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ORIGINAL ARTICLE

The outcomes of Mini-Laparoscopic Pyeloplasty in Patients More Than Two Years: A prospective case series study.

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ABSTRACT

Background: The aim of this study was to evaluate the mini-laparoscopic efficacy in the management of ureteropelvic junction obstruction as regards functional and cosmetic results, complications, and patient's overall satisfaction.

Methods: a total of 28 patients were prospectively enrolled in this study at Zagazig university hospitals. All patients underwent preoperative laboratory evaluation and radiologic evaluation for assessment of pelvis antero-posterior diameter and maximal cortical thickness in mm using abdominal ultrasonography, and differential renal function, glomerular filtration rate (GFR) and drainage using renal scintigraphy. All patients underwent transperitoneal mini-laparoscopic pyeloplasty. Patients were evaluated postoperatively with documentation of any complications.

Results: Of 33 patients recruited in this study, 25 patients with a mean age of 18.47 ± 8.03 years completed 6 months of follow-up. Mean operative time was 178.2 ± 34.9 minutes. pVAS score at discharge was 0.40 ± 0.21 . There were highly statistically significant differences between both preoperative and postoperative ultrasonography and renal scintigraphy results. There is no major perioperative complication as per the Clavien-Dindo classification of surgical complications (grades IV–V). Total PSAQ score was 39.96 ± 2.44 .

Conclusions: Mini-laparoscopic pyeloplasty is a safe and feasible method for treatment of UPJO, as regards to the efficacy it shows excellent functional and cosmetic outcomes.

Keywords: Mini-laparoscopic pyeloplasty (mLP); Patient Scar Assessment Questionnaire (PSAQ); Postoperative Visual Analogue scale (pVAS); Ureteropelvic Junction obstruction (UPJO).



INTRODUCTION

Ureteropelvic junction obstruction is a common cause for pelvicalyceal system dilatation. Its causes may be primary or secondary. Regardless of its cause, the result is poor urinary drainage across the ureteropelvic junction that results in hydronephrosis. Intrinsic adynamic or atretic segment is a common cause for UPJO moreover, extrinsic factors such as abnormal crossing vessels and cicatricial bands due to postoperative or inflammatory reaction may cause ureteropelvic junction obstruction [1].

Before prenatal ultrasound era, patients with UPJO presented with renal colic, hematuria, UTI, or a clinically palpable abdominal mass. With emergence of prenatal ultrasound, urological anomalies are diagnosed earlier and frequently [2]. Open surgical repair of UPJO (dismembered pyeloplasty) has been the gold standard treatment, with a long-term success rate exceeds 95%. However, this procedure is associated with

significant postoperative morbidity and lower cosmetic results because of the flank incision [3].

In 1993, laparoscopic pyeloplasty was initially reported by Schuessler et al. It is a minimally invasive approach for reconstruction of the ureteropelvic junction under direct visualization. It has success rates comparable to the open surgical repair and in addition offers lower morbidity and better convalescence [8]. Laparoscopic pyeloplasty has become the treatment of choice for UPJO in many centers [4].

The introduction of miniature laparoscopic instruments rather than 5- or 10-mm instruments continues to improve surgical outcomes. The miniports are virtually incisionless and do not require suturing upon closure, resulting in a 'scarless' incision. Also, miniaturization of the incisions reduces pain and hospital stays, fasten recovery, and avoid wound morbidity [5]. In this study, we studied the safety and efficacy of mLP in patients above two years of age, report functional

and cosmetic outcomes of the procedure, and compare our preoperative and postoperative results.

METHODS

Ethical Considerations: Written consent was obtained from every patient after explanation of the procedure. Medical research and ethics committee of Zagazig University approved the study. The work was carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Study Design: This study was a prospective descriptive case series study carried out in Zagazig University Hospitals between January 2017 and January 2019. All patients with UPJO who fulfilled the inclusion criteria were included in this study and underwent mLP. Patients were evaluated before surgical interference by complete general and urological evaluation with stress on the renal ultrasonography, renal scintigraphy, and urine analysis.

Inclusion criteria: They were established as patients with primary ureteropelvic junction obstruction (UPJO). The following were the exclusion criteria: 1) age less than 2 years, 2) secondary ureteropelvic junction obstruction, 3) associated renal and ureteric pathology, 4) history of major abdominal surgery, 5) single kidney.

