

Title:	Computer-navigated total knee arthroplasty
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Aim

To assess the safety, effectiveness and cost-effectiveness of computer-navigated total knee arthroplasty (CNTKA) for any indication through a systematic review of the literature.

Results and Conclusions

Safety:

Comparative and case series safety data were available for this procedure with safety data reported in a small proportion of the included studies. Infection and deep vein thrombosis were the most common adverse events and were reported in 1% and 1.7% of patients respectively. No associated mortality was reported. Conversion from CNTKA to the conventional technique was required in 1.3% of patients.

Effectiveness:

Radiological outcomes

Radiological outcomes (postoperative deformity, deviation of the mechanical axis from target angle and satisfactory alignment) were the main reported indicators of the effectiveness of CNTKA. Meta-analyses demonstrated that CNTKA resulted in the greatest accuracy of implantation.

Clinical and peri-hospital outcomes

Few studies, however, reported non-radiological outcomes. Range of motion and the Knee Society Score were the most commonly reported clinical outcomes and were comparable with the conventional technique. Duration of surgery and tourniquet time were the most commonly reported peri-hospital outcomes with CNTKA resulting in a mean additional 11.99 and 14.38 minutes for surgery and tourniquet times respectively.

Cost Effectiveness:

Due to the absence of long-term data supporting improved clinical effectiveness as a result of CNTKA, a Markov model was applied with the rationale that improved alignment may lead to a reduction in the total knee arthroplasty revision rate. Four scenarios in the 10-year revision rate were tested:

1. no improvement (approximately 6%)
2. a 1% improvement
3. a 2% improvement
4. a 3% improvement (ie a 50% reduction).

Based on a number of estimates and assumptions:

- At an incremental cost of CNTKA of \$1029 per procedure.
- For (scenarios 1 and 2) CNTKA is unlikely to be cost-effective.
- CNTKA is potentially cost effective when the 10-year revision rate of total knee arthroplasty improves by 2% or more (scenarios 3 and 4).

Methods:

The evidence regarding CNTKA was systematically assessed. Medline, EMBASE, Austhealth, CINAHL, PubMed and Science Citation Index and the Cochrane Library were searched for relevant literature from January 1997 to March 2008.

Long-term linking data

Additional, separate searches were conducted to identify literature which linked postoperative knee alignment with long-term outcomes. No specific link between postoperative alignment and long term clinical outcomes such as revision rates were noted.