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ROBOTIC-ASSISTED VERSUS CONVENTIONAL LAPAROSCOPIC PYELOPLASTY FOR PEDIATRIC URETEROPELVIC JUNCTION OBSTRUCTION: A META-ANALYSIS

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Abstract: Background: The application of robot-assisted laparoscopic surgery (RALP) in paediatric urology is increasing, but there is still controversy about the efficacy and safety of RALP compared to traditional treatment assisted laparoscopic surgery (LAP) in increasing obstructive uropathy at the ureteropelvic junction (UPJO) in children. This meta-analysis of effects to evaluate and evaluate the clinical efficacy of robot-assisted laparoscopic surgery (RALP) and paediatric pyeloplasty in laparoscopic treatment of UPJO, A computer search was conducted in English as PubMed, Cochrane database, Web of Science, OVID, and in Chinese databases as Sinomed, China National Knowledge Infrastructure (CNKI), Weipu database, and Wanfang databases for relevant literature, with categorical dates up to December 2024. The Man 5.4 variables were used for meta-analysis of the literature data. For risk ratio, the literature (RR) was used as the reference database, RevMan used for statistical measures, such as statistical databases. The mean (MD) was conducted. Descriptive analysis was conducted for patients with less literature and postoperative data. Results: A total of 13 studies were included, with 916 cases, all undergoing pyeloplasty. RALP superiority aspects over traditional laparoscopic surgery in the following surgical success rate [RR = 1.04, 95% CI (1.01, 1.07)], ureteropelvic anastomosis [MD = -27.39, 95% CI (-44.33, -10.46)], postoperative retention time [MD = -1.00, 95% CI (-1.42, -0.58)], stay insufficient [MD = -1.17, 95% CI (-1.82, -0.52)], intraoperative blood loss [MD = -2.98, 95% CI (-4.77, -1.19)], and reoperation rate [RR = 0.38, 95% CI (0.16, 0.87)], all statistically significant differences after renal surgery ($P < 0.05$). RALP had significant differences compared to traditional higher [MD = 2.68, 95% CI (1.78, 3.58)] ($p < 0.05$), which showed significant posterior ior-changes (APD) and laparoscopic surgery [MD = -0.08, 95% CI (-0.26, 0.10)], statistically significant split function (GRF) [MD = 0.69, 95% CI (-1.85, before laparoscopic surgery] 3.24)], operating time [MD = -9.8, 95% CI (-24.04, 4.44)], postoperative complications [RR = 0.70, 95% CI (0.43, 1.14)], and follow-up time [MD = 0.08, 95% CI (-3.33, 3.49)] showed no statistically significant differences ($P > 0.05$). Conclusion: With pyeloplasty, pyeloplasty has a significant effect in treating renal paediatric vis-ureter obstruction groups, laparoscopic pyeloplasty has been compared with conventional pyeloplasty. pelvis-ureter anastomosis shorter time, less bleeding, shorter duration of postoperative drainage, lower reoperation rates, and shorter postoperative hospital stays. This robotic-assisted pyeloplasty has been shown to result in a higher success rate, faster recovery rates, and long-term better surgical outcomes. However, due to high hospital discharge, this remains certain in its application.
Keywords: Ureteropelvic junction obstruction; Robotic surgery; Laparoscopy; Treatment outcome; Meta-analysis

1 INTRODUCTION

Ureteropelvic junction obstruction (UPJO) is the most common cause of hydronephrosis in children and a common congenital malformation of the urinary system in children, with an incidence of 1/800 – 1/600[1-2] . It is often detected in infancy that previous open Ander-son-Hynes pyeloplasty is the treatment of choice for UPJO, with a success rate of more than 90% [3] . In recent years, with the development and popularization of minimally invasive surgical techniques, traditional laparoscopic pyeloplasty (LP) and robot-ic-assisted laparoscopic pyeloplasty (RALP) have played an important role in the treatment of UPJO. Compared with open pyeloplasty, laparoscopic pyeloplasty has less trauma, faster recovery, and the success rate of surgery is not lower than traditional open surgery [1-2] . However, the abdominal cavity space of children is limited, endoscopic suture and knotting is technically demanding for surgeons, and the learning curve is relatively long [2]. However, Da Vinci robot-assisted laparoscopic surgery has higher flexibility, stronger stability, more efficient operation, and is more conducive to fine operations such as endoluminal anatomical separation and suture knotting [4]. In this study, Meta-analysis will be used to comprehensively evaluate the effect of RALP and LP in the treatment of UPJO.

2 MATERIALS AND METHODS

2.1 Literature Inclusion and Exclusion Criteria

1. Inclusion criteria ① The study subjects were newborns and children; ② The study content was robot-assisted laparoscopic surgery or traditional laparoscopic surgery in the treatment of ureteropelvic junction obstruction in children; ③The success criteria of surgery were the disappearance or alleviation of clinical symptoms after surgery and during follow-up, urinary ultrasonography showed improvement of hydronephrosis and improvement of drainage curve on the renogram [5]. 2. Exclusion criteria: ① The study subjects are adults; ② The studies of RALP or LP in the treatment of UPJO are simply included; ③ The repeated literatures or literature data are incomplete; ④ Multiple studies from the same center, with repeated data; ⑤ Case reports, animal experiments, reviews or systematic reviews, conference proceedings and literatures with too low quality evaluation; ⑥ The study contents or indicators are inconsistent.

2.2 Search Strategy

Two searchers independently searched. English databases (PubMed, Cochrane database, Web of Science, Ovid, Embase) and Chinese databases (CNKI, VIP database, CBM, Wanfang database) were searched by computer system. English Search terms: Ro-botic/Robot-assisted, Pyeloplasty, Children/Pediatric, Ureteropelvic junction obstruction; Chinese search terms: robotic, pyeloplasty, pediatric, ureteropelvic junction obstruction. The literature was published until December 2024.

