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Review – Adrenal Glands

Robotic Versus Laparoscopic Adrenalectomy: A Systematic Review and Meta-analysis

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Abstract

Context: Over the last decade, robot-assisted adrenalectomy has been included in the surgical armamentarium for the management of adrenal masses.
Objective: To critically analyze the available evidence of studies comparing laparoscopic and robotic adrenalectomy.
Evidence acquisition: A systematic literature review was performed in August 2013 using PubMed, Scopus, and Web of Science electronic search engines. Article selection proceeded according to the search strategy based on Preferred Reporting Items for Systematic Reviews and Meta-analysis criteria.
Evidence synthesis: Nine studies were selected for the analysis including 600 patients who underwent minimally invasive adrenalectomy (277 robot assisted and 323 laparoscopic). Only one of the studies was a randomized clinical trial (RCT) but of low quality according to the Jadad scale. However, the methodological quality of included nonrandomized studies was relatively high. Body mass index was higher for the laparoscopic group (weighted mean difference [WMD]: −2.37; 95% confidence interval [CI], − 3.01 to −1.74; $p < 0.00001$). A transperitoneal approach was mostly used for both techniques (72.5% of robotic cases and 75.5% of laparoscopic cases; $p = 0.27$). There was no significant difference between the two groups in terms of conversion rate (odds ratio [OR]: 0.82; 95% CI, 0.39–1.75; $p = 0.61$) and operative time (WMD: 5.88; 95% CI, −6.02 to 17.79; $p = 0.33$). There was a significantly longer hospital stay in the conventional laparoscopic group (WMD: −0.43; 95% CI, −0.56 to −0.30; $p < 0.00001$), as well as a higher estimated blood loss (WMD: −18.21; 95% CI, −29.11 to −7.32; $p = 0.001$). There was also no statistically significant difference in terms of postoperative complication rate (OR: 0.04; 95% CI, −0.07 to −0.00; $p = 0.05$) between groups. Most of the postoperative complications were minor (80% for the robotic group and 68% for the conventional laparoscopic group). Limitations of the present analysis are the limited sample size and including only one low-quality RCT.
Conclusions: Robot-assisted adrenalectomy can be performed safely and effectively with operative time and conversion rates similar to laparoscopic adrenalectomy. In addition, it can provide potential advantages of a shorter hospital stay, less blood loss, and lower occurrence of postoperative complications. These findings seem to support the use of robotics for the minimally invasive surgical management of adrenal masses.

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1. Introduction

Laparoscopic adrenalectomy was first reported in 1992. Since then it has largely replaced the open approach as the standard of care for adrenal removal, given well-known advantages such as less postoperative pain, minor blood loss, and better cosmetic appearance [1]. Nevertheless, laparoscopy is recognized as associated with a steep learning curve [2]. In 1999, Piazza et al. [3] and Hubens et al. [4] described the first robotic adrenalectomy cases using the AESOP 2000, which was the commercially available robotic platform in Europe at that time.

With the introduction of the da Vinci system (Intuitive Surgical, Sunnyvale, CA, USA), several series of robotic adrenalectomy have been reported, showing the safety and feasibility of the procedure as well as potential advantages over laparoscopy, given the unique features of the currently available robotic system, such as three-dimensional vision and the EndoWrist technique [5].

Robotic surgery in urology has been mainly used to date for procedures involving reconstruction such as radical prostatectomy and partial nephrectomy, whereas its use for extirpative procedures such as nephrectomy and adrenalectomy has been limited, mainly because of cost issues [6].

The aim of this study was to review systematically the available evidence comparing the surgical outcomes of robot-assisted adrenalectomy with those of conventional laparoscopic adrenalectomy.

2. Evidence acquisition

2.1. Literature search and study selection

A systematic literature review was performed in August 2013 using the PubMed, Scopus, and Web of Science databases to identify relevant studies. Searches were restricted to publications in English. Two separate searches were done by applying a free-text protocol with the following search terms: *robotic adrenalectomy* and *robot-assisted adrenalectomy*.

Article selection proceeded according to the search strategy based on Preferred Reporting Items for Systematic Reviews and Meta-analysis criteria (www.prisma-statement.org) (Fig. 1). Only studies comparing robot-assisted and laparoscopic techniques were included for further screening. Cited references from the selected articles retrieved in the search were also assessed for significant papers. Conference abstracts were not included because they were not deemed to be methodologically appropriate. Two independent reviewers completed this process, and all disagreements were resolved by their consensus.

2.2. Study quality assessment

The level of evidence was rated for each included study according to the criteria provided by the Oxford Center for Evidence-Based Medicine [7]. The methodological quality of the studies was assessed using the Newcastle-Ottawa Scale

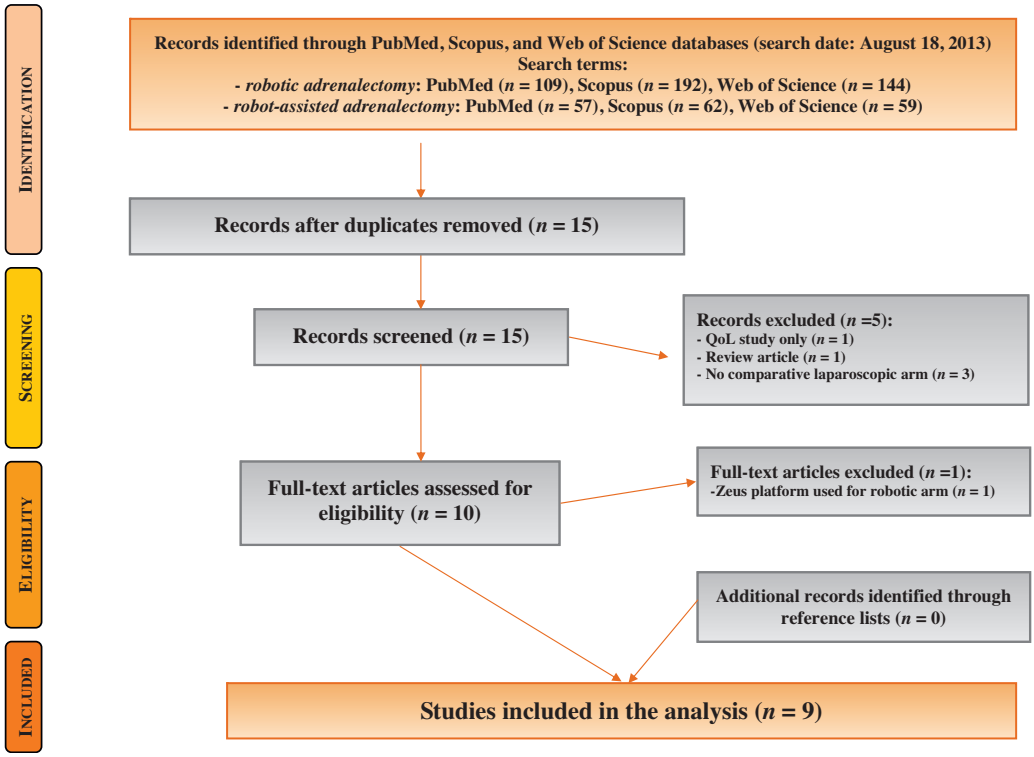

Fig. 1 – Preferred Reporting Items for Systematic Reviews and Meta-analysis flow of study selection. QoL = quality of life.