Comparison of peri-operative outcomes of robot-assisted vs laparoscopic partial nephrectomy: a meta-analysis

CRD summary
This review found that robot-assisted partial nephrectomy had equivalent perioperative outcomes to laparoscopic partial nephrectomy, but with a significantly shorter warm ischaemia time. This conclusion is probably reliable, but some uncertainty remains because the results were not from randomised controlled trials.

Authors' objectives
To compare the perioperative outcomes of robot-assisted partial nephrectomy versus laparoscopic partial nephrectomy.

Searching
MEDLINE, EMBASE, The Cochrane library, and the Internet using Google Scholar, were searched in January 2013, for studies published in English. Reference lists were searched, and search terms were presented.

Study selection
Randomised controlled trials or retrospective observational studies, comparing robot-assisted with laparoscopic partial nephrectomy, were eligible. Studies had to state whether transperitoneal or retroperitoneal techniques were used. Studies including only children, only benign lesions, only tumours in a solitary kidney, only complex renal tumours, or patients previously treated with nephron-sparing surgery, were excluded. The outcomes considered included: operating time, warm ischaemia time, blood loss, length of hospital stay, conversion rates, positive surgical margins, and complications.

The included studies were conducted in the USA, Korea, France or Turkey. Average patient age ranged from 50 to 63 years, and 39% of patients were women. Average tumour size ranged from 20 to 34mm and most tumours were of malignant pathology. All studies used a transperitoneal approach.

The number of reviewers who selected studies was not stated.

Assessment of study quality
No quality assessment was reported.

Data extraction
Two reviewers independently extracted the data. Means and standard deviations, for each outcome and each type of surgery, were extracted for continuous outcomes. The numbers of events were extracted for dichotomous outcomes. Authors were contacted where data were unavailable or unclear; if these data were not provided, the study was excluded.

Methods of synthesis
Meta-analyses were performed to calculate the summary mean difference, for continuous outcomes, and odds ratio, for dichotomous outcomes, each with 95% confidence interval. Heterogeneity was assessed using Cochran's Q and I². Random-effects analyses were used where heterogeneity was high (apparently I²>50%); otherwise fixed-effect analyses were used.

A sensitivity analysis removing studies with few patients was performed. Meta-analyses were used to test for differences in demographics (age, gender, laterality, pathology and tumour size) between the two treatments.

Results of the review
Seven studies were included, with 766 patients (range 27 to 265); all were retrospective cohort studies. Robot-assisted and laparoscopic patient groups were generally similar in age, gender, pathology and tumour size, across studies, but robot-assisted patients appeared more likely to have left laterality.
There was no statistically significant difference, between robot-assisted and laparoscopic partial nephrectomy, in operating time (MD -4.00 minutes, 95% CI -28.33 to 20.33; I²=91%). No statistically significant differences were found for conversion rate, estimated blood loss, positive margin, complications, and length of hospital stay. Heterogeneity (I²) was less than 50% in all these analyses, except for blood loss where I² was 77%.

Warm ischaemia time was statistically significantly shorter for robot-assisted partial nephrectomy (MD 3.65 minutes, 95% CI 0.83 to 6.46; I²=61%).

Removing the smaller studies in sensitivity analyses did not lead to any substantial differences in the results.

Authors' conclusions
Robot-assisted partial nephrectomy had equivalent perioperative outcomes to laparoscopic partial nephrectomy, but with a significantly shorter warm ischaemia time.

CRD commentary
This review addressed a relevant research question, with apparently appropriate inclusion criteria. A suitable search was performed, but only studies published in English were considered, so some relevant studies may have been missed. Limited action was taken to avoid review error and bias.

No quality assessment of the studies was performed, so the quality of these studies is unclear. The authors did note that all were retrospective observational studies, which are more prone to bias than randomised controlled trials. The analysis found no evidence of differences between the types of patients receiving the different surgeries, except perhaps for tumour laterality. Studies were synthesised using suitable meta-analyses.

The results are likely to be reliable and the authors' conclusions are appropriate, but the results were not from randomised controlled trials, and the uncertain quality of the studies leaves some doubt over their reliability.

Implications of the review for practice and research
The authors made no recommendations for practice or research.

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