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Robot-assisted Pyeloureterostomy in Bifid Renal Pelvis With Ureteropelvic Junction Obstruction of the Lower Moiety

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ABSTRACT

Duplications of the urinary collecting system and pyelo-ureteral junction obstruction (PUJO) are common, but the simultaneous presence of both anomalies is rarely encountered. In incomplete duplicated systems, PUJO usually affects the lower moiety. We present the case of a 5-year old boy with left bifid renal pelvis and hydronephosis of the lower moiety treated by robot-assisted pyeloureterostomy.

Introduction

Duplications of the urinary collecting system are the most common anomalies of the upper urinary tract with a reported incidence of 1 in 125 or 0,8%.[1] They can be complete or incomplete and associated to other anomalies such as vesicoureteral reflux, ureterocele and ectopic ureter. Pelviureter junction (PUJ) is the most common site of obstruction in the urinary tract. Although duplications and PUJO are common, the simultaneous presence of both anomalies is rarely encountered. In incomplete duplicated systems, PUJO usually affects the lower . Diagnosis and management of this condition can be different because of the wide anatomic variants. We report the case of a 5-year-old boy with left bifid renal pelvis treated by robot-assisted pyeloureterostomy.

Case presentation

A 5-year-old male came to our attention for hydronephrosis of the lower pole of a left duplex kidney. He was born on term, no anomalies were prenatally identified. The left pelvic dilation was detected on a screening ultrasound at one month of age (antero-posterior diameter, APD: 12 mm). A voiding cystourethrogram ruled out a vesicoureteral reflux and other lower tract causes of hydronephrosis, such as posterior urethral valves. A diuretic renal scintigraphy with MAG3 identified a poor response to the administration of diuretic, though determining an equal contribution between the two kidneys (functional contribution 50%). Being the infant asymptomatic and parenchyma preserved, a conservative follow-up was decided. Ultrasounds were repeated every six months until the age of 3 years and then every year until the age of 5. A MAG3-diuretic renal scintigraphy was repeated at 18 months of age, and it was basically unchanged compared to the first one. The ultrasonography follow-up documented a progressive increase of the pelvic dilation (APD at 5 years, old 25 mm). An URO CT scan was performed and confirmed a left duplex kidney with a dilated lower moiety (APD 25 mm), and identified a reduction in parenchymal thickness of the lower left moiety. A tardive scan at 60°min showed a persistent retention of contrast medium within the pelvis (Fig. 1a–b).

In sight of these findings the patient was referred to our department. Having considered the age of the patient, the worsening of the dilation and the obstructive pattern on scintigraphy and URO-scan, we decided to treat the patient using a robot-assisted laparoscopic pyeloplasty.

We used the DaVinci Xi Robotic Surgical System. The patient was positioned in lateral decubitus and tilted at about 45°.

The optical port was inserted in the umbilicus and two 8 mm working ports were placed on the epigastrium and left iliac fossa. An additional 5 mm port was placed between the umbilical and epigastric ones.

The hydronephrotic pelvis was visible through the mesocolon, so we opted for a transmescolic approach. Once opened the parietal

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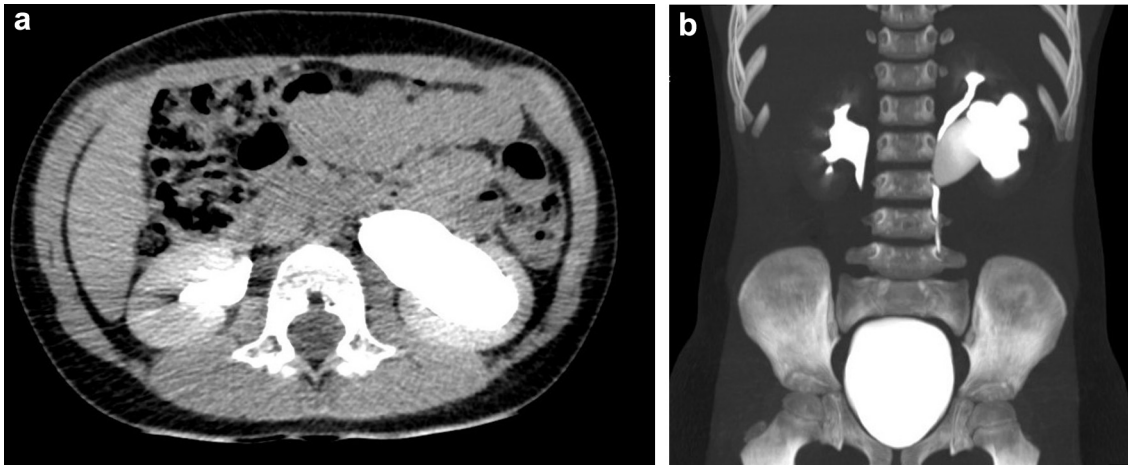

Figure 1. a–b Axial (a) and cornal (b) view of hydronephosis of the lower moiety. The course of the ureter draining the lower pole was not visible.

peritoneum, the lower UPJ and gonadal vessels identified, the ureter was gently mobilized, isolated and surrounded by a rubber band. We started to look for the upper system and we realized that we were dealing with a bifid pelvis.

