Alternative approaches to endoscopic ablation for benign enlargement of the prostate: systematic review of randomised controlled trials
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CRD summary
This review investigated the safety and efficacy of several newer methods of prostatic ablation for benign prostatic hypertrophy, compared with transurethral resection. There were encouraging results for holmium laser enucleation, but the review was limited by low-quality studies. Given this, and only weak statistical evidence of a primary analysis, the reliability of the review's results is questionable.

Authors' objectives
To assess the effectiveness of and risks associated with newer methods of endoscopic prostatic ablation compared with standard transurethral resection for benign prostatic hypertrophy.

Searching
MEDLINE (from 1966), EMBASE (from 1980), MEDLINE In-Process and Other Non-Indexed Citations (September 2006), BIOSIS Previews (from 1985), Science Citation Index (from 1985), ISI Proceedings (from 1990), the Cochrane Controlled Trials Register, the Cochrane Database of Systematic Reviews, DARE, HTA, National Research Register, Clinical Trials and Current Controlled Trials were searched up to 2006. Conference proceedings of three recent meetings of relevant professional bodies were handsearched, and the bibliographies of identified studies were screened. No language restrictions were applied. Details of the search strategy were not given in the paper, but are available from the authors.

Study selection
Randomised controlled trials (RCTs) including men with a clinical diagnosis of benign prostatic hypertrophy were eligible for inclusion. In the included studies, where stated, the mean age ranged from approximately 60 to 73 years, urine flow (Qmax mL/second) from 4.5 to 12.2, residual volume from 4 to 350 mL and prostate size from 22 to 78 mL.

Inclusion criteria for the intervention were ablative endoscopic treatments that removed tissue immediately (e.g. resection or vaporisation). Only studies in which the control arm was transurethral resection of the prostate were eligible for inclusion. Studies of procedures that caused delayed tissue necrosis (e.g. microwave or radiofrequency therapy), or treatments not involving tissue removal (e.g. transurethral incision), or those in which the control arm was conservative management, were not eligible for inclusion. In the included studies, the interventions were holmium laser enucleation, laser vaporisation, transurethral vaporesection, transurethral vaporisation, bipolar transurethral resection and bipolar transurethral vapopresection.

Studies that reported the change in symptom score 12 months after surgery were eligible for inclusion. Symptom score was measured using either the international prostate symptom score or the American Urological Association symptom index. The baseline symptom score in the included studies ranged from 13.7 to 29.6, where stated. The secondary outcomes were peak urine flow rate, quality of life, blood transfusion, urinary retention, bladder neck stenosis or urethral stricture, incontinence, urinary tract infection, sexual dysfunction, duration of operation, length of hospital stay and reoperation.

Two authors independently assessed studies for relevance, but the authors did not state how any disagreements were resolved.

Assessment of study quality
The criteria used for the validity assessment were not explicitly stated but were based on several published quality scales (e.g. NHS Centre for Reviews and Dissemination and the Delphi List).
Two authors independently assessed the validity of the studies.

**Data extraction**
Two authors independently extracted the data. Where disagreements could not be resolved through discussion, a third reviewer made the decision.

**Methods of synthesis**
The studies were combined in a random-effects meta-analysis. Pooled relative risks (RRs) were calculated for dichotomous outcomes using the Mantel-Haenszel method, while weighted mean differences (WMDs) were calculated for continuous outcomes using the inverse variance method. Statistical heterogeneity was investigated using $\chi^2$ and $I^2$ statistics.

**Results of the review**
The review included 45 trials, all of which were judged as moderate or poor quality. Only 3 studies performed an appropriate intention-to-treat analysis.

The meta-analysis was based on 47 comparisons (3,970 participants).

There were no significant differences in change in symptom score for any intervention.

Holmium laser enucleation was associated with larger changes in peak urine flow rate at 12 months compared with transurethral resection of the prostate (WMD 1.48 mL/second, 95% confidence interval, CI: 0.58, 2.40, $p=0.002$). There was no significant difference in change in flow rate for any of the other interventions.