2.3 Data Extraction, Outcome Measures and Quality Evaluation

Two reviewers read the titles and abstracts of the articles, screened the articles according to the inclusion criteria and exclusion criteria, then searched and read the full text, independently extracted the data, and cross-checked them. The extracted contents included: ① basic information of the study: first author, publication year, study region, article source, sample size, age, gender, lesion side, and follow-up time; ② outcome indicators of the study: success rate of surgery, incidence of postoperative complications, operation time, ureteropelvic anastomosis time, preoperative and postoperative renal pelvis anteroposterior diameter (APD) value, preoperative and postoperative renal function (GRF) value, intraoperative blood loss, postoperative drainage tube indwelling time, hospital stay, hospitalization costs, and postoperative follow-up time. Literature quality evaluation refers to Newcastle-Ot-tawa (NOS) evaluation scale, including selection (4 points), comparability (2 points) and outcome (3 points); it is divided into low risk (7 ~ 9 points), moderate risk (4 ~ 6 points) and high risk (1 ~ 3 points); the literatures with NOS score < 5 points are excluded. Fourth, statistical processing was performed using RevMan 5.4 to analyze the data. Heterogeneity tests were performed for each study, and if $P \geq 0.1$ and $I\,2 < 50\%$, each study was considered homogeneous and a fixed-effect model was selected; if $P < 0.1$ and $I\,2 \geq 50\%$, each study was considered heterogeneous and a random-effect model was selected. RR was used as the analysis statistic for dichotomous variables; weighted mean difference (MD) was used as the analysis statistic for continuous variables. Descriptive analysis is adopted for the study indicators with few included literatures and incomplete data.

3 RESULTS

3.1 Literature Search Results

According to the search strategy, 789 literatures were obtained, and 776 literatures were excluded, including 262 repeated literatures, 496 case reports, animal experiments, reviews or systematic reviews, conference proceedings and unrelated literatures, 18 literatures inconsistent with the content of this article, incomplete data and low quality evaluation, and finally 13 studies were included [3-4, 6-13]. Literature search results and flow are shown in Figure 1.

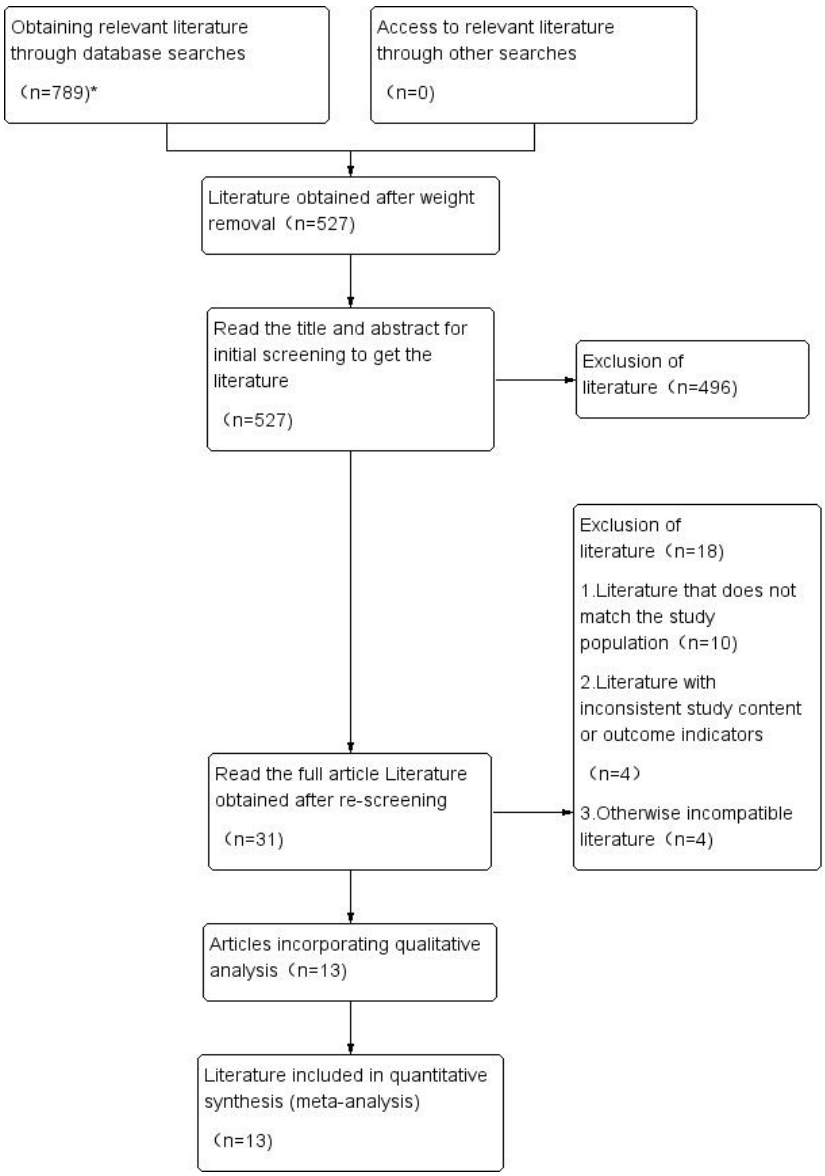

Figure 1 Literature Search Process and Results

*Note: The databases searched and literature data retrieved were as follows: PubMed (n = 172), EMbase (n = 61), The Cochrane Library (n = 9), OVID (n = 312), Web of Science (n = 41), Sinomed (n = 39), CNKI (n = 95), Wanfang Database (n = 37), and VIP Database (n = 23).

