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Robot-assisted and Laparoscopic Repair of Ureteropelvic Junction Obstruction: A Systematic Review and Meta-analysis

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Abstract

Context: Over the last two decades, minimally invasive treatment options for ureteropelvic junction obstruction (UPJO) have been developed and popularized.
Objective: To critically analyze the current status of laparoscopic and robotic repair of UPJO.
Evidence acquisition: A systematic literature review was performed in November 2012 using PubMed. Article selection proceeded according to the search strategy based on Preferred Reporting Items for Systematic Reviews and Meta-analyses criteria.
Evidence synthesis: Multiple series of laparoscopic pyeloplasty have demonstrated high success rates and low perioperative morbidity in pediatric and adult populations, with both the transperitoneal and retroperitoneal approaches. Data on pediatric robot-assisted pyeloplasty are increasingly becoming available. A larger number of cases have also been reported for adult patients, confirming that robotic pyeloplasty represents a viable option for either primary or secondary repair. Robot-assisted redo pyeloplasty has been mostly described in the pediatric population. Different technical variations have been implemented with the aim of tailoring the procedure to each specific case. The type of stenting, retrograde versus antegrade, continues to be debated. Internal-external stenting as well as a stentless approach have been used, especially in the pediatric population. Comparative studies demonstrate similar success and complication rates between minimally invasive and open pyeloplasty in both the adult and pediatric setting. A clear advantage in terms of hospital stay for minimally invasive over open pyeloplasty was observed only in the adult population.
Conclusions: Laparoscopy represents an efficient and effective less invasive alternative to open pyeloplasty. Robotic pyeloplasty is likely to emerge as the new minimally invasive standard of care whenever robotic technology is available because its precise suturing and shorter learning curve represent unique attractive features. For both laparoscopy and robotics, the technique can be tailored to the specific case according to intraoperative findings and personal surgical experience.

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1. Introduction

Over the last two decades, minimally invasive treatment options for ureteropelvic junction obstruction (UPJO) have been developed and popularized [1]. In 1993, the first cases of laparoscopic pyeloplasty (LP) were reported in the adult population [2,3], and 2 yr later the feasibility of the procedure was demonstrated in the pediatric setting [4].

The use of robotic assistance in urologic laparoscopy has expanded exponentially in recent years, given the unique features provided by the robotic platform, especially in the setting of reconstructive procedures where extensive suturing is needed. The first robotic pyeloplasty (RP) series was reported by Gettman et al. in 2002 [5]. Since these pioneering descriptions, LP and RP have been increasingly adopted worldwide. The present review critically analyzes the current status of laparoscopic and robotic repair of UPJO by means of a systematic literature review.

2. Evidence acquisition

A systematic literature review was performed in November 2012 using PubMed to identify relevant studies. Searches were restricted to publications in English.

Three separate searches were done by applying a free-text protocol with the following search terms: *laparoscopic pyeloplasty*, *laparoscopy* and *ureteropelvic junction obstruction*, and *robotic pyeloplasty*.

Article selection proceeded according to the search strategy based on Preferred Reporting Items for Systematic Reviews and Meta-analyses criteria (www.prisma-statement.org) (Fig. 1).

Review articles, editorials, commentaries, and letters to the editor were included only if deemed to contain relevant information. The same principle was used to decide for the inclusion of case reports and very small case series (fewer than five patients). In addition, cited references from the selected articles and from review articles retrieved in the search were assessed for significant papers not previously included.

In addition to the manuscript type, the study topic was also considered as a selection criterion. It was decided to exclude articles related to patient preparation and preoperative imaging studies as well as articles related to specific clinical situations, such as bilateral UPJO, UPJO in the horseshoe kidney, UPJO in the ectopic kidney, and coexistent urinary lithiasis. Manuscripts describing only technical notes, specific instrumentation, or pure experimental research were included only if deemed to be particularly significant.

Also excluded were procedures defined as "laparoscopic assisted," where part of the procedure was performed by externalizing the UPJ at the skin level. Salvage procedures such as ureterocalicostomy or ileal ureter were also not included in the analysis. Studies focusing on learning curve, training, and costs were not included. Studies comparing

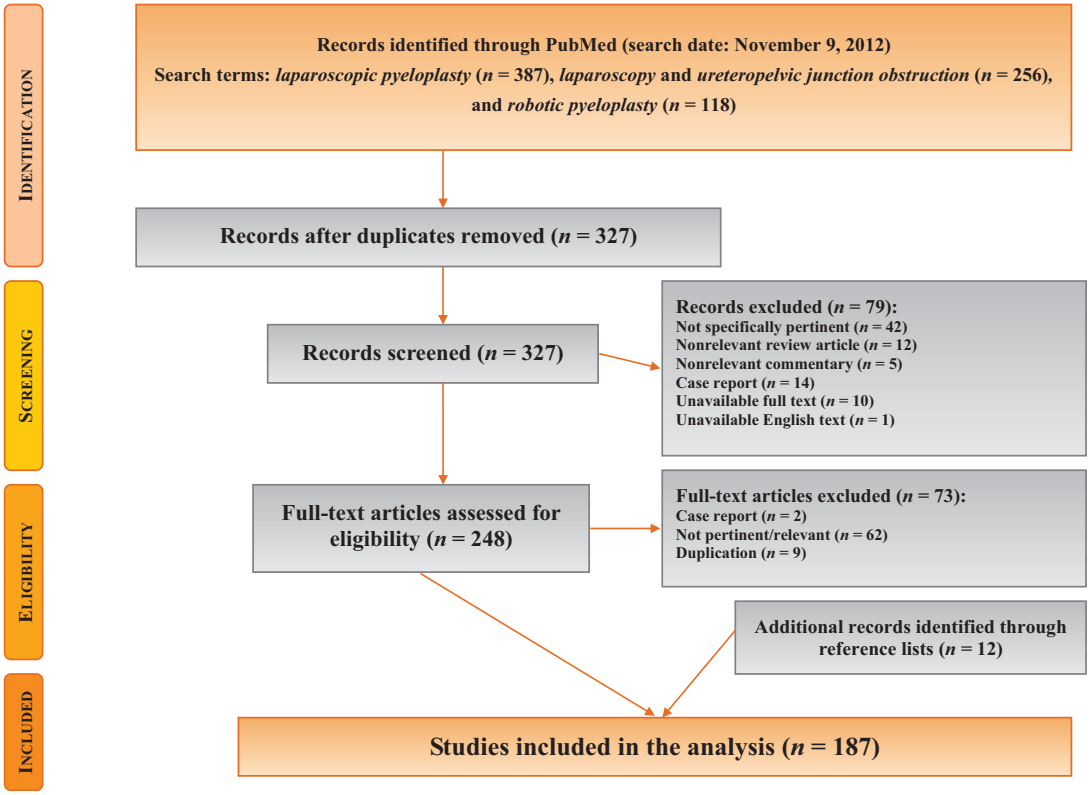

Fig. 1 – Preferred Reporting Items for Systematic Reviews and Meta-analysis flow of study selection.