

Decision analysis supports unicompartmental replacement as primary surgical treatment for advanced isolated antero-medial gonarthrosis

Purpose: Decision analysis was used to evaluate total (TKR) and unicompartmental (UKR) knee replacement for treatment of medial compartment gonarthrosis, focusing on the total number of operations and infections (most frequent serious complication).

Methods: A 20-year-outcome analysis tree of a hypothetical cohort of 100 60-year-old patients with isolated medial compartment gonarthrosis, was developed. Ten-year-implant survival rates (90-95% for TKR, 85-95% for UKR) were converted to annual revision rates. Revisions were grouped in 5-year sub-cohorts, each with their own ten-year-implant survival and infection rates (UKR->TKR 90% and 1%, 1stTKR revision 85% and 1%, 2ndTKR revision 80% and 2%, 3rdTKR revision 70% and 3%, 4thTKR revision 60% and 4%). This allowed determination of the total number of procedures. Infection rate for primary TKR was set at 1%, for UKR at 0.5%. This allowed determination of the total number of infections expected. Secondly, the total number of hospital days was calculated, based on overnight stay after UKR, 3 days hospital stay after TKR. No mortality over time was taken into account in the primary analysis.

Results:

Primary procedure	10-year-implant survival	Procedures	Infections	Hospital days
TKR	95	112	1.18	386
TKR	90	123	1.37	473
UKR	95	111	0.62	134
UKR	85	133	0.85	242

Conclusion:

UKR as primary treatment reduces the number of infections and length of hospital stay. With increasing failure rate, the total number of procedures increases. UKA survival rates of 70% at 10 years would impose a surgical morbidity related to infection and hospital length of stay comparable to TKA survival rates of 95% at 10 years.

When mortality is taken into account, the differences between UKA and TKA outcomes favourable to UKA, such as infection, length of stay, become more accentuated, as more involved procedures are moved into the future and the cohort shrinks. Inversely, the difference in total number of procedures performed, more for UKA compared to TKA, diminishes for the same reason.

Decision analysis allows calculation, rather than intuitive assessment, of the impact of varying various outcome variables.