



Imageless computer assisted versus conventional total knee replacement. A Bayesian meta-analysis of 23 comparative studies.

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Brin Y.S. et al.

ABSTRACT

We have undertaken a meta-analysis of the English literature, to assess the component alignment outcomes after imageless computer assisted (CAOS) total knee arthroplasty (TKA) versus conventional TKA. We reviewed 23 publications that met the inclusion criteria. Results were summarised via a Bayesian hierarchical random effects meta-analysis model. Separate analyses were conducted for prospective randomised trials alone, as well as for all randomised and observational studies.

In 20 papers (4,199 TKAs) we found a reduction in outliers rate of approximately 80% in limb mechanical axis when operated with the CAOS. For the coronal femoral and tibial implants positions, the analysis included 3,058 TKAs. The analysis for the femoral implant showed a reduction in outliers rate of approximately 87% and for the tibial implant a reduction in outliers rate of approximately 80%. Imageless navigation when performing TKA improves component orientation and postoperative limb alignment.

The clinical significance of these findings though has to be proven in the future

SUMMARY

Meta-Analysis of 23 comparative studies to assess the component alignment outcomes after imageless computer-assisted (CAOS) versus conventional TKA.

In total there were 4063 patients with 4163 TKA surgeries analyzed regarding mechanical axis, femoral and tibial angle. The results of randomized controlled trials were additionally looked at in separate.

CONCLUSION

Imageless CAOS significantly reduces the number of outliers in TKA.

“[...] the use of imageless CAOS for TKA significantly reduces the number of outliers in the limb mechanical axis and coronal position of the implants by a rate of approximately 80%.”

Reduced outliers rate by approx. 87% (femoral implant position) and 80% (mechanical axis) with outliers defined by deviations $\pm 3^\circ$.

“Analysing the femoral implant position revealed 280 (18.4%) patients in the conventional group that had outliers in femoral implant position, compared to 48 (3.1%) in the CAOS group. The meta-analysis estimated better results with the CAOS TKA [implying] a strong effect with reducing the outliers rate by approximately 87% when using the CAOS.”

(continued...)

“There were 390 (18.6%) outliers for the mechanical axis in the conventional group compared to 92 (4.3%) in the CAOS group. The meta-analysis estimated [...] a strong effect, with CAOS reducing outlier rate by approximately 80%.”