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Retroperitoneoscopic Dismembered Pyeloplasty for Primary Ureteropelvic Junction Obstruction in a Horseshoe Kidney: A Case Report and Review of the Literature

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ABSTRACT

A 22-year-old female presented with symptomatic primary ureteropelvic junction (UPJ) obstruction of the right renal moiety in a horseshoe kidney. She was managed via right retroperitoneoscopic dismembered pyeloplasty. The patient is doing well in 2 years of follow-up. A review of the literature revealed 24 cases of transperitoneal laparoscopic pyeloplasty done for UPJ obstruction in a horseshoe kidney. Of these, only 1 case was approached with anterior extraperitoneal techniques for the kidney. Herein, we report the first right retroperitoneoscopic dismembered pyeloplasty, performed using 3 ports described for classic retroperitoneoscopy.

CASE REPORT

A 22-year-old female presented with a history of recurrent, dull, aching right flank pain for 1 year. There were no other associated symptoms. Her general physical examination and abdominal examination were unremarkable. Her blood investigations revealed normal hemogram, normal renal function tests, normal liver function tests, normal urinalysis, and urine culture and sensitivity. The renal ultrasound showed the presence of a horseshoe kidney with hydronephrotic right renal moiety. An intravenous urogram showed a moderately dilated, right pelvicalyceal system. Contrast enhanced computed tomography (CT) scans of the abdomen did not show any aberrant renal vessel crossing the ureteropelvic region. The DTPA scan revealed right spilt renal function of 40%, with significant subrenal obstruction (Figure 1).

The patient was managed with right retroperitoneoscopic pyeloplasty. Before the procedure, a right retrograde ureteropyelogram was done and a 6 Fr, 26 cm double-J stent was inserted. The patient was placed in the right kidney position and ports placement was done. The first port was placed just below and in front of the twelfth rib. A small 2.5 cm incision was given, and the dorsolumbar fascia was incised to reach the retroperitoneal space. The space was developed partially by blunt finger dissection and further developed by the indigenous balloon dissection method. Carbon dioxide pneumoretroperitoneum, with a pressure of 15 mmHg, was maintained throughout the procedure. The ureter was identified first, and the pelvis, ureteropelvic junction, and upper ureter were dissected to make them free of the surrounding fascia (Figure 2). The renal pelvis opened up, the redundant pelvis was trimmed, and the proximal ureter was spatulated laterally for 2.5 cm. The ureteropelvic anastomosis was performed with 4-0 polygalactin as a continuous suture. A soft Silastic tube drain was inserted at the end of the procedure.

The postoperative course was uneventful. Total operative time and intracorporeal suturing time were 120 minutes and 40 minutes, respectively. Estimated blood loss was 50 mL. The patient was discharged on the third postoperative day. The double-J stent was removed at 6 weeks. A renal ultrasound and intravenous urography (IVU) were performed 3 months following the operation and showed near complete resolution of hydronephrosis. A DTPA scan at the 12-month follow-up showed split renal function of 42% with no subrenal obstruction (Figure 3). The patient is doing well in 2 years of follow-up.

KEYWORDS: Retroperitoneoscopy, dismembered, pyeloplasty, horseshoe kidney, UPJ obstruction

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Figure 1. A preoperative renogram showing the right subrenal obstructive pattern.

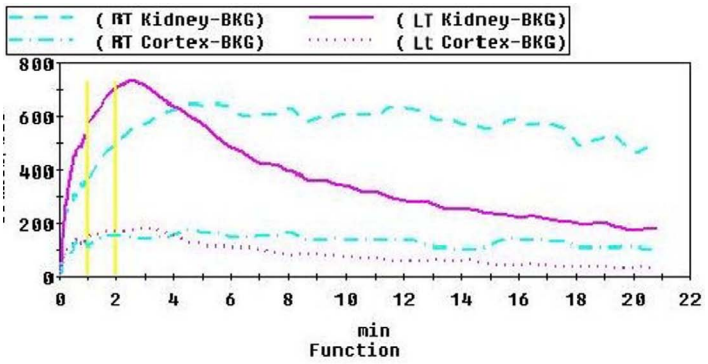
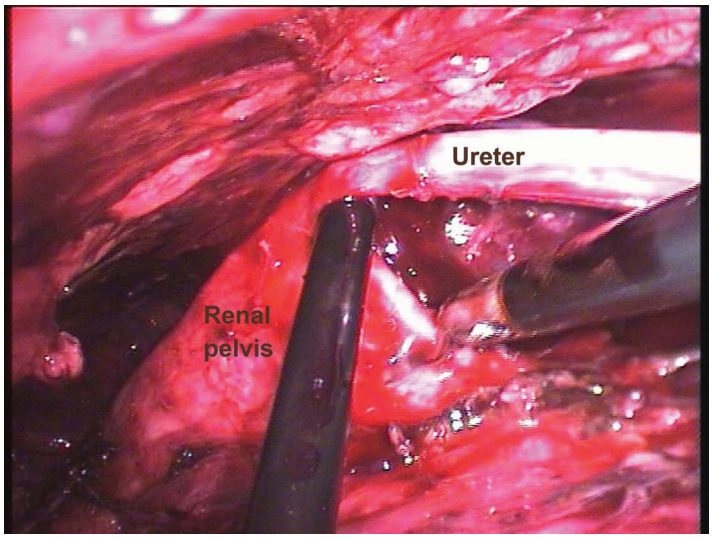