3.2 Basic Characteristics of Cases in the Included Study Literatures

Among the 13 included literatures, 12 literatures were retrospective cohort study and 1 was randomized controlled study, with a total number of 916 cases, including 489 cases of robot-assisted laparoscopic surgery and 427 cases of traditional laparoscopic surgery [10]. The basic characteristics of literature cases included in the meta-analysis are shown in Table 1, and the surgery-related indicators of literature donations included in the study are shown in Table 2 [3-4, 6-13].

Table 1 Literature Characteristics of Included Studies

Included study article presentation	Study region	Number of cases		Age at surgery (months) [a]		Follow-up Time (months) [b]	
		RALP Group	LP Group	RALP Group	LP Group	RALP Group	LP Group
Li Yixuan et al, 2023[8]	CHINA	21	42	48.55	84.69	16.57	16.39
Liu Hui et al, 2023[7]	CHINA	22	48	87.64	64.79	NR	NR

Qi Liu et al, 2023[6]	CHINA	31	32	57.35	50.09	NR	NR
Li Qian et al, 2024[9]	CHINA	27	20	79.20	78.00	12.8	11.4
Yiqing Lv et al, 2019[4]	CHINA	15	24	90.00	38.40	17.5	22.3
Patel et al, 2016[14]	USA	55	13	93.96	81.91	NR	NR
Esposito et al, 2019[3]	Italy	37	30	93.47	31.35	21.13	19.52
Koga et al, 2023[15]	JAPAN	22	34	88.8	94.8	NR	NR
González et al, 2022[16]	USA	174	86	106.43	123.02	46.67	41.58
Silay et al, 2020[12]	Tulki	26	27	53.66	30.50	10.50	14.26
Sun et al, 2023[11]	CHINA	12	21	18.34	11.90	100	100
Tam et al 2018[10]	CHINA	26	37	38.74	28.74	24.77	38.05
Neheman et al 2018[17]	Israel	21	13	6.03	5.88	14.09	5.65

*Note: NR indicates not reported; a indicates mean age at operation; b indicates mean follow-up time; RALP: robot-assisted laparoscopic pyeloplasty; LP: conventional laparoscopic pyeloplasty; UPJO: ureteropelvic junction obstruction

Table 2 Surgery-Related Indicators of UPJO Cases Included in Study Article

Literature included in the study	Surgical time (x±s,min)		Renal pelvic-ureteral anastomosis time (x+s,min)		Postoperative complications (cases)		Reoperation (cases)	
	RALP Group	LP Group	RALP Group	LP Group	RALP Group	LP Group	RALP	LP
Li Yixuan et al,, 2023[8]	252.6±39.00	231.28±46.06	135.60±22.80	131.92±32.23	1	2	0	0
Liu Hui et al, 2023[7]	152.05±38.63	140.44±37.25	27.95±9.52	41.17±8.34	2	4	0	0
Qi Liu et al, 2023[6]	119.87±15.64	128.53±36.27	NR	NR	4	6	0	0
Li Qian et al, 2024[9]	153.0±14.4	189.9±32.6	68.8±16.8	97.5±12.0	1	3	0	0

Yiqing Lv et al, 2019[4]	173±31	167±25	NR	NR	1	1	1	1
Patel et al, 2016[14]	231.70±46.13	264.62±40.86	NR	NR	2	0	0	1
Esposito et al, 2019[3]	137.10±24.70	155.89±44.11	77.84±11.53	104.19±12.25	0	1	0	1
Koga et al, 2023[15]	305.2 ± 50.1	340.0 ± 117.9	60.2 ± 13.8	133.0 ± 31.6	0	4	0	4
González et al, 2022[16]	183.28±47.05	148.75±61.56	NR	NR	2	2	2	2
Silay et al, 2020[12]	105.19±22.87	139.26±43.21	NR	NR	2	2	0	2
Sun et al, 2023[11]	120.25 ± 37.54	156.10 ± 51.11	NR	NR	0	0	0	1
Tam et al, 2018[10]	251.80±53.01	250±58.81	NR	NR	4	6	1	3
Neheman et al, 2018[17]	164.98±32.81	181.49±39.15	NR	NR	5	4	1	1

*Note: The operation time of RALP group included the time of mechanical installation; NR: not reported; RALP: robot-assisted laparoscopic pyeloplasty; LP: traditional laparoscopic pyeloplasty; UPJO: ureteropelvic junction obstruction

3.3 Meta-Analysis Results

3.3.1 Surgical success rate

A total of 9 literatures recorded the success rate of two surgical methods, heterogeneity test result $\chi 2 = 4.71$, $I 2 = 0\%$, $P = 0.79$, using fixed effect model. The success rate of surgery in the RALP group was higher than that in the LP group, and the difference was statistically significant [RR = 1.04, 95% CI (1.01, 1.07), P = 0.02] [3-4, 10-15, 17] (Figure 2).

