Optimal method of urgent decompression of the collecting system for obstruction and infection due to ureteral calculi


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
Percutaneous nephrostomy and retrograde ureteral catheterization for renal drainage in cases of obstruction and infection associated with ureteral calculi.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Male and female patients presenting with obstructing ureteral calculi and clinical signs of infection.

Setting
Hospital. The economic study was carried out in the USA.

Dates to which data relate
The main effectiveness data were derived from a single trial conducted between May 1995 and October 1997. Resource and cost data were taken from 1995-97 sources. The price year was not stated.

Source of effectiveness data
The estimates of the number of positive urine cultures obtained at drainage, time to treatment, length of case, fluoroscopy time, time to normal white blood count (WBC), time to normal temperature, time to normal temperature and WBC, length of stay and treatment failure were derived from a single study.

Link between effectiveness and cost data
The costing was undertaken retrospectively on the same patient sample as that used in the effectiveness study.

Study sample
Overall, 42 patients (mean age: 41.3 +/- 13.6 years, 18:24 male-to-female ratio) were randomised to receive percutaneous nephrostomy (n=21, mean age: 41.3 +/- 13 years, 8:13 male-to-female ratio) or retrograde ureteral catheterization (n=21, mean age: 41.3 +/- 14.5 years, 10:11 male-to-female ratio). Sample size was determined based on the assumption that a difference of 1 day in time to normalisation of WBC and temperature would represent a clinically and economically significant difference between groups. Assuming a standard deviation of 1 day, a desired power of 80% and alpha of 0.05, sample size calculation yielded a necessary sample size of 17 patients per group.
Study design
Case-control study. The duration of follow-up was not stated. There was no loss to follow-up.

Analysis of effectiveness
The analysis of the clinical study was based on treatment completers only. The primary health outcomes were the number of positive urine cultures obtained at drainage, time to treatment, length of case, fluoroscopy time, time to normal white blood count (WBC), time to normal temperature, time to normal temperature and WBC, time of stay and treatment failure. The two groups were comparable in terms of patient, stone and clinical characteristics. However, a greater proportion of urine cultures were positive in the percutaneous nephrostomy group compared with retrograde ureteral catheterization group.

Effectiveness results
Results for the percutaneous nephrostomy group and the retrograde ureteral catheterization group were as follows:

Positive urine cultures obtained at drainage, 62.9% and 19.1%, (p=0.01);
time to treatment, 3.4 (+/- 2.4) hours and 4.2 (+/- 3.5) hours, (p<0.05);
length of case, 49.2 (+/- 37.6) minutes and 32.7 (+/- 20.5) minutes, (p<0.05);
fluoroscopy time, 7.7 (+/- 4.8) minutes and 5.1 (+/- 3.3) minutes;
times to normal WBC and temperature, 2.6 (+/- 1.4) days and 2.4 +/-2 days;
times to normal WBC, 2.0 (+/- 1.2) days and 1.7 (+/- 0.8) days;
times to normal temperature, 2.3 (+/- 1.5) days and 2.6 (+/- 2.1);
length of stay, 4.5 (+/- 3.7) days and 3.2 (+/- 2.8) days.

One treatment failure occurred in the percutaneous nephrostomy group.

Clinical conclusions
Percutaneous nephrostomy and retrograde ureteral catheterization effectively relieve obstruction and infection due to ureteral calculi. Neither modality demonstrated superiority in promoting a more rapid recovery after drainage.

Measure of benefits used in the economic analysis
No summary benefit measure was used in the analysis and as such the benefits are considered to be the same as the outcome measures.

Direct costs
Retrograde ureteral catheterization and percutaneous nephrostomy costs were included in the analysis. The cost of each procedure was calculated based on cumulative costs at the participating hospital where the majority of the patients were recruited. Operating room costs were based on mean procedural time for each group. Supply charges assumed use of routine disposable items. In the retrograde ureteral catheterization group the cost was calculated assuming general anaesthesia, which was used in the majority (62%) of this group). Quantities were reported separately from the prices. The quantity/cost boundary adopted was the hospital. Discounting was not undertaken due to the short study period. The price year was not stated.
Statistical analysis of costs
Not undertaken.

Indirect Costs
Not considered.

Currency
US dollars ($).

Sensitivity analysis
Not undertaken.

Estimated benefits used in the economic analysis
The benefits were as recorded in the Effectiveness Results field above.

Cost results
The total charges were $2,401.33 in the percutaneous nephrostomy group and $1,137.01 in the retrograde ureteral catheterization group.

Synthesis of costs and benefits
Costs and benefits were not combined.

Authors’ conclusions
The study showed no difference in clinical efficacy, availability or patient preference between percutaneous nephrostomy and retrograde ureteral catheterization for drainage of the obstructed, infected system. However, percutaneous nephrostomy was less costly than retrograde ureteral catheterization. The decision on which mode of drainage to use may be based on logistical factors, surgeon preference and stone characteristics.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator is clear. The efficacy of percutaneous nephrostomy and retrograde ureteral catheterization in decompressing the collecting system have made both alternatives attractive. The optimal method of decompression, however, is still controversial. You, as a user of this database, should consider whether these are widely used health technologies in your own setting.

Validity of estimate of measure of benefit
No ummary benefit measure was used in the analysis and as such the authors conducted a cost and outcomes study. However, as noted by the authors, the sample sizes of the two groups were too small for accurate comparison in terms of difference in time to clinical improvement with positive cultures (data not shown). The data have not been used selectively but a full economic evaluation using one benefit measure, if feasible, would assure greater validity in terms of the strength of the economic evaluation.

Validity of estimate of costs
Resources and quantities were reported separately from the prices. Adequate details of methods of quantity/cost estimation were given and important cost items do not appear to have been omitted. However, no statistical analysis was conducted. As the study was retrospective, the costs need to be treated with a degree of caution.

Other issues
The authors' conclusions are likely to be justified given the uncertainties in the data. As noted by the authors, some community hospitals lack ready access to an interventional radiologist. In this circumstance retrograde ureteral catheterization may be the only reasonable option. Level 1 trauma centre, percutaneous nephrostomy is often more expedient than retrograde ureteral catheterization because of limited access to an open operating room. Appropriate comparisons with other studies supporting the clinical results from the present investigation were reported in the study. Results do not appear to have been presented selectively.

**Implications of the study**
Further research is required by using positive culture itself as a criterion for enrolment in the study.

**Source of funding**
None stated.

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