Figure 2. Retroperitoneoscopic view of the dilated pelvis with the ureteropelvic junction.



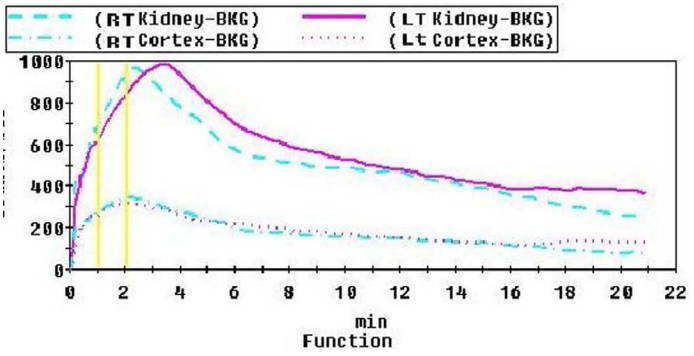
DISCUSSION

Horseshoe kidneys are the most common congenital renal fusion anomaly with an approximate incidence of 1/400 births to 1/1000 births. Although most horseshoe kidneys are asymptomatic, ureteropelvic junction obstruction occurs in 15 to 33% of this population [1]. A high incidence of ureteropelvic junction (UPJ) obstruction is related to a high insertion of the ureter in the pelvis, the anatomic relation of the ureter to the isthmus, and a high incidence of aberrant renal vessels at the lower pole. Surgical management in the form of the excision of stenotic ureteropelvic segments, the trimming of a redundant pelvis, the transposition of any aberrant vessels, and ureteropelvic anastomosis are the basic principles of management. The division of the isthmus and the nephropexy may or may not be required. The division of the isthmus has been a topic of debate during pyeloplasty in such patients. Culp et al. reported that isthmusectomy may allow the kidneys to lie in a more dependent position that maintains the patency of newly reconstructed ureteropelvic regions. After division of the isthmus, the medial portion of the separated kidney rotates to lessen the obstruction.

Traditionally, isthmusectomy entails the placement of sutures on either side of the intended line of division, with subsequent closure of the renal capsule over the suture line. This suture closure facilitates hemostasis [3]. Similarly, the role of nephropexy remains debatable. At present, nephropexy is not believed to be universally necessary [1,3].

Traditionally, open dismembered pyeloplasty is performed with a success rate of 55 to 80% [1,2]. In an era of minimally invasive surgery, endopyelotomy and robotic and laparoscopic pyeloplasties are performed for UPJ obstruction in horseshoe kidneys and other renal fusion anomalies with variable success

Figure 3. A postoperative renogram showing nonobstructive drainage of the right kidney.



(Table 1). Hemorrhage is very important and a common complication of endopyelotomy, particularly in horseshoe kidneys with a high incidence of lower polar aberrant renal vessels. The long-term success rate of antegrade/retrograde endopyelotomy is around 60 versus 95% for laparoscopic pyeloplasty [4]. Although robotic pyeloplasty is promising it is expensive, and long-term results are awaited [5]. The open surgical approach of dismembered pyeloplasty is found through the retroperitoneal approach.

Laparoscopic pyeloplasty is, in a true sense, the reflection of open pyeloplasty. In transperitoneal laparoscopic pyeloplasty,

Table 1. Reported case reports/series of horseshoe kidneys with UPJ obstruction, and the results of laparoscopic pyeloplasty.

