

INPLASY

Survival outcomes after robot-assisted versus open partial nephrectomy for resectable renal tumors: A systematic review of the literature and meta-analysis

INPLASY202450054

doi: 10.37766/inplasy2024.5.0054

Received: 12 May 2024

Published: 12 May 2024

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Formal screening of search results against eligibility criteria.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202450054

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 12 May 2024 and was last updated on 12 May 2024.

INTRODUCTION

Review question / Objective Partial nephrectomy (PN) has been broadly adopted as the treatment of choice for resectable renal masses (as a measure to optimize oncologic outcome and at the same time preserve as much of the renal function as possible). Open surgery has been traditionally the standard procedure for PN although minimal invasive surgery and robotic technology are promising alternative methods of treatment. There is a plethora of evidences that robotic partial nephrectomy (RPN) offers comparable or even better results compared with open technique in terms of perioperative mortality and complications, ischemia time, conversion to open surgery, hospital stay, blood transfusion and renal functional outcome. The long term oncologic results of RPN are yet to be determined though.

Aim of the present study is to conduct a Systematic Review and Metaanalysis to evaluate and analyze the risk of local recurrence, metastasis and death between patients who underwent open versus robotic procedure for resectable renal cell carcinoma.

Condition being studied During the last decades there is a shift of the surgical methods from open surgery to the minimal invasive treatment for resectable renal tumors mainly due to the favorable perioperative profile of the latter technique (laparoscopic or robotic). Laparoscopic surgery has proved to be safe and effective compared with the open procedure but also has some clear and well known limitations such as poor ergonomics, prolonged warm ischemia time and difficulties in instruments' manipulations. Robotic technology has overcome these limitations and previous comparative studies and/or SRMA have shown

that the perioperative safety profile of RPN is similar or even better from that of laparoscopic and open surgery. However, the oncologic outcomes of the RPN are yet to be determined by a head-to-head comparison with those of open procedure. The outcomes to be studied are: positive surgical margins, local recurrence free survival, distant/systematic metastasis free survival, disease (cancer) free specific survival and overall survival.

METHODS

Participant or population Patients with resectable renal malignancies treated exclusively with partial nephrectomy will be included in the SRMA. Methods of treatment will be either robotic surgery or open procedure. Patients underwent laparoscopic surgery or any form of minimal invasive surgery (not specified laparoscopic or robotic) will be excluded. Moreover, reports with a mean or median follow up less than 24 months will not be evaluated.

Intervention Robotic (assisted) partial nephrectomy (RPN) versus open partial nephrectomy (control).

Comparator Comparison of robotic versus the control (open surgery) in terms of oncologic outcomes.

Study designs to be included Comparative studies of open versus robotic partial nephrectomy will be evaluated. Papers reporting on oncologic outcomes (local recurrence free survival, distant/systematic metastasis free survival, disease-cancer-free specific survival and overall survival) will be considered for inclusion. Non comparative studies, abstracts of conferences (not full text publications), editorials, comments of previous publications and non-English literature will be excluded. Comparative studies of open versus robotic partial nephrectomy will be evaluated.

Eligibility criteria Adult patients (>18 years old) with organ confined renal mass, tumors of any size and any complexity (nephrometry) score.

Information sources PubMed/Medline and Scopus databases were searched with the use of the following terms: Renal Cancer, OR Renal Tumor, OR Renal Malignancy, OR kidney Tumor, OR Kidney Cancer, AND Partial Nephrectomy, OR Nephron Sparing, OR Organ Sparing AND Open, AND Robotic, OR Robot OR Robot Assisted. Additional hand search was performed based on the references of articles with similar content. In Publications will missing or incomplete data we will

attempt to come in contact with the corresponding authors requesting the missing or the raw data.

Main outcome(s) The main outcomes to be studied are : local recurrence free survival, distant/systematic metastasis free survival, disease/cancer free specific survival and overall survival.

Additional outcome(s) Positive surgical margins.

Quality assessment / Risk of bias analysis To the best of the authors' knowledge there is a paucity of relevant randomized controlled trials comparing open versus RPN. Therefore, the SRMA will be primarily based on retrospective cohort comparative studies with an inherent risk of bias. All these studies will be evaluated according to the Newcastle-Ottawa Scale for cohort and case-control studies. Only those with the higher score will be included in the metaanalysis.

Strategy of data synthesis Variability of the included studies will be evaluated with I² test and the thresholds of 25%, 50% & 75% will classify the heterogeneity as low, moderate and high. Random-effect and fixed effect models will be applied in case of the presence or absence of heterogeneity respectively. The results for the primary and secondary outcomes along with the relevant publications will be presented in forest-plot diagrams with the corresponding weighted-adjusted hazard ratio and 95% confidence intervals. Funnel plots will present the risk of publication bias.

Subgroup analysis If appropriate subgroup analysis will be conducted according to clinical stage and nephrometry score (tumor complexity).

Sensitivity analysis To avoid any disproportional influence of a single study to the results, the pooling and data extraction was performed after excluding the first study. Then the same analysis was performed after excluding the second study, then the third and so on. Should overlapping studies from the same center are encountered the one with the highest Newcastle-Ottawa score or the more recent one will be included. In case of similar scoring the analysis will be performed with the inclusion of the excluded study.

Language restriction Papers written in non-English language will be excluded.

Country(ies) involved Greece.

Keywords Renal, Cancer, Partial, Nephrectomy, Nephron-sparing, Oncologic, Outcomes.

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