Equipment: Standard laparoscopic tower/monitor, veress cannula, 2.9 mm 30° telescope, 4 \ 3mm trocars, bipolar forceps 3mm, maryland grasper 3mm, metzenbaum scissors 3mm, hook electrode 3mm, irrigator-aspirator 3mm, needle holder 3mm, 4/0 vicryl sutures with 1/2 Circle CT-1 needle (Ethicon™).

Surgical procedures: The surgical technique performed was dismembered pyeloplasty. A retrograde pyelogram performed to confirm the diagnosis, define the anatomy of the UPJ, and the length and position of the obstructing segment aiding in port placement. The patient is positioned in lateral decubitus position with the side to be treated up. Veress needle was used to obtain pneumoperitoneum of 10 - 15 mm Hg prior to port insertion. Three ports are used, the telescope port is placed lateral to the umbilicus on the side of the affected kidney. The next ports are placed mid clavicular and anterior axillary lines in a triangular fashion to the telescope port.

White line of Tolddt's was incised to reflect the colon. The ureter was identified and dissected carefully upward towards the ureteropelvic junction and dilated renal pelvis, then stitch was placed through the abdominal wall to stabilize the renal pelvis. The pelvis was cut with scissors, and if anterior crossing vessels are present, the ureter and the renal pelvis was transposed anterior to the

vessels. The ureter is spatulated laterally and using 3.0 polyglactin suture in a running fashion for pelvi-ureteric anastomosis, and after completion of the posterior wall a 4th 3 mm port is inserted to complete the diamond shape with the previous three port to all guidewire insertion and antegrade DJ insertion. After proper placing of the DJ the anterior wall anastomosis was completed, and the hanging stich of the pelvis was removed. A 10 F tube drain is introduced, and bladder catheter is fixed. Oral feeding is allowed as soon as the patient is recovered from anesthesia. Pain control is available on patient demand. pVAS is recorded at 12 and 24 hours postoperatively, and at discharge. Urethral catheter and DJ were removed at discharge and 1 month respectively. All patients have been followed by US and PSAQ score was measured at 3 months and renal scintigraphy is done at 6 months.

STATISTICAL ANALYSIS

The data were presented by mean \pm SD and analyzed with SPSS version 20 (IBM Corp., Armonk, IL, USA). Mean age, operative time in minutes, blood loss in ml, drain removal time in hours, DJ stent removal time in days, hospital stay in hours. Comparison of preoperative and postoperative ultrasonographic parenchymal thickness and anteroposterior pelvic diameter value and renal scintigraphy GFR and drainage using paired students t-test. Statistical significance was considered at $p < 0.05$ for all analyses.

RESULTS

Demographic and preoperative data were noted (Table 1), and patients' perioperative results were noted (Table 2). Major complications were not observed, as per the Clavien-Dindo classification of surgical complications (grades IV–V). 3 patients (12%) develop persistent urinary leakage grade I managed conservatively by little bit retraction of the drain, 2 patients (8%) develop persistent urinary leakage grade III b due to improper DJ position (didn't reach the bladder) managed by double J repositioning endoscopically. 4 patients (16%) developed postoperative fever grade I and was managed by antipyretics (Paracetamol tablet or suppository), and 5 patients (20%) develops stent related symptoms (dysuria) grade II treated by antimuscarinic (Tropium chloride 20 mg tablet BID). 2 patients developed postoperative pain treated by ibuprofen syrup in pediatric patient and ketorolac (0.5mg/kg, IV) in adult (Table 3).

The mean GFR of the affected kidney increased from 29.92 preoperatively to 42.20 postoperatively, mean antro - posterior diameter of the renal pelvis reduced from 5.37 cm preoperatively to 2.80 cm postoperatively. Mean parenchymal thickness in mm increased from 8.33 preoperatively to 8.42 postoperatively. The

obstruction assessed by mean ($T \frac{1}{2}$) in renal scintigraphy improved from 31.52 preoperatively to 10.45 postoperatively. All show highly statistically significance difference (P-value ≤ 0.001) except the mean parenchymal thickness shows no statistically significance difference (Table 4). Regarding pain assessment mean pVAS

6h postoperative was 1.60, mean pVAS 12h postoperative was 0.94, mean pVAS 24h postoperative was 0.56 and mean pVAS at discharge was 0.40. (Table 5) As regards to assessment of cosmetic results using Scar Assessment Questionnaire (PSAQ) mean total PSAQ at 3 months was 39.96 (Table 6).