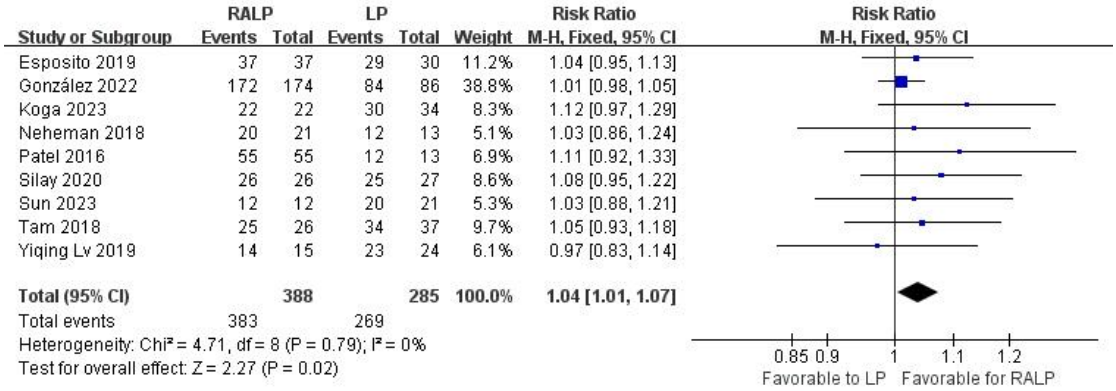

Figure 2 Meta-Analysis of Success Rates of RALP and LP Procedures for Ureteropelvic Junction Obstruction RALP: Robot-Assisted Laparoscopic Pyeloplasty LP: Conventional Laparoscopic Pyeloplasty

3.3.2 Pelvoureteropelvic anastomosis time

There were 5 literatures comparing pyeloureteral anastomosis time between the two surgical methods, heterogeneity test result $\chi 2 = 99.74$, $I 2 = 96\%$, $P < 0.00001$, using random effect model. The ureteropelvic anastomosis time in the RALP group was shorter than that in the LP group, and the difference was statistically significant [MD = -27.39, 95% CI (-44.33, -10.46), P = 0.002] [3, 7-9, 15] (Figure 3).

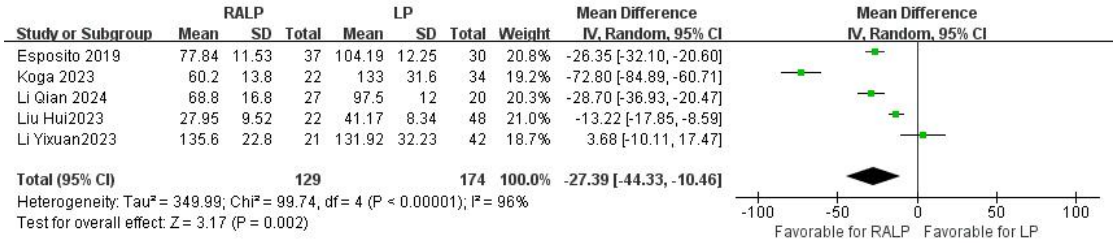

Figure 3 Meta-Analysis of Ureteropelvic Junction Obstruction RALP and LP Ureteropelvic Anastomosis Time RALP: Robot-Assisted Laparoscopic Pyeloplasty LP: Conventional Laparoscopic Pyeloplasty

3.3.3 Intraoperative blood loss

Five literatures compared intraoperative blood loss between two surgical methods, heterogeneity test result χ 2 = 29.39, I 2 = 86%, P < 0.00001, using random effect model. Intraoperative blood loss was less in the RALP group than in the LP group, and the difference was statistically significant [MD = -2.98, 95% CI (-4.77, -1.19), P = 0.001] [6-9, 15] (Figure 4).

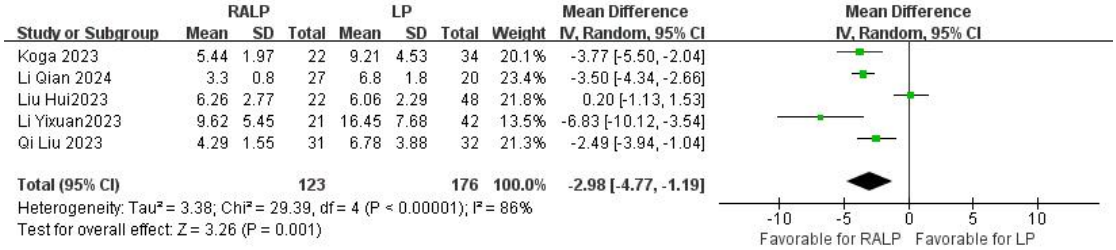

Figure 4 Meta-Analysis of Intraoperative Blood Loss of Ureteropelvic Junction Obstruction RALP and LP RALP: Robot-Assisted Laparoscopic Pyeloplasty LP: Conventional Laparoscopic Pyeloplasty

3.3.4 Postoperative drainage tube indwelling time

There were 3 literatures comparing postoperative drainage tube indwelling time between two surgical methods, heterogeneity test result χ 2 = 3.40, I 2 = 41%, P = 0.18, using fixed effect model. The postoperative drainage tube indwelling time in RALP group was shorter than that in LP group, and the difference had statistical significance [MD = -1.00, 95% CI (-1.42, -0.58), P < 0.00001] [6, 11, 15] (Figure 5).

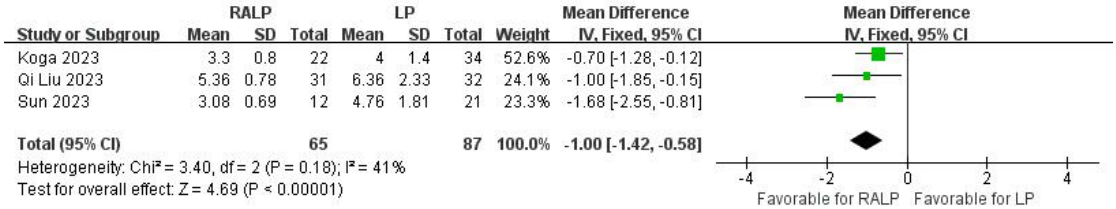

Figure 5 Meta-Analysis of Drainage Tube Indwelling Time after Ureteropelvic Junction Obstruction RALP and LP RALP: Robot-Assisted Laparoscopic Pyeloplasty LP: Conventional Laparoscopic Pyeloplasty

3.3.5 Postoperative hospital stay

12 papers compared the postoperative hospital stays between two surgical methods, heterogeneity test results χ 2 = 198.03, I 2 = 94%, P < 0.00001, using the random effect model. Postoperative hospital stay was shorter in the RALP group than in the LP group, and the difference was statistically significant [MD = -1.17, 95% CI (-1.82, -0.52), P = 0.0004] [3, 6-12, 14-17] (Figure 6).

