Systematic review and meta-analysis of percutaneous nephrolithotomy for patients in the supine versus prone position
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CRD summary
The authors concluded that kidney stone removal by keyhole surgery (percutaneous nephrolithotomy) worked as well and safely on people lying face up (supine position) and those lying face down (prone); there was no strong evidence for either position. Although there were potential gaps in the literature search, the review was well conducted and the conclusions are likely to be reliable.

Authors' objectives
To assess the safety and efficacy of percutaneous nephrolithotomy for patients in the supine versus prone position.

Searching
MEDLINE, EMBASE, and Cochrane Central Register of Controlled Trials (CENTRAL) were searched with no language restrictions. Search terms were reported, but search dates were not. Reference lists of identified studies, reviews, and other publications were handsearched.

Study selection
Randomised controlled trials (RCTs), quasi-RCTs, case-control studies and cohort studies that compared the efficacy and safety of percutaneous nephrolithotomy for patients in the supine and prone position were eligible for inclusion. The primary outcome of interest was the stone-free rate. Secondary outcomes were operative time, complications, transfusion rates, and fever rates. Outcomes were defined in the paper.

The included patients had a mean age range from 38 to 54 years. Stone burden in the supine and prone position was reported. Definitions of supine position and operative time varied.

It appeared that two reviewers independently carried out the study selection.

Assessment of study quality
The quality of RCTs was assessed using the Cochrane Collaboration risk of bias tool (covering sequence generation, allocation concealment, blinding, incomplete outcome data, selective reporting of outcomes, and other sources of bias). Other studies were assessed using a modified version of the Newcastle-Ottawa Scale. Studies were scored out of 9 points, with 5 to 9 points representing high quality and fewer than 5 points representing low quality.

Two reviewers independently assessed study quality. Disagreements were resolved with the involvement of a third reviewer.

Data extraction
Data were extracted by two reviewers to calculate odds ratios (ORs), or mean differences (MDs) and 95% confidence intervals (CIs). Authors were contacted for missing data. In the event this was not available, missing data were imputed.

Methods of synthesis
Summary odds ratios, weighted mean differences (WMDs), and 95% confidence intervals were estimated in a fixed-effect or random-effects meta-analysis. The latter was used in the presence of heterogeneity, which was assessed using $\chi^2$ and $I^2$ statistics. $I^2$ values of 25%, 50% and 75% were defined by the authors as low, medium, and high heterogeneity.

Subgroup analysis was carried out according to study design. Sensitivity analysis was conducted to explore the influence of low quality studies.

Publication bias was assessed with a funnel plot.
**Results of the review**

Two RCTs (155 patients) and two case-control studies (n=234 patients) were included in the review. The RCTs and one case-control study were deemed to be high quality, although lack of allocation concealment and blinding were features of the RCTs.

A statistically significant shorter operative time for percutaneous nephrolithotomy in the supine position was reported in three studies (MD -24.84 minutes, 95% CI -34.45 to -15.23; $I^2=57\%$). There were no statistically significant differences between supine and prone position on any of the other outcomes (stone-free rate, complications, transfusion rate, and fever rates).

Sub-group and sensitivity analyses did not alter the main results.

**Authors' conclusions**

Percutaneous nephrolithotomy in the supine position was as effective and safe as percutaneous nephrolithotomy in the prone position. There was no overwhelming evidence to suggest which was superior.

**CRD commentary**

The review question was clear and was supported by potentially replicable inclusion criteria. The search strategy included relevant data sources and attempts were made to minimise language bias. The search dates were not stated, which made it difficult to interpret whether searching was up-to-date; there was no apparent search for unpublished material. The potential for publication bias was unclear as the results of the reported assessment were not presented. The review process was conducted with efforts to minimise error and bias

Appropriate quality assessment criteria were applied to the included studies. Study details were sparse for patients and intervention characteristics, which made it difficult to interpret the generalisability of findings. It appeared there might have been some confusion in the reported design of included studies. The authors stated that these were case-control but, based on the available information, it appeared more likely that they were cohort studies as they had groups of patients with percutaneous nephrolithotomy in the supine and prone positions, rather than selecting groups of patients based on outcome. The authors acknowledged that the evidence base was limited.

Although there were potential gaps in the search, the review was largely well conducted and the authors’ conclusions are likely to be reliable.

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

Practice: The authors stated that percutaneous nephrolithotomy was an alternative option for the removal of renal calculi in percutaneous nephrolithotomy.

Research: The authors stated that large-scale multicentre RCTs were needed to enable a robust conclusion.

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