Table (1): Demographic and preoperative data.

Patients Number		25	
Mean age (Years) Mean± SD		14.68 ± 7.61	
		(N)	Percentage
Sex	Male	13	52%
	Female	12	48%
Age group	Pediatric	16	64%
	Adult	9	36%
Diagnosis	Loin pain	10	40%
	Asymptomatic	9	36%
	UTI	6	24%

n= number / SD= Standard deviation

Table (2): Peri-operative data.

	Mean ± Standard deviation
Operative time in minutes	178.2 ± 34.9
Blood loss in ml	130.2 ± 74.6
Drain removal time in hours	36.7 ± 12
DJ stent removal time in days	28.6 ± 5.4
Hospital Stay in hours	48.7 ± 18

Table (3): Complications of both groups.

	CDC	N (%)	Management
Conversion to hybrid procedure		5 (20%)	
Fever	I	4 (16%)	Follow up
Persistent urinary leakage	I	3 (12%)	Follow up
Postoperative pain	II	7 (28%)	Analgesics
Storage symptoms	II	5 (20%)	Antimuscarinic.
Persistent urinary leakage	IIIb	2 (8%)	Percutaneous nephrostomy catheter placement.

Clavien-Dindo classification.

Table (4): Follow up data.

		Mean± SD	Range	P - Value
PT (mm)	Preoperative	8.33 ± 1.95	4.50 - 11.50	0.064
	Postoperative	8.42 ± 1.89	5.00 - 11.50	
APD (cm)	Preoperative	5.37± 0.63	3.9 – 6.3	< 0.001 *
	Postoperative	2.80 ± 0.86	1.8 – 4.5	
GFR (ml/min)	Preoperative	29.92 ± 6.25	18–40	< 0.001 *
	Postoperative	42.20 ± 8.87	25-60	
T ½ (min)	Preoperative	31.52 ± 10.77	16–60	< 0.001 *
	Postoperative	10.45 ± 4.42	4-18	

P= probability of significance / *statistically significant / Used test is paired sample t-test.

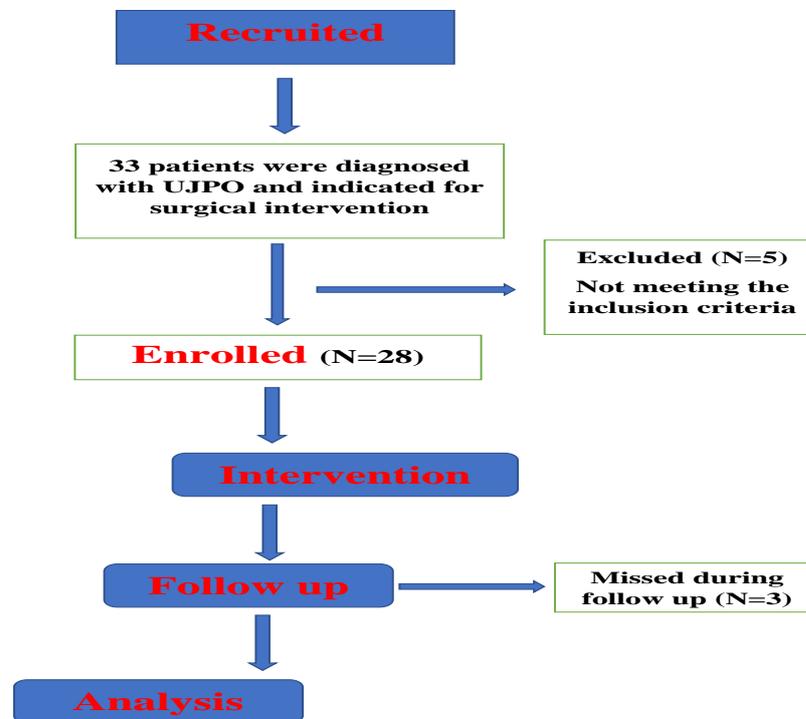
Table (5): Pain Visual Analogue Scale (pVAS) Results.

	Mean ± Standard deviation
pVAS 6h postoperative	1.60 ± 0.52
pVAS 12h postoperative	0.94 ± 0.30
pVAS 24h postoperative	0.56 ± 0.26
pVAS at discharge	0.40 ± 0.21

Table (6): Cosmetic results of the patients.

