The effect of shock wave rate on the outcome of shock wave lithotripsy: a meta-analysis
Semins M J, Trock B J, Matlaga B R

CRD summary
The authors concluded that shock wave lithotripsy performed with a treatment rate of 60 shocks per minute was more successful than a treatment rate of 120 shocks per minute. Given concerns about the review methods and quality of the data, as well as the small number and size of the included studies, the review conclusions may not be reliable.

Authors' objectives
To investigate the effect of the rate of shock wave delivery on the outcome of shock wave lithotripsy (SWL).

Searching
MEDLINE and EMBASE were searched for English language publications up to April 2007; search terms were reported.

Study selection
Randomised controlled trials (RCTs) that compared SWL treatment at 60 shocks per minute (1 Hertz) to 120 shocks per minute (2 Hertz) were eligible for inclusion. Studies had to report treatment success or failure (as defined by the authors of the primary studies). In the included studies, success rate was defined as the proportion of patients with fragment sizes from less than 2 mm up to less than 5 mm at 10 days to three months after treatment. Eligible studies did not have to record the true stone-free rate. The methods used to evaluate outcomes varied across studies.

The authors did not specify inclusion criteria for participants. Participants with single radiopaque renal and/or ureteral stones with a mean range of 13.2 mm (longest axis) to 84.4 mm² (surface area) were included in the review. The mean age of the participants varied from 42 to 50 years.

The authors stated neither how the papers were selected for review nor how many reviewers performed the selection.

Assessment of study quality
The authors did not report carrying out a validity assessment. They reported the method of randomisation and whether sample size calculations were reported.

Data extraction
The definition used determine success in each study was recorded. Percentage success rates were extracted for each study and risk differences with 95% confidence intervals (CIs) were reported. Two reviewers independently extracted data for the review, with any disagreements resolved by discussion.

Methods of synthesis
Pooled risk differences with 95% CIs were calculated using the Mantel-Haenszel fixed-effect method. Heterogeneity was assessed using Cochran's Q and the I² statistic. For studies with a I² greater than 50 per cent, the data were pooled using a random-effects model. Publication bias was assessed using a funnel plot and Egger's regression method.

Results of the review
Four RCTs (n=589) were included in the review.

Only one study described the method of randomisation. Two studies reported sample size calculations. No other information was reported.

Participants treated with a rate of 60 shocks per minute demonstrated a statistically improved treatment outcome compared to participants treated with 120 shocks per minute (four trials; RD -0.10, 95% CI -0.17, -0.04, p=0.002). There was no statistical heterogeneity between the studies and no publication bias.
**Authors' conclusions**

SWL performed with a treatment rate of 60 shocks per minute was more successful than a treatment rate of 120 shocks per minute.

**CRD commentary**

The inclusion criteria were clear for intervention and study design, and broadly defined for participants and outcomes. The authors searched two databases, but there was no attempt to identify unpublished studies. The authors attempted to assess publication bias using two validated techniques, however, only four studies were included in the review, so these tests were unlikely to be reliable. In addition, the search was restricted to English language publications, which may have introduced language bias. Two reviewers were reported to have been involved in some aspects of the review process, thus limiting some reviewer bias. The authors did not report carrying out a validity assessment, however, two relevant aspects of study design were reported. The clinical differences between studies, particularly in treatment protocols, suggested that the pooled data may not be reliable. Given concerns about the review methods and quality of the data, as well as the small number and size of the included studies, the review conclusions may not be reliable.

**Implications of the review for practice and research**

Practice: The authors did not state any implications for practice.

Research: The authors stated that further studies should focus on defining the effect of a slower treatment rate on tissue injury caused by SWL and determine other factors that may be altered to improve the effect of treatment.

**Funding**

Not stated.

**Bibliographic details**


**PubMedID**

18001796

**DOI**

10.1016/j.juro.2007.08.173

**Indexing Status**

Subject indexing assigned by NLM

**MeSH**

Humans; Kidney Calculi /therapy; Lithotripsy /methods; Time Factors; Treatment Outcome; Ureteral Calculi /therapy

**AccessionNumber**

12008000155

**Date bibliographic record published**

01/09/2008

**Date abstract record published**

20/05/2009

**Record Status**

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.