S.N.	Author/Series	Journal	Cases	TPLP/ RPLP	Renal Moiety (RK/LK)	Pri/Sec UPJ Obstruct.	Important Aspects/ Concomitant Procedures	Follow-up in Months (mean, range)	Hospital Stay in Days (mean, range)	Operating Time in Min (mean, range)	Blood loss in mL (mean,range)
1	Jenetschek et al.	*Urology* 1996	1	TPLP	LK	pri	first reported the lap. pyeloplasty in HSK (1 had HSK in series of 17)	Not given	5.1 (2-11)	280 (240-360)	N/A
2	Nadler et al	*J Endourol* 2003	1	TPLP	LK	pri	hand-assisted, isthmuscetomy by harmonic scalpel in same operation	1	3	230	300
3	Hsu and Presti	*Urology* 2003	1	RPLP	LK	pri	ant./ext. peritoneal approach	8	1.5	400	30
4	Eden et al.	*J Urol* 2004	1	TPLP	LK	pri	only TPLP in 124 RPLP group	19.7	2.8	144	N/A
5	Bove et al.	*J Urol* 2004	5	TPLP	LK-2 RK-3	pri	pyelolithotomy in 3 cases in same operation	24.6 (4-83)	3.2 (2-5)	195 (85-403)	122 (20-300)
6	Kawauchi A et al.	*J Endourol.* 2005	1	TPLP	LK	pri	4-year isthmusectomy	3	14	310	10
7	Reddy et al.	*J Urol* 2005	1	TPLP	LK	pri	4-year had contralateral contracted kidney with hypertension	3	14	160 (90-270)	60
8	Lane et al.	*J Endourol* 2006	1	TPLP	LK	pri	A case of bilateral UPJ obs.; unilateral nephrectomy done in same operation.	4	3	132	350
9	Yamaguchi	*Nihon Hinyokika Gakkai Zasshi* 2006	1	TPLP	LK	sec	nephropexy and isthmuscetomy performed	18	N/A	312	75
10	Chammas et al.	*BJU Int* 2006	3	TPLP	RK	priv	robot-assisted pyelolithotomy in 2 patients	21	7.6	148	< 100
11	Taluq et al.	*Can J Urol* 2007	1	TPLP	LK	pri	pediatric pt	6	1	272	< 10
12	Braga et al.	*J Endourol* 2007	2	TPLP	LK	pri	pediatric pt	12	2.1 (1-4)	221	N/A
13	Nadu et al.	*Int Braz J Urol* 2009	2	TPLP	LK		pyelolithotomy of multiple caliceal stones	N/A	N/A	N/A	N/A
14	Obermayr et al.	*J Ped Urol* 2010	1	TPLP	LK	pri	9 months old; associated caliceal diverticulum treated in same sitting	1 1/2 (6 weeks)	8	N/A	N/A
15	Lallas et al.	*W J Urol* 2011	2	TPLP	LK	sec	both patients had history of failed endopyelotomy	19.3 (15.5-24)	2.5	390 (360-420)	minimal

Abbreviations: TPLP: transperitoneal laparoscopic pyeloplasty); RPLP: retroperitoneal laparoscopic pyeloplasty; LK: left kidney (moiety) of a horseshoe kidney; RK: right kidney (moiety) of a horseshoe kidney

the peritoneal cavity is traversed, and there can be many complications such as urine leaks, bowel injuries, peritonitis, and ileus. Retroperitoneoscopic dismembered pyeloplasty respects the basic principle of approaching kidneys through the retroperitoneum so there are no peritoneal complications. Our technique of retroperitoneoscopic dismembered pyeloplasty is suitable for anomalous and malrotated kidneys, which usually lay low in the retroperitoneum. The port placement in retroperitoneoscopy is subcostal, which is favorable for reconstruction in such kidneys. The anomalous kidneys, such as horseshoe kidneys, malrotated kidneys, ectopic kidneys, and crossed ectopia with or without fusions (if associated with UPJ obstruction), can be dealt with via this technique. However, careful selection of cases and preoperative investigation with respect to an anomalous vascular supply of such kidneys should be kept in mind.