There was no difference in quality of life between any of the interventions and transurethral resection of the prostate, although this result was based on few studies and low statistical power.

Compared with transurethral resection of the prostate, there were lower rates of blood transfusion after holmium laser enucleation (RR 0.27, 95% CI: 0.07, 0.95, $p=0.04$), laser vaporisation (RR 0.14, 95% CI: 0.05, 0.42, $p=0.004$) and transurethral vaporisation (RR 0.18, 95% CI: 0.07, 0.46, $p<0.001$).

The risk of urinary retention requiring recatheterisation was higher after laser vaporisation (RR 2.89, 95% CI: 1.55, 5.42, $p<0.001$) and transurethral vaporisation (RR 3.10, 95% CI: 1.53, 6.29, $p=0.002$), than after transurethral resection of the prostate. There were no differences in risk between holmium laser enucleation or bipolar transurethral resection and transurethral resection of the prostate. There were insufficient data on transurethral vaporisation for analysis.

Strictures were less common after laser vaporisation than after transurethral resection of the prostate (RR 0.54, 95% CI: 0.32, 0.90, $p=0.02$). There were no differences in risk between any of the other interventions and transurethral resection of the prostate.

Laser vaporisation was associated with a higher risk of incontinence than transurethral resection of the prostate, but this effect was driven by one study (RR 2.24, 95% CI: 1.03, 4.88, $p=0.04$) and the type of incontinence was not described. There was no significant difference in risk for any of the other interventions.

There was no significant difference in risk of urinary tract infection when comparing any of the interventions with transurethral resection of the prostate.

Laser vaporisation (RR 0.22, 95% CI: 0.13, 0.39, $p<0.001$) and transurethral vaporisation (RR 0.78, 95% CI: 0.64, 0.95, $p<0.01$) were both associated with a reduced risk of loss of ejaculation compared with transurethral resection of the prostate. Laser vaporisation (RR 8.89, 95% CI: 1.29, 61.37, $p=0.03$) was associated with a higher risk of erectile dysfunction compared with transurethral resection of the prostate. None of the other interventions were associated with an altered risk of sexual function.

In terms of duration of the operation, holmium laser enucleation took an average of 17 minutes longer (95% CI: 13.45, 20.47, $p<0.001$) to perform than transurethral resection of the prostate.
Length of hospital stay was significantly shorter for each intervention than for transurethral resection of the prostate, by between 0.5 and 1.5 days.

Reoperation was more likely after laser vaporisation than after transurethral resection (RR 1.68, 95% CI: 1.03, 2.74, p=0.004).

**Authors' conclusions**
The newer ablative interventions studied in the review were equally as effective as transurethral resection of the prostate, and some had fewer adverse effects. In particular, holmium laser enucleation appears a promising alternative to transurethral resection of the prostate but needs further evaluation.

**CRD commentary**
The review question was stated clearly, and study design, participant, intervention and outcome criteria were all stated. Although the search strategy was not given in the review, the search appears comprehensive and it is therefore unlikely that any papers were missed. The authors made efforts to reduce the possibility of error and bias in the review through duplicate assessment of relevance and validity and duplicate data extraction. The meta-analysis was an appropriate method of synthesis. Where the data were too sparse for a meta-analysis, the authors pointed this out.

The results of the review were compromised by the poor quality of the included studies, but the authors' conclusions are suitably conservative in view of this. One of the primary analyses on which the authors based their conclusions (the beneficial effect of holmium laser enucleation on symptom score) did not reach statistical significance (p<0.05). The reliability of the conclusions is therefore unclear.

**Implications of the review for practice and research**
Practice: In the absence of a more effective procedure, transurethral resection of the prostate should remain the standard approach of treatment for men with benign prostatic hypertrophy.

Research: Further high-quality, rigorous RCTs, with clearly defined outcomes, interventions and timing of outcome measurement, are required. Reasons for reoperation should be stated clearly.

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**Other publications of related interest**


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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.