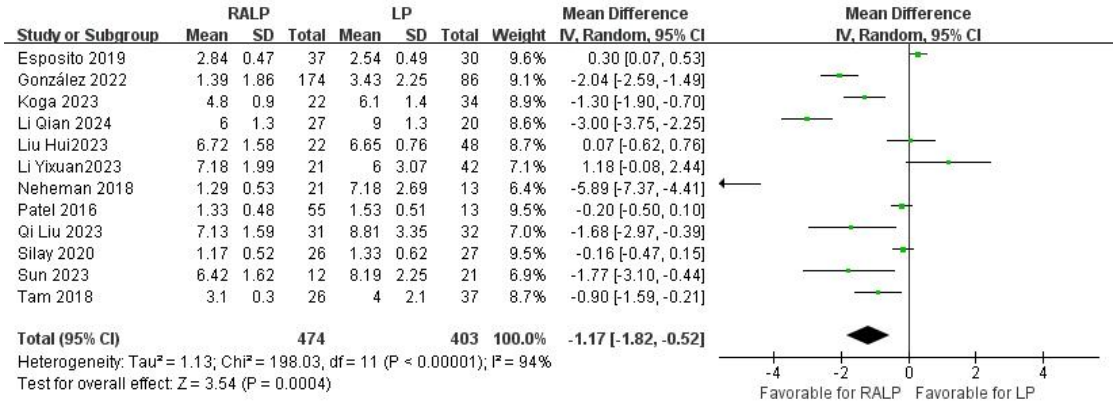

Figure 6 Meta-Analysis of Length of Stay after RALP and LP for Ureteropelvic Junction Obstruction RALP and LP: Robot-Assisted Laparoscopic Pyeloplasty LP: Conventional Laparoscopic Pyeloplasty

3.3.6 Reoperation rate

Nine papers compared the reoperation rates between the two surgical methods, with heterogeneity test results χ 2 = 2.80, I 2 = 0%, P = 0.95, using a fixed-effect model. The incidence of reoperation in the RALP group was lower than that in the LP group, and the difference was statistically significant [RR = 0.38, 95% CI (0.16, 0.87), P = 0.02] [3-4, 10-15, 17] (Figure 7).

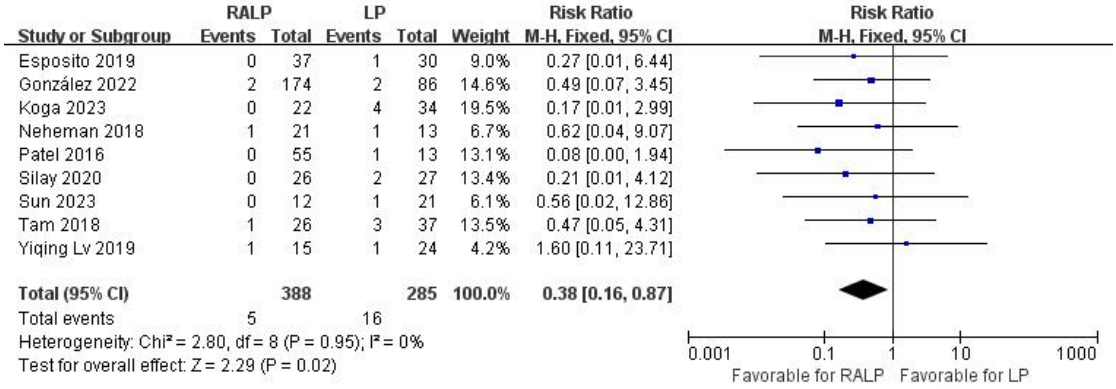

Figure 7 Meta-Analysis of Reoperation Rates for Ureteropelvic Junction Obstruction RALP and LP RALP: Robot-Assisted Laparoscopic Pyeloplasty LP: Conventional Laparoscopic Pyeloplasty

3.3.7 Hospitalization costs

There were 4 literatures comparing hospitalization costs between the two surgical methods, heterogeneity test result χ 2 = 304.41, I 2 = 99%, P < 0.00001, using random effect model. Hospitalization costs were higher in the RALP group than in the LP group, and the difference was statistically significant [MD = 2.68, 95% CI (1.78, 3.58), P < 0.00001] [6-7, 9, 11] (Figure 8).

