Minimally invasive unicompartmental versus total condylar knee arthroplasty: early results of a matched-pair comparison

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
The use of minimally invasive unicompartmental knee arthroplasty (UKA) was compared with total knee arthroplasty (TKA).

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients with isolated medial compartmental osteoarthritis of the knee. The inclusion criteria included:

- age above 50 years;
- active community ambulatory status;
- radiological evidence of medial compartmental osteoarthritis only;
- absence of patello-femoral symptoms;
- competence of both cruciate ligaments;
- less than 15 degrees varus; and
- absence of fixed flexion deformity.

Setting
The study setting was secondary care. The economic study was conducted in the Department of Orthopaedic Surgery, Singapore General Hospital, Singapore.

Dates to which data relate
The dates to which the effectiveness and resource use data related were not reported. The price year was not reported.

Source of effectiveness data
The effectiveness data were derived from a single study.
Link between effectiveness and cost data
The costing was undertaken prospectively on the same patient sample as that used in the effectiveness study.

Study sample
It was unclear whether the sample size was determined in the planning phase to assure a certain power. The authors did not report whether power calculations were performed retrospectively. A total of 50 consecutive patients were allocated to undergo UKA. During the same period, 50 patients were matched to the intervention group and were allocated to receive TKA. The mean age of the patients was 65.1 years (range: 54 - 80) in the UKA group and 65.5 years (range: 55 - 80) in the TKA group. The UKA group comprised 8 males and 42 females, while the TKA group had 6 males and 44 females.

Study design
This was a prospective cohort study that was carried out at a single centre. The patient groups were followed for 6 months. However, the authors did not report the loss to follow-up for any of the two groups.

Analysis of effectiveness
All of the patients included in the study were accounted for in the analysis. The outcomes used were:

the mean operating time;
the days required for independent ambulation;
the time to achieve 90 degree flexion;
hospital stay;
total postoperative drainage;
the fall in postoperative haemoglobin;
the mean preoperative range of motion; and
the mean flexion achieved at 6 months.

Progress in rehabilitation was monitored by the average time taken by the patient to achieve 90 degrees flexion, as well as to ambulate independently and without assistant by the therapist. The patients were evaluated at 6 months to compare the range of motion achieved. The groups were matched in terms of age, preoperative range of motion and radiological severity of arthritis and deformity, and were shown to be comparable.

Effectiveness results
The mean operating times between both groups were similar, with 90 (+/- 24) minutes for UKA and 87 (+/- 22) minutes for TKA, (p=0.40).

The total postoperative drainage was significantly less with UKA (203 +/- 131 mL) than with TKA (333 +/- 229 mL), (p<0.01).

Whilst preoperative haemoglobin was similar for both groups, patients in the UKA group had a higher postoperative haemoglobin (11.5 g/dl) than those in the TKA group (10.5 g/dL), (p=0.01).

Patients with UKA enjoyed a quicker rehabilitation and ambulated independently earlier at an average of 2.1 (+/- 0.8) days after the operation, compared with 5.4 (+/- 2.2) days for those with TKA, (p<0.01).
Patients in the UKA group achieved a flexion of 90 degrees after 3.6 (+/- 1.1) days in contrast to the 6.9 (+/- 2.5) days required by those in the TKA group, (p<0.01).

Patients in the UKA group also had a shorter hospitalisation (5.9 +/- 1.5 days) than those in the TKA group (9.4 +/- 3.0 days), (p<0.01).

At 6 months, patients with UKA had a greater range of motion (122 +/- 14 degrees) than the TKA group (108 +/- 17 degrees), (p<0.01).

Clinical conclusions
The authors concluded that, despite the study only reflecting on early results at 6 months, many of the potential benefits of UKA were realised during this period.

Measure of benefits used in the economic analysis
The authors did not derive a measure of health benefit. The analysis was therefore categorised as a cost-consequences study.

Direct costs
The costs and resource use were not reported separately. The direct costs included were those to the third-party payer as they reflected hospital bills. Amongst the costs included in the analysis were implant costs and hospitalisation stay. However, the authors did not report all the remaining costs included. It appears that these costs have been derived from hospital bills in the hospital where this study was undertaken. Discounting was not relevant, as all the costs were incurred within a short time, and hence was not performed. The study reported the average costs. The price year was not reported.

Statistical analysis of costs
The costs were treated stochastically, with average costs for the two groups being compared using a t-test.

Indirect Costs
The indirect costs were not included.

Currency
Singapore dollars (S$).

Sensitivity analysis
No sensitivity analyses were performed.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The average bill was S$8,700 for a patient with UKA versus S$12,000 for a patient with TKA, (p<0.01).

Synthesis of costs and benefits
The costs and benefits were not combined.
Authors' conclusions
Minimally invasive unicompartmental knee arthroplasty (UKA) was a relatively more cost-effective procedure than total knee arthroplasty (TKA).

CRD COMMENTARY - Selection of comparators
A justification was given for using TKA as the comparator. It was a proven procedure for the treatment of advanced knee arthrosis.

Validity of estimate of measure of effectiveness
The study was based on a prospective cohort study. However, even though this study design was appropriate for the study question, it would have been more appropriate for the authors to have conducted a randomised controlled trial. Despite this, the patients were well matched and were shown to be comparable in terms of age, gender and prognostic features. The study sample appears to have been representative of the study population. The authors conducted an appropriate statistical analysis to test whether differences observed between the two groups were statistically significant.

Validity of estimate of measure of benefit
The authors did not derive a measure of health benefit. The analysis was therefore categorised as a cost-consequences study.

Validity of estimate of costs
The authors provided very few details about the costing methodology. Consequently, it is not possible to state whether all the categories of cost relevant to the perspective adopted, and cost items, were included in the analysis. This will hamper the generalisability of the results. It would appear that the costs (in this case average hospital bills) were derived from the authors' setting. Differences in costs between the two groups were appropriately tested for statistical significance. The costs were, appropriately, not discounted since all the costs were incurred within a short time. Charges (i.e. hospital bills) were used to proxy costs, which might not reflect the true cost of both operations. The price year was not reported, which will hamper any possible inflation exercises.

Other issues
The authors made appropriate comparisons of their findings with those from other studies, published in the 1990s, that had found similar results to this one. The issue of generalisability to other settings was not addressed. The authors do not appear to have presented their results selectively and their conclusions reflected the scope of the analysis. The authors reported no limitations to their study.

Implications of the study
The authors made no recommendations in their study. However, they appeared to suggest that, in eligible populations, minimally invasive UKA should be considered over TKA.

Source of funding
None stated.

Bibliographic details
Other publications of related interest
Robertsson O, Borgquist L, Knutson K, et al. Use of unicompartmental instead of tricompartmental protheses for

Levine WN, Ozuna RM, Scott RD, et al. Conversion of failed modern unicompartmental arthroplasty to total knee

Laurencin CT, Zelicof SB, Costt RD, et al. Unicompartmental versus total knee arthroplasty in the same patient: a

Indexing Status
Subject indexing assigned by NLM

MeSH
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