

Ten-year results concerning loosening rates of navigated vs. conventional total knee arthroplasty with Aesculap search prosthesis implanted in 1999

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Background: Many studies have shown that optimal axis alignment of a knee prosthesis leads to longer implant life.[1] This optimal axis alignment, the literature is unanimous on this point, can be best achieved using a navigation system.[2, 3] Undoubtedly, not alone the price of such a system, but also the longer operating time raise the costs of the operation. On the other hand, against the backdrop of a guarantee for endoprostheses to be introduced in Germany, the acquisition of a navigation system may be a good investment in the long term for hospitals as they could expect a lower loosening rate. If navigation can achieve a longer implant life beneficial to the patient's health for years, it would also provide an economic benefit. Thus, the objective of this study was to compare, ten years after the operation, the loosening rate of navigated knee replacements with that of conventionally implanted knee replacements, the same Aesculap Search prosthesis being used in both cases.

Methods: To this effect, all 217 Aesculap Search[®] prostheses (113 conventional and 104 navigated) implanted in 1999 were included in this study. Of the 213 patients, 94 patients (96 knees) were still available for follow-up after 10 years, 72 patients had died in the meantime, 19 patients had to be reoperated, and 28 patients refuse to participate to the study for various reasons. Of these 96 prostheses, 46 were conventionally implanted and 50 using navigation. The radiographs were evaluated using the Knee Society Score.[4]

Results: Of the 19 replaced prostheses, 7 in the conventional group und 1 in the navigated group had to be replaced because of aseptic loosening. This corresponds to a survivorship rate after 10 years of 87% of all prostheses implanted conventionally and of 98% of all prostheses implanted using navigation. With $p < 0,05$, the difference between the loosening rate of the conventionally implanted and of the navigated prostheses is of statistical significance. Evaluation of the results showed that a total of 9 prostheses were to be assessed as loosened in the conventional group, corresponding to a proportion of 16, 4%. Taking into account 8 prostheses suspected to be loosened, a loosening rate of 31% was found in the conventional group. After the end of the study, in the navigated group, 5 prostheses were found with certainty to be loosened, corresponding to a proportion of 9, 1%. In addition, 7 prostheses were to be regarded as suspect, resulting in a rate of aseptic loosening of 22% in the navigated group. After 12 years, there was no more statistically significant difference at the end of follow-up.

In all prostheses found with certainty to be loosened, the limb alignment was outside of the optimal zone of $\pm 3^\circ$ zero.

To our knowledge, no replacement of the prosthesis was necessary at 10 years in the patients who did not participate in the study. After 10 years, including the prostheses which were not included in the study, we have a rate of aseptic loosening of 6, 25% in the conventional and of 1% in the navigated group. For all patients after 10 years, the total replacement rate (aseptic, septic, instability, bruises, fracture, malrotation) was 10, 6% in the conventional and 6, 7% in the navigated group. At the end of the study, including all patients, the total aseptic loosening rate was 15% in the conventional and 11, 5% in the navigated group.

Discussion: To summarize, the study shows that, after 10 years, the prostheses implanted using navigation have a statistically significant lower rate of aseptic loosening than the prostheses implanted

conventionally. Over longer periods of time, the navigated method shows no more statistically significant advantage, but its rate of aseptic loosening is still lower than that of the conventional method. We mean that, because of the lower rate of aseptic loosening, the navigated technique has proven to be advantageous also in the long term perspective. Against the background of the guarantee requested for prostheses, it is also justifiable in terms of business administration and, in any patient who does not have to undergo a replacement operation, advisable in terms of economic policy.

References

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