Outcomes of stenting after uncomplicated ureteroscopy: systematic review and meta-analysis

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CRD summary
This well-conducted review concluded that the use of stenting following uncomplicated ureteroscopy is associated with higher morbidity. However, the considerable diversity and poor reporting of the included studies mean that the role of stenting in the management of patients after uncomplicated ureteroscopy remains unclear. These suitably cautious conclusions are supported by the evidence presented.

Authors' objectives
To determine whether the outcome of routine ureteric stent placement following uncomplicated ureteroscopy is inferior to that without stent replacement.

Searching
The Cochrane Renal Group's Specialised Register, the Cochrane CENTRAL Register (Issue 2, 2006), MEDLINE and PREMEDLINE (1966 to 2006), and EMBASE (1980 to 2006) were searched without any language restrictions. The authors also searched reference lists of urology textbooks, reviews and relevant trials, and abstracts of conference proceedings.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion.

Specific interventions included in the review
Studies that compared stenting with no stenting following uncomplicated ureteroscopy were eligible for inclusion. The size of the stents varied from 6 to 7 French gauge, where reported; most trials using semirigid or rigid ureteroscopes ranging from 6.0 to 9.5 French gauge. Different sources of intracorporeal lithotripsy were used as for fragmentation of large calculi.

Participants included in the review
Studies of adults with a clinical diagnosis of ureteric stone requiring intervention, or undergoing diagnostic or therapeutic uroscopy for upper tract transitional cell carcinoma, were eligible for inclusion. The majority of the studies included patients irrespective of stone location; others only included patients with stones in the lower ureter. The length of hospital stay ranged from a few hours as an out-patient to 2 or 3 days.

Outcomes assessed in the review
The studies had to report one of the following: patient-rated pain using a validated scale; need for analgesia; lower urinary tract symptoms; unplanned medical visits or hospital admission; complications related to stent; return to normal physical activities; participant satisfaction; health economics or health-related quality of life.

How were decisions on the relevance of primary studies made?
Two independent reviewers assessed trials for inclusion.

Assessment of study quality
The validity checklist of the Cochrane Renal group was used to assess concealment of allocation, intention-to-treat analysis, completeness of follow-up, and blinding of the investigators, participants and outcome. Two independent reviewers assessed validity, with any discrepancies resolved by discussion or by consulting a third reviewer.
Data extraction

Two independent reviewers extracted the data from the included studies. They extracted data for the calculation of a relative risk (RR) with 95% confidence interval (CI) for binary outcomes, or a mean difference for continuous outcomes. If important data were missing, the authors of the primary studies were contacted for further information.

Methods of synthesis

How were the studies combined?

A pooled RR or weighted mean difference with 95% CI was calculated when two or more studies reported on the same outcome.

A Mantel-Haenszel fixed-effect model was used in the absence of substantial heterogeneity, otherwise a DerSimonian and Laird random-effects model was used. Studies that could not be combined using meta-analysis were combined narratively.

How were differences between studies investigated?

Cochran's test (significance threshold of p<0.1) and the I-squared statistic were used to assess statistical heterogeneity. Potential sources of heterogeneity (participants, treatments and study quality) were explored.

Results of the review

Nine RCTs (n=831) were included.

The overall quality of the included studies was poor, although this was partly due to poor reporting. Most of the included studies had a small sample size. The authors also noted the absence of a standardised definition of uncomplicated ureteroscopy, outcome measures, and length and duration of stenting.

Patient outcomes.

Stenting was associated with a statistically significantly greater risk of urinary frequency or urgency (RR 2.0, 95% CI: 1.11, 3.62, p=0.02; based on 257 patients in 4 studies) and dysuria (RR 2.25 95% CI: 1.14, 4.43, p=0.02; based on 255 patients in 4 studies).

A further 3 studies showed that stents were associated with a greater risk of lower urinary tract symptoms.

No significant difference was shown in risk of haematuria (RR 2.18, 95% CI: 0.72, 6.61, p=0.17; based on 207 patients in 3 studies), urinary tract infections (RR 1.09, 95% CI: 0.48, 2.47, p=0.84; based on 210 patients in 3 studies), use of analgesia (RR 1.03, 95% CI: 0.73, 1.47; based on 2 studies; another 2 studies that were unsuitable for meta-analysis also showed no difference in use of analgesia), or unplanned medical visits or admissions to hospitals (RR 0.53, 95% CI: 0.17, 1.60, p=0.26; based on 485 patients in 7 studies).

Five studies assessed pain scores that were measured at different time points following the procedure: immediate pain (within or at 3 days of procedure), delayed pain (7 days post-procedure), and pain at 2 or 12 weeks post-procedure. There was evidence of substantial heterogeneity, with studies reporting conflicting results even amongst those assessing pain at similar time points.

Efficacy outcomes (6 studies).

No difference was shown between stenting and non stenting in the proportion of participants developing strictures, or stone-free rates (data not shown).

Health-related quality of life. None of the included studies reported on health-related quality of life.

Cost information

Three studies reported on cost per patient with or without stenting. The main cost was operation time, which was longer
in patients receiving stents during ureteroscopy. No studies reported on the cost-effectiveness of this intervention.

**Authors' conclusions**
Patients with stents placed following ureteroscopy had significantly higher morbidity than those without stent placement. Considerable heterogeneity and poor quality of reporting mean that the use of stents in the management of patients after uncomplicated ureteroscopy remains unclear.

**CRD commentary**
The review addressed a clear research question and the inclusion criteria seemed appropriate. Several relevant sources were used to identify potential studies, and there were searches for unpublished and non-English language publications. Methods were used to minimise bias in the study selection, data extraction and validity assessment processes. The validity of the included studies was assessed using appropriate criteria, and the results of this assessment were reported clearly and considered in the interpretation of the results.

The decision to statistically combine studies only when two or more studies reported the same outcome was appropriate. However, a limitation in the reporting of this review was that there were no details of the individual results of the studies included in the narrative synthesis. The authors provided a useful discussion of the limitations of research in this field, including issues with definitions, performance and reporting of included studies. Overall, this was a well-conducted systematic review. The conclusions can be considered reliable and used as a benchmark for future research.

**Implications of the review for practice and research**
Practice: The authors stated that any implications for practice would be potentially flawed, owing to a lack of standardisation of outcome measures, considerable clinical heterogeneity, withdrawals after randomisation, imprecise outcome measurement and poor reporting of clinical trials.

Research: The authors stated that higher quality and more rigorous RCTs are needed. These trials need to use standardised outcome measures, should be multi-centred, and should be protocol driven. Furthermore, patient-assessed outcomes and health economic outcomes should be used. Variations in stent design, size and material, and the effect of different types of intracorporeal lithotripsy sources on the requirement of stents need examination.

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