

Operative Times with Robot-Assisted Laparoscopic Pyeloplasty are Associated with Surgeon Experience Level and Trainee Level

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BACKGROUND

Ureteropelvic junction obstruction (UPJO) is a blockage at the junction where the ureter attaches to the kidney, and it is the most frequently diagnosed cause of urinary obstruction in children. This often results in build up of fluid within the kidney that ultimately results in parenchymal damage and deterioration of kidney function. Robotic-assisted laparoscopic pyeloplasty (RALP) is the most commonly performed robotic procedure in pediatric urology for the repair of UPJO. While the safety and efficacy of RALP has been demonstrated previously, there is paucity of data regarding length of procedure, which is can be associated with quality improvement and reduction in cost.

PURPOSE

The purpose of this study is to examine various surgeon and patient factors associated with pediatric RALP procedure times.

METHODS

An IRB-approved retrospective analysis was performed on prospectively collected quality improvement data for all patients undergoing RALP at a single institution (2013 – 2020). Demographic information collected included patient age, gender, BMI, level of experience of primary surgeon, trainee level, console time, and total procedure time. Descriptive statistics, including t test for comparing two groups and ANOVA test for comparing multiple groups, were used to compare total procedure and console time among different cohorts .



Fig 1: Da Vinci Robot System

Variable	Mean Total Procedure Time (min)	95% Confidence Interval (min)	Total Procedure Time P-value
Patient Age			< 0.005
< 1	157.75	146.55 – 169.15	
1 – 4	157.11	145.86 – 168.38	
4 - 10	181.40	170.02 – 192.78	
> 10	206.29	188.65 – 223.92	
Patient Gender			0.329
Male	177.34	169.38 – 185.28	
Female	175.09	165.54 – 184.63	
BMI			< 0.005
< 19.5	168.44	161.62 – 175.26	
19.5 - 25	210.14	184.20 – 236.08	
> 25	214.91	173.05 – 256.77	
Surgeon Experience at Current institution			< 0.005
< 30 cases	227.70	197.15 – 258.24	
30 – 100 cases	194.72	175.04 – 214.31	
> 100 cases	166.20	160.11 – 172.29	
Trainee Level			< 0.005
Fellow	190.93	180.05 – 201.82	
Resident	168.42	160.82 – 176.02	

Table 1. The effect of patient age, patient gender, BMI, surgeon experience and trainee level on mean total procedure time

RESULTS

Among 285 pediatric patients, patient factors such as younger age at the time of the surgery ($p < 0.005$) and lower BMI (< 0.005) were associated with significantly lower total procedure and console times. Surgeon factors including surgeon experience level and trainee level were associated with significant differences in console time and total procedure time, where higher primary surgeon experience were associated with lower total procedure times ($p < 0.005$) and console times ($p < 0.005$). Of note, cases with fellow assistance had higher total procedure times ($p < 0.005$) and console times ($p < 0.005$), likely reflecting the educational activity time differences at most institutions.

CONCLUSION

Review of high-volume data at our single institution revealed that total procedure time and console time of RALP in children are influenced by surgeon experience level, trainee level, age, and BMI of patients at the time of the surgery. Consideration of such factors could allow for improved pre-operative allocation of resources, i.e. variable booking times based on patient age or BMI to improve efficiency and reduce overall cost.

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