The majority of the literature focused on the transperitoneal

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approach because for instrument handling and intracorporeal suturing, there is a large peritoneal space that makes the procedure comparatively easy. Hence this procedure is more popular but associated with peritoneal complications. In retroperitoneoscopy, there is limited space for instrument handling and intracorporeal suturing, which makes it a difficult procedure, but there are no complications related to the violation of the peritoneal cavity. Janetschek et al. first reported transperitoneal laparoscopic pyeloplasty in a case of a horseshoe kidney. He presented the experience of transperitoneal and retroperitoneoscopic repair of ureteropelvic junction obstruction in 17 patients where 1 case had a horseshoe kidney with UPJ obstruction with left renal moiety. The authors failed to give a detailed description of the procedure in this particular patient [6]. Nadler et al. reported hand-assisted transperitoneal laparoscopic pyeloplasty in 1 case in which isthmusectomy by harmonic scalpel was performed simultaneously in the same operation [7]. Hsu and Presto reported a novel technique of anterior extraperitoneal laparoscopic pyeloplasty with good results. In this technique, the authors made an 8 cm incision in the anterior abdominal wall lateral to the rectus muscle, and by blunt finger dissection a space was created in which a balloon was inflated to make pre-peritoneal space. In this space, trocars (camera and secondary ports) were inserted, and lateral dissection was done to push the peritoneum medially to reach to kidney. The main drawback of this technique revealed that the pre-peritoneal space created was too large and time consuming [8]. Eden et al. reported a case of laparoscopic transperitoneal pyeloplasty with good results and concluded that the procedure is feasible, even for a horseshoe kidney [9]. Bove et al. reported 11 cases of upper urinary tract anomalies with UPJ obstruction. Of these, horseshoe kidneys were present in 5, pelvic kidneys in 3, pancake kidney in 1, malrotated kidney in 1, and a duplicated collecting system in one patient. Laparoscopic transperitoneal dismembered pyeloplasty was performed in all cases. In 5 cases of horseshoe kidneys of this series, right renal moiety was involved in 3 and left renal moiety in 2. Concomitant pyelolithotomy was done simultaneously in 3 such patients. The authors concluded that in anomalous kidneys with UPJ obstruction, laparoscopic pyeloplasty is the procedure of choice [10].

Kawauchi et al. reported transperitoneal laparoscopic pyeloplasty in pediatric patients in which isthmusectomy was also performed simultaneously and the procedure was uneventful [11]. Reddy et al. reported transperitoneal laparoscopic pyeloplasty in 1 patient with good results and concluded that it should be the procedure of choice in such patients [12]. Lane et al. reported an interesting case of bilateral UPJ obstruction with a horseshoe kidney. The patient presented with nonfunctioning left renal moiety, and right renal moiety was functioning but obstructed. The serum creatinine in this patient at presentation was 2.9 mg%, which dropped to 1.6 mg% following retrograde DJ stenting. The patient was taken for simultaneous left transperitoneal laparoscopic nephrectomy and right dismembered pyeloplasty. The operative time was 5.7 hours, but the procedure was uneventful [13]. Yamaguchi et al. reported transperitoneal laparoscopic pyeloplasty in 1 patient where nephropexy and isthmusectomy were also done simultaneously, and they concluded that simultaneous procedures are feasible in such patients [14]. Chammas et al. reported laparoscopic robot-assisted pyeloplasty in 3 patients where robot-assisted pyelolithotomy was also performed simultaneously [15]. Taluq et al. reported transperitoneal laparoscopic pyeloplasty in a pediatric patient. The procedure was successful with a good outcome [16]. Braga et al. reported another case of transperitoneal laparoscopic pyeloplasty in pediatric patients with a good outcome [17].

Nadu et al., in a paper on the role of laparoscopic surgery in the management of nephrolithiasis, also discussed 2 patients who had horseshoe kidneys with UPJ obstruction. Both these patients also had pelvic and multiple caliceal stones. The pyelolithotomy, extraction of caliceal stones, and laparoscopic transperitoneal pyeloplasty were done successfully in both patients. The authors concluded that despite the anterior location of the pelvis with aberrant renal vessels, the procedure remained successful in such cases [18]. In an interesting case report, Obermayr et al. reported successful laparoscopic transperitoneal pyeloplasty in a 9-month-old child. This was a case of Turner syndrome with horseshoe kidney and ureteropelvic junction obstruction of the left renal moiety, and there were caliceal diverticula with a narrow infundibulum of the upper pole. The resection of the narrow infundibulum was also performed simultaneously in the same operation, and the authors concluded that laparoscopic surgery is technically feasible in selected cases with complex malformations of the kidney and renal collecting system [19].

Lallas et al. reported the experience of transperitoneal laparoscopic pyeloplasty in 2 of his 9 patients who had horseshoe kidneys with UPJ obstruction. In this study, retrograde endopyelotomy was performed in 6 patients, and in 1 patient robotic pyeloplasty was done. The reason for the selection of different modalities for 9 patients was not clearly explained, which shows that laparoscopic pyeloplasty is still not universally performed on horseshoe kidneys [20]. In our case, retroperitoneoscopic dismembered pyeloplasty by classical retroperitoneoscopy using 3 ports showed a good outcome in 2 years of follow-up.

CONCLUSION

Although transperitoneal laparoscopic pyeloplasty is being performed for UPJ obstruction in horseshoe kidneys, retroperitoneoscopic dismembered pyeloplasty is an effective and more suitable technique in such patients.

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