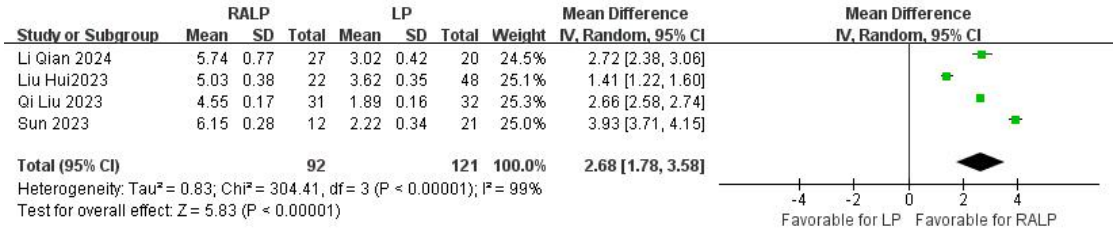

Figure 8 Meta-Analysis of Hospital Costs for Ureteropelvic Junction Obstruction RALP and LP RALP: Robot-Assisted Laparoscopic Pyeloplasty LP: Conventional Laparoscopic Pyeloplasty

3.3.8 Changes in anteroposterior diameter (APD) of renal pelvis before and after operation

Eight papers compared the changes in anteroposterior diameter (APD) values of the renal pelvis between the two surgical methods, and the heterogeneity test results were χ 2 = 5.74, I 2 = 0%, and P = 0.57, using a fixed-effect model. The decrease in APD values before and after surgery in the RALP group was significantly higher than that in the LP group, but the difference was not statistically significant [MD = -0.08, 95% CI (-0.26, 0.10), P = 0.40] [3, 6-12] (Figure 9).

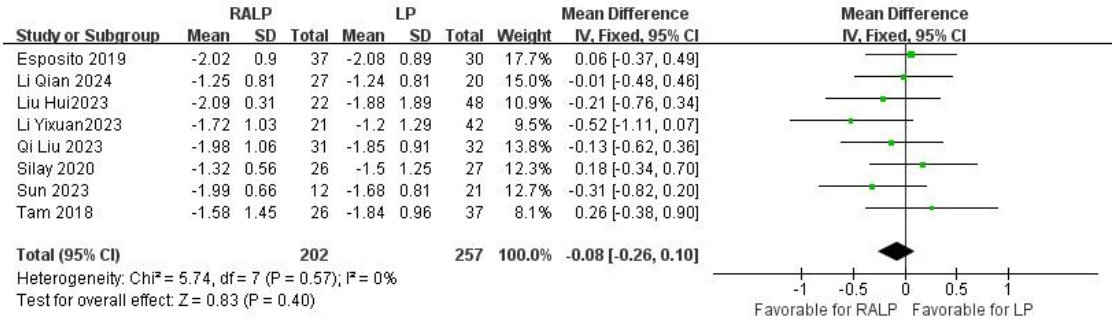

Figure 9 Meta-Analysis of APD Value Changes before and after Ureteropelvic Junction Obstruction RALP and LP Surgery RALP: Robot-Assisted Laparoscopic Pyeloplasty LP: Conventional Laparoscopic Pyeloplasty

3.3.9 Changes of renal function (DRF) before and after operation

There were 3 literatures comparing the change of renal function (DRF) between the two surgical methods, heterogeneity test result χ 2 = 2.19, I 2 = 9%, P = 0.33, using fixed effect model. The change of renal function (DRF) before and after operation in the RALP group was not significantly different from that in the LP group [MD = 0.69, 95% CI (-1.85, 3.24), P = 0.59] [8-10] (Figure 10).

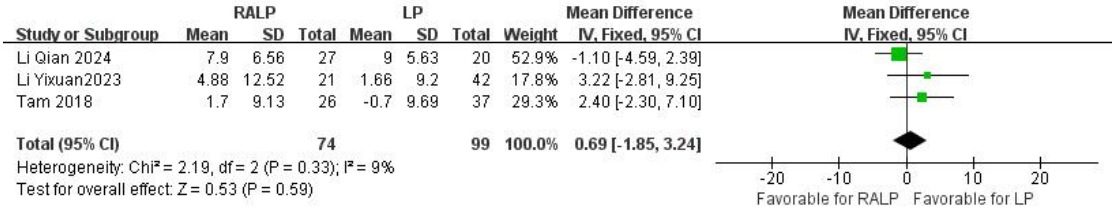

Figure 10 Meta-Analysis of Fractional Renal Function (DRF) Changes before and after Surgery for Ureteropelvic Junction Obstruction RALP and LP: Robot-Assisted Laparoscopic Pyeloplasty LP: Conventional Laparoscopic Pyeloplasty

3.3.10 Surgery time

Thirteen literatures compared the operation time between two surgical methods, heterogeneity test result χ 2 = 76.88, I 2 = 84%, P < 0.00001, using random effect model. Operative time was shorter in the RALP group than in the LP group, but the difference was not statistically significant [MD = -9.8, 95% CI (-24.04, 4.44), P = 0.18] [3, 4, 6-13] (Figure 11).

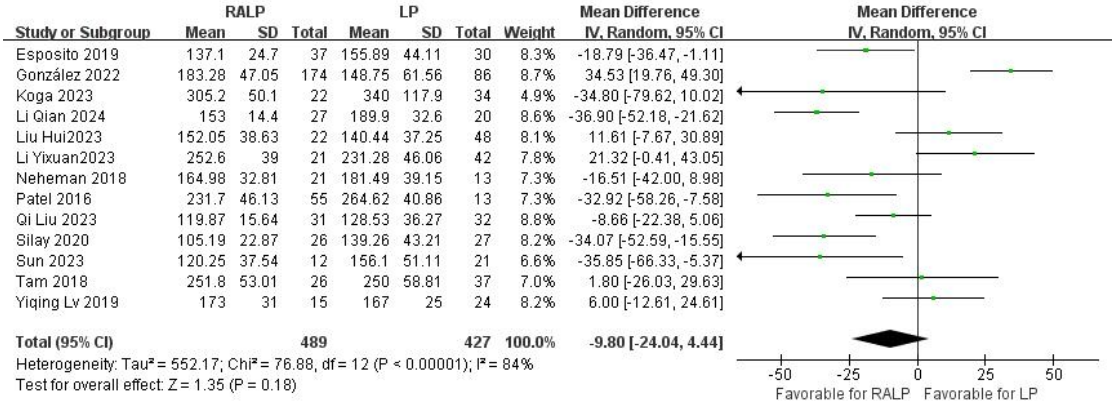

Figure 11 Meta-Analysis of Operative Time for Ureteropelvic Junction Obstruction RALP and LP RALP: Robot-Assisted Laparoscopic Pyeloplasty LP: Conventional Laparoscopic Pyeloplasty