	Mean ± Standard deviation
Scar Appearance	9.96 ± 1.3
Scar Symptoms	6.24 ± 0.59
Scar Consciousness	8.00 ± 1.11
Satisfaction with Appearance	9.60 ± 1.29
Satisfaction with Symptoms	6.00 ± 0.00
Total PSAQ ^a	39.96 ± 2.44

PSAQ (Patient Scar Assessment Questionnaire Results at 3 months postoperative).



DISCUSSION

Ureteropelvic junction obstruction (UPJO) is the most common abnormality of the kidney [6]. The use of antenatal ultrasonography and the advent of modern imaging techniques have resulted in earlier diagnosis of hydronephrosis [7]. Andersen and Hynes described open pyeloplasty and it remains the gold standard treatment for UPJO. Over the last two decades, many new approaches have evolved for the treatment of UPJO, from open pyeloplasty to various minimally invasive procedures such as endopyelotomy, balloon dilatation, laparoscopic and robotic pyeloplasty [8].

Due to development of laparoscopic devices and surgical technology, laparoscopic pyeloplasty (LP)

has become the standard surgical treatment method globally. LP is a safe and effective, minimally invasive method for the treatment of UPJO [4]. The advantages of laparoscopic approach that having less postoperative pain, shorter hospital stay, and more rapid convalescence, with better cosmetic results compared with open pyeloplasty [9]. The introduction of miniaturized laparoscopic instruments continues to further the field. The 3-mm ports are virtually incisionless and do not require suturing upon closure. The result for the patient is essentially a “scarless” incision. Moreover, many consider that 3-mm incisions rather than 5- or 10-mm incisions reduce pain and translate to shorter hospital stays, faster recovery,

and diminished wound morbidity [10]. Therefore, this study was designed to evaluate mini-laparoscopic procedure in treatment of UPJO to demonstrate the feasibility and results of this technique after 3 months of follow-up.

In literature Simforoosh et al, Leonardo et al, and Pelit et al, found mean operative time were 127, 107, and 119 minutes respectively. We found that our operative time is longer than other studies and this attributed to our initial growing experience and small number of cases relative to others [11], [12], [13]. Simforoosh et al, reported, febrile UTI in two patients, which was treated by an antibiotic therapy, urinary leakage was found in eight patients, in six patients, urinary leakage was consequent of Double-J migration and were corrected endoscopically, and other two patients did not response to Double-J reinsertion, so they were treated with nephrostomy [11]. Leonardo et al, 2019 reported 6 children had UTI, one of them needing hospitalization, 2 had dislodgement of the DJ stent, and one had omental fat exteriorization during drain removal [12]. Pelit et al observed urine leak from the drain in two patients, spontaneous resolution was seen to have occurred at the follow-up on day 5 in one patient, while the urine leakage ceased after the replacement of the DJ stent in another patient. One patient has UTI and was treated according to urinary culture result. Another patient develops secondary UPJO at the follow-up in the 12th month and underwent laser endopyelotomy with flexible ureteroscopy [13]. Marco B et al, reported 3 patients suffered complications Clavien-Dindo Classification IIIb, 2 patients suffered an omental prolapse through a port site after drainage removal, which were reduced under general anesthesia, one patient required placement of a percutaneous drain due to a urine leak. One patient due to intraoperative acidosis required an intensive care unit bed for bicarbonate correction regime [13].

So, we found that most of complications reported in the literature from mLP were related to stent DJ and UTI, and that agreed with our study results.

Many researchers reported hospital stay 3.41, 2.1, 2, 3.3, 4.69 and 3 days respectively [11], [12], [13], [14], [15]. From these results we found that our hospital stay time was shorter than others this may be attributed to early removal of the drain (36.7 ± 12 hours).

Leonardo et al, reported, mean reduction on the postoperative APD was 41.8% (end APD 5 to 41mm). Three patients had improved but maintained postoperative hydronephrosis. The difference between our results and Leonardo et al. results may attribute to reduction of the pelvis in our study [12].

All of them showed a good washout curve on DTPA.

Marco B et al, reported that all the patients presenting in the renography less than 15% of the split renal function of the affected kidney showed a recovering function [14]. Fiori et al, reported that all patients but one in the had a $T_{1/2} < 20$ min on renal scan performed 1 year after surgery [15].

