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Navigation improves the ten to fifteen-year survival rate after mobile bearing total knee arthroplasty. A French multicentric nationwide study

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Abstract

The survival rate of navigation-assisted mobile bearing total knee arthroplasty after 13 years when mechanical revision was considered as the end-point was significantly improved when compared to conventionally implanted mobile bearing total knee arthroplasty. Longer follow-up is required to prove superiority of any technique.

1 Introduction

Total knee arthroplasty (TKA) is a highly successful procedure. Survival rates of more than 90% after 10 years are generally reported after implantation of conventional, fixed bearing TKAs. However, complications and revisions may still occur for many reasons, and some of them may be related to polyethylene wear. The use of a mobile bearing has been suggested to improve the functional results, decrease polyethylene wear and improve long term survival (Dennis 2006). Clinical relevance of this design change remains debated (Kelly 2011). Computer assistance has been suggested to improve the accuracy of implantation of a TKA (Jenny 2005). Short term results are still controversial (Roberts 2015). However, few long-term results have been documented (Song 2016). The present study was designed to evaluate the long-term (more than 10 years) results of mobile bearings TKAs on a national scale. The secondary goal was to assess the influence of navigation assistance on the survival rate

The primary hypothesis of this study was that the 10-year survival rate of mobile bearing TKAs will be improved in comparison to historical papers when analyzing survival rates and knee function as evaluated by the Knee Society Score (KSS). The secondary hypothesis was that the use of navigation assistance during implantation will improve the 10-year survival rate in comparison to conventionally implanted TKAs.

2 Material and methods

All patients operated on between 2001 and 2004 in all participating centers for implantation of a mobile bearing TKA (whatever design used) were eligible for this study. Usual demographic and peri-operative items have been recorded. All patients were contacted after the 10-year follow-up for repeat clinical and radiological examination (KSS, Oxford knee questionnaire and knee plain X-rays). Patients who did not return were interviewed by phone call. For patients lost of follow-up, family or general practitioner was contacted to obtain relevant information about prosthesis survival. Survival curve was plotted according to the actuarial technique, using the occurrence of TKA revision for mechanical reason as end-point. The influence of the implantation technique was assessed with a logrank test at a 0.05 level of significance.

3 Results

1,604 TKAs were implanted during the study time-frame. There was no difference in any baseline criteria between conventional (968 cases) and navigated (636 cases) TKAs. 289 patients deceased before the 10 year follow up (18%). Final follow-up was obtained for 926 cases (58%). 26 prosthetic revisions were performed for mechanical reasons during the follow-up time (2%). The global 10-year survival rate was 93.9%. The 10-year survival rate for mechanical revision was 98.6%. The 15-year survival rate for mechanical revision was 96.0% (figure 1). No component was considered loose at the final radiographic evaluation. No polyethylene wear was detected at the final radiographic evaluation.

Considering mechanical revision only, the 10-year survival rate of conventional TKAs was 98.6% vs 98.7% for navigated TKAs (NS). However, the 13-year survival rate were 97.2% and 98.3% respectively ($p < 0.05$) (figure 2). The survival curves could not be plotted to the 15-year follow-up because of low remaining cases.

4 Discussion

The present study represents the longer follow-up of navigated TKAs published in the literature. This study confirms our initial hypothesis, namely quite satisfactory results of navigated implanted TKA after more than 10 years. Navigation, whose precision is no longer to be demonstrated, probably contributed to the quality of the results. A more consistent anatomical reconstruction and ligamentous balance of the knee should lead to more consistent survival of the TKA. Other authors did observe similar results (Baumbach 2016). However, superiority of navigated TKA in comparison to conventional implanted TKA is difficult to prove because of the subtle differences expected in mostly underpowered studies (D'Amato 2018). Longer term follow-up may be required.

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6 Disclosure

Jean-Yves JENNY receives royalties from AESCULAP, is a paid consultant for Exactech, is an unpaid consultant for FH Orthopedics, is member of the board of the CAOS-International Society, of the International Society for Technology in Arthroplasty and of the French Society for Hip and Knee Surgery. Dominique SARAGAGLIA receives royalties from AESCULAP

Figure 1: Global survival rate – mechanical revision

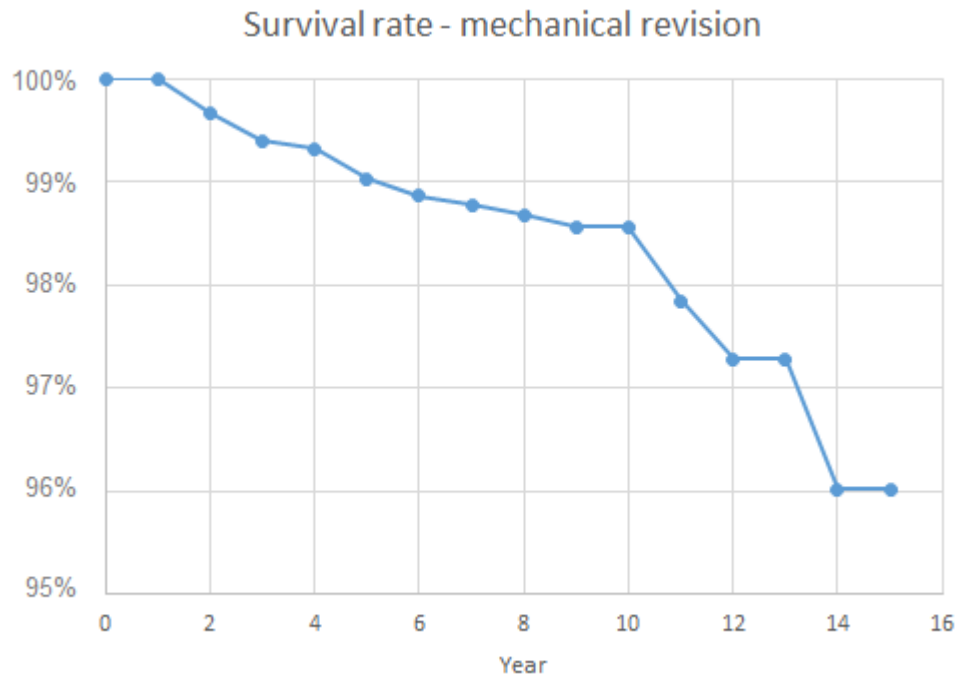


Figure 2: Survival rate – mechanical revision – conventional vs navigated TKAs