3.3.11 Incidence of postoperative complications

Twelve literatures compared the incidence rate of postoperative complications between two surgical methods, heterogeneity test result χ 2 = 3.62, I 2 = 0%, P = 0.98, using fixed effect model. The incidence of complications in the RALP group was lower than that in the LP group, but the difference was not statistically significant [RR = 0.70, 95% CI (0.43, 1.14), P = 0.15] [3-4, 6-10, 12, 14-17] (Figure 12).

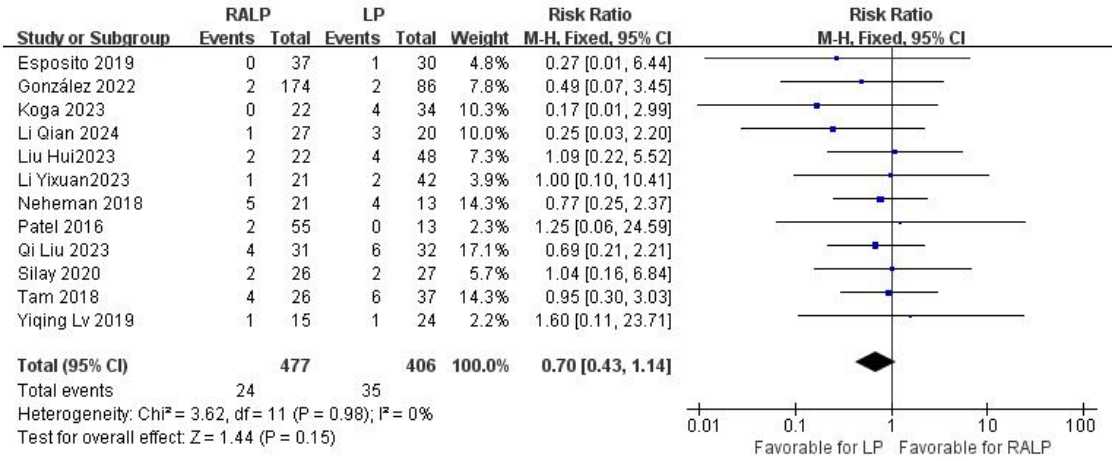

Figure 12 Meta-Analysis of the Incidence of Complications Following Ureteropelvic Junction Obstruction RALP and LP RALP: Robot-Assisted Laparoscopic Pyeloplasty LP: Conventional Laparoscopic Pyeloplasty

3.3.12 Follow-up time

Eight literatures compared the follow-up time between two surgical methods, heterogeneity test result $\chi^2 = 53.56$, $I^2 = 87\%$, $P < 0.00001$, using random effect model. There was no statistically significant difference in follow-up time between the RALP group and the LP group [MD = 0.08, 95% CI (-3.33, 3.49), P = 0.96] [3, 8-12, 16, 17] (Figure13).

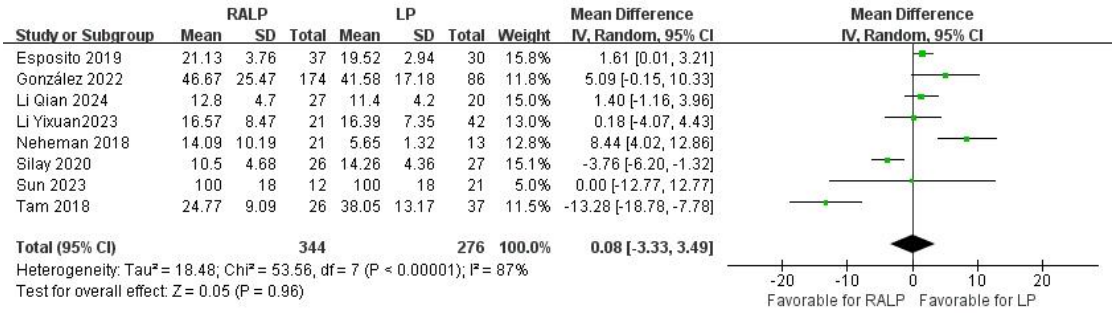

Figure 13 Meta-Analysis of Follow-Up Time for Ureteropelvic Junction Obstruction RALP and LP RALP: Robot-Assisted Laparoscopic Pyeloplasty LP: Conventional Laparoscopic Pyeloplasty

3.3.13 Publication bias

To compare the success rate of RALP and LP, funnel plots were generated and publication bias detection was performed in the included literatures. The graphs were basically symmetrical (Figure 14). However, the development of robotic technology in pediatric surgery is still in its infancy, the number of published studies is not large, and there are few cases involved. There are a large number of randomized prospective studies in the literature, so publication bias is difficult to avoid.