Leonardo et al, reported that, all children had good cosmetic results [12]. Pelit et al, reported that, the minimum and maximum PSAQ scores at month 3 postoperatively were 24 and 86, respectively. [13]. Simforoosh et al, reported that the mean appearance score (PSAQ) was 10.2 [11].

The primary endpoint if the study was the functional success of the procedure after renal isotope scan at 6 months, and the secondary endpoint was the cosmetic success of the procedure after PSAQ at 3 months.

The limitations of this study related to the limited number of patients, diversity of the age groups and short follow up time, also the weakness and limited availability of minilaparoscopic instruments as more challenges to our study. Also due to our initial experience in intracorporeal suturing make the operative time longer than others.

CONCLUSIONS

Minilaparoscopic pyeloplasty is a safe and feasible method for treatment of UPJO, as regards to the efficacy it shows excellent functional and cosmetic outcomes.

Conflicts of Interest/ Financial Disclosures: Nothing to declare.

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REFERENCES

1. Eden C, Gianduzzo T, Chang C, Thiruchelvam N, Jones A. Extraperitoneal laparoscopic pyeloplasty for primary and secondary ureteropelvic junction obstruction. *J Urol* 2004; 172(6): 2308-11.
2. Cain MP, Rink RC, Thomas AC, Austin PF, Kaefer M, Casale AJ. Symptomatic ureteropelvic junction obstruction in children in the era of prenatal sonography—is there a higher incidence of crossing vessels? *Urology* 2001; 57(2): 338-41.
3. Troxel S, Das S, Helfer E, Nugyen M. Laparoscopy versus dorsal lumbotomy for ureteropelvic junction obstruction repair. *J Urol* 2006; 176(3): 1073-6.
4. Kapoor A, Allard CB. Laparoscopic pyeloplasty: The standard of care for ureteropelvic junction obstruction. *Can Urol Assoc J* 2011; 5(2): 136.
5. Soble JJ, Gill IS. Needlescopic urology: incorporating 2-mm instruments in laparoscopic surgery. *Urology* 1998; 52(2): 187-94.

6. Williams B, Tareen B, Resnick MI. Pathophysiology and treatment of ureteropelvic junction obstruction. *Curr Urol Rep* 2007; 8(2): 111-7.
7. Lee H, Han SW. Ureteropelvic junction obstruction: what we know and what we don't know. *Korean J Urol* 2009; 50(5): 423-31.
8. Schuessler WW, Grune MT, Tecuanhuey LV, Preminger GM. Laparoscopic dismembered pyeloplasty. *J Urol*. 1993; 150(6): 1795-9.
9. Lasmar MT, Junior CHA, Vengjer A, Guerra FA, Souza EA, Rocha LM. Transperitoneal laparoscopic pyeloplasty: Brazilian initial experience with 55 cases. *Int Braz J Urol* 2010; 36(6): 678-84.
10. Porpiglia F, Morra I, Bertolo R, Manfredi M, Mele F, Fiori C. Pure mini-laparoscopic transperitoneal pyeloplasty in an adult population: feasibility, safety, and functional results after one year of follow-up. *Urology* 2012; 79(3): 728-32.
11. Simforoosh N, Djafari AA, Shemshaki H, Shakiba B, Golshan A, Bonakdar M. Mini-laparoscopic management of ureteropelvic junction obstruction in adults and children: A high-volume case series. *J Laparoendosc Adv Surg Tech* 2019; 29(6): 747-51.
12. Leonardo CR, Muzzi A, Távora JE, Soares RQ. The outcomes of mini-laparoscopic pyeloplasty in children-Brazilian experience. *Int Braz J Urol* 2020; 46(2): 253-9.
13. Pelit ES, Ciftci H, Kati B, Yagmur I, Ordek E, Arslan E, Yeni E. Mini-laparoscopic pyeloplasty in adults: Functional and cosmetic results. *Urol J*. 2018; 15(6): 339-43.
14. Marco BB, Fuller TF, Friedersdorff F, González R, Lingnau A. Transperitoneal mini-laparoscopic pyeloplasty in flank position: a safe method for infants and young adults. *Front Surg* 2018; 5: 32.
15. Fiori C, Morra I, Bertolo R, Mele F, Chiarissi ML, Porpiglia F. Standard vs mini-laparoscopic pyeloplasty: perioperative outcomes and cosmetic results. *BJU Int* 2013; 111(3b): E121-E6.

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