 15%. This is due to medialisation of acetabular cup that is the consequence of the use of non-cemented prostheses. Even though it could have an influence on hip biomechanics, the anterior-posterior displacement of the femur has not been taken into account in our series. This is a consequence of both the lack of studies about this parameter and the difficulty of modifying it during surgery. Prosthesis with modular neck could be of interest for this purpose even though this is only a hypothesis.

Our study showed results comparable to the literature [Nogler et al., 2004] for acetabular cup orientation. Even though the range of both inclination and anteversion is rather wide, it must be kept in mind that navigated surgery reduces this kind of error [Parratte et al., 2007]. Another source of error is the localisation of pelvis landmarks [Dardenne et al., 2008].

Concerning the failure rate, it was found to be as low as 7.2% of our cases for which navigated surgery had to be cancelled. Joint dislocation was observed in 1.6% of our patients, which is lower than the 2 to 10% found in literature for non-navigated surgery.

This study is, to our knowledge, the most important regarding the number of cases treated. It showed similar results to the ones that can be found in literature in a larger sample, hence confirming those results.

## References

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