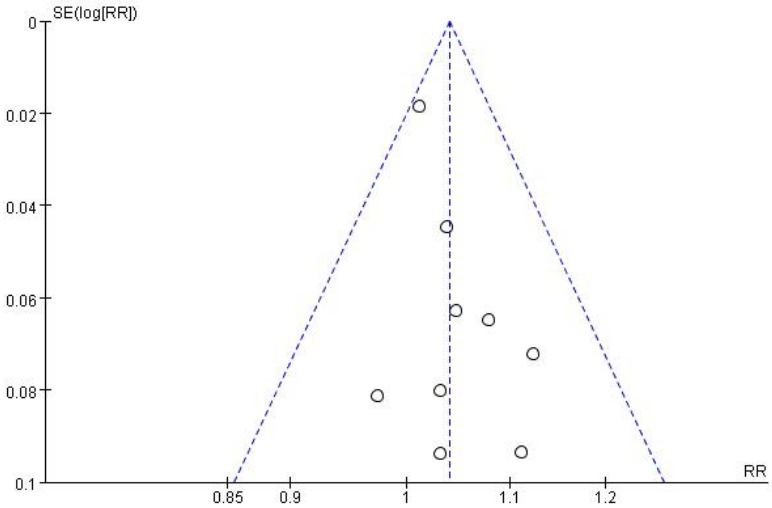

Figure 14 Funnel Plot of Surgical Success Rate of Included Literatures

4 DISCUSSION

Congenital hydronephrosis in children is often caused by ureteropelvic junction obstruction (UPJO) and has many etiologies, which can be divided into: ① ureteropelvic junction stenosis; ② ureteral polyps; ③ high ureteral orifice; ④ ectopic vessels or fibrous cord compression [8]. UPJO is prone to damage renal function, and the main treatment is surgical treatment. The aim of UPJO surgery is to relieve obstruction and improve renal function, and with the development of minimally invasive techniques, laparoscopic pyeloplasty has gradually become a routine procedure for the treatment of UPJO in children [18]. Robotic surgery system has the advantages of high-resolution 3D vision, debulking procedure, highly dexterous robotic arm, short learning curve, etc., overcoming the technical defects of some traditional laparoscopes and has been rapidly developed in the surgical field. Robot-assisted laparoscopic pyeloplasty (RALP) has been used to treat UPJO in children with domestic expert consensus and surgical operation guidelines [1, 19] . At present, several medical centers in China have successively reported the successful application of RALP in pediatric UPJO [20-22] . However, due to cost and surgeon experience, RALP surgery has some limitations in China. The aim of this study was to systematically evaluate the therapeutic effects of traditional laparoscopic pyeloplasty and robot-assisted laparoscopic pyeloplasty for ureteropelvic junction obstruction by meta-analysis.

4.1 Procedural Success

This study showed that the success rate of surgery in the RALP group was higher than that in the LP group. Nine literatures showed that the success rate of operation in RALP group was higher than that in LP group, and the success rate of operation in both groups in each study was greater than 90% [3, 4, 10-15, 17]. Therefore, we believe that both RALP and LP are effective surgical methods for the treatment of UPJO, and with the continuous accumulation of surgeon experience and the continuous development of robotic surgical techniques, the surgical success rate of RALP is generally higher than that of LP group.

4.2 Pyeloureteral Anastomosis Time

This study showed that the ureteropelvic anastomosis time in the RALP group was shorter than that in the LP group. Five of these articles indicated that the ureteropelvic anastomosis time was shorter in the RALP group than in the LP group [3, 7-9, 15]. This is related to the advantages of RALP such as a highly dexterous robotic arm, a high-resolution 3D field of view, and a short learning curve. It suggests that RALP is more sensitive and conducive to intraoperative suture operation, but it is also related to intraoperative experience.

4.3 Intraoperative Blood Loss and Postoperative Drainage Tube Indwelling Time

This study showed that intraoperative blood loss in the RALP group was less than that in the LP group. Five of the articles indicated that the intraoperative blood loss in the RALP group was less than that in the LP group [6-9, 15]. These results indicate that RALP has better visual field and sensitive operation and can better reduce intraoperative bleeding. Among them, 3 literatures showed that the postoperative indwelling time of drainage tube in RALP group was shorter than that in LP group [6, 11, 15]. showed that the RALP group had faster postoperative recovery and less postoperative exudation, which was also related to less intraoperative blood loss. These results indicate that the RALP group is more conducive to rapid recovery.

4.4 Postoperative Hospital Stay and Reoperation Rate

The analysis showed that the length of hospital stay was shorter in the RALP group than in the LP group, indicating that postoperative rehabilitation was faster in the RALP group. However, there are variations in medical regimens across regions that may also influence length of stay. In the table of 9 literatures, the reoperation rate of RALP group was lower than that of LP group, indicating that the success rate and long-term effect of RALP group were better than LP [3-4, 10-15, 17].

4.5 Hospitalization Cost

Four literatures showed that the hospitalization cost of RALP group was higher than that of LP group, which was related to the device cost of robot [6-7, 9, 11] . With the reduction of cost, the development of surgical techniques and the shortening of hospital stay, the hospitalization costs of RALP may be gradually reduced. However, there was no significant difference in operation time between the RALP group and the LP group, which was related to the length of robotic installation and the experience of the surgeon. Postoperative complications mainly included: improper position of double-J tube, flatulence, urinary tract infection, aggravated hydronephrosis, etc. There was no significant difference in postoperative complications between RALP group and LP group. In addition, there was no significant difference between RALP group and LP group in APD value change before and after operation, renal function (GRF) change before and after operation, and postoperative follow-up time. The results showed that there was no significant difference between RALP group and LP group in relieving hydronephrosis and improving renal function.

5 CONCLUSION

In summary, robot-assisted laparoscopic pyeloplasty for ureteropelvic junction obstruction in children has a higher success rate, shorter ureteropelvic anastomosis time, less intraoperative bleeding, shorter postoperative drainage tube indwelling time, lower reoperation rate, and shorter postoperative hospital stay compared with traditional laparoscopic pyeloplasty. showed that RALP had a higher success rate, faster postoperative recovery, and better long-term results. However, due to the high hospitalization costs, there are still some limitations in clinical application.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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