As this anatomical variant excluded a traditional dismembered pieloplasty, we decided to perform a pelviureteric anastomosis between the common ureter and the dilated lower pelvis. We incised the common ureter distal to the bifidity and the dilated

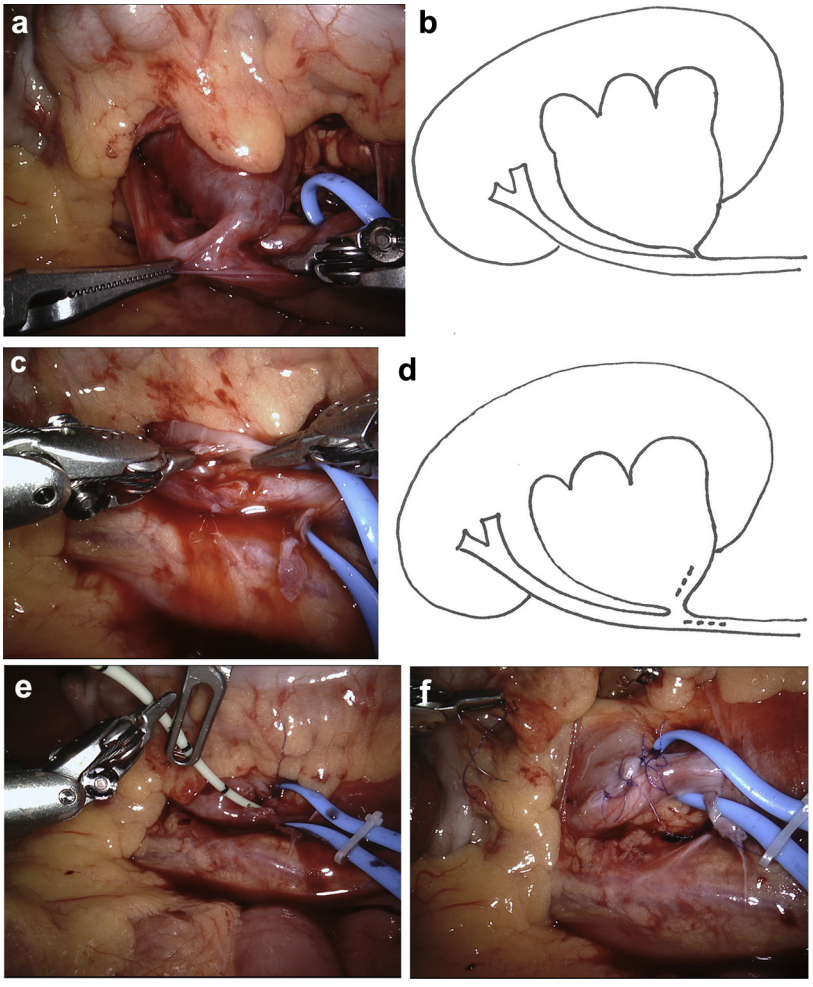

Figure 2. a–b) bifid system with a dilated lower pelvis; c–d) the common ureter and the dilated pelvis is incised as close as possible to each other; e) after realization of the posterior anastomosis, an antegrade double-J ureteral stent is placed intraoperatively; f) pyeloureteric anastomosis with a 5–0 interrupted PDS suture. The **figures** 2b and 2d are the schemes of figures 2a and 2c respectively. So it would be appropriate to change the pattern of figures i.e. a and b in the same line, c and d in another one and the last e and f in a third line.

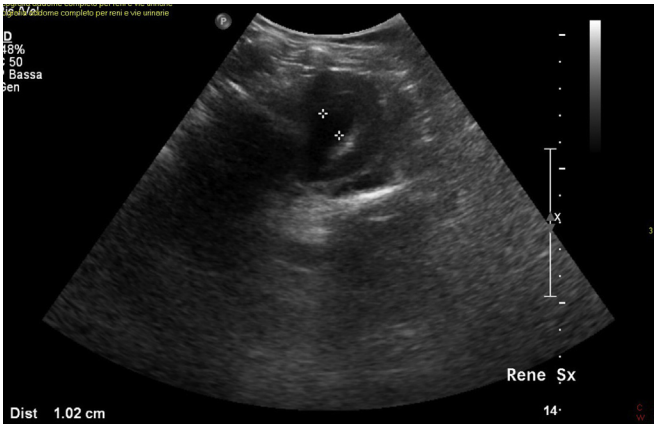

Figure 3. US at 3 months follow-up showing reduction of pelvic dilatation.

pelvis as close as possible to each other. The anastomosis was performed with a 5–0 interrupted PDS suture. An antegrade double-J ureteral stent was placed through a 3 mm trocar inserted in the assistant port. The anterior anastomosis was then completed. We closed the mesocolon with a 5–0 PDS running suture (Fig. 2).

The trocar sites were then closed. The Foley catheter was left in place and removed on postoperative day 3. The stent was cistoscopically removed after 1 month and at 3 months follow-up, the US confirmed a reduction of pelvic diameter (10 mm) (Fig. 3).

Discussion

Ureteropyeloanastomosis was first described by Kummel in 1913 as reported by Diaz-Ball.[2] In 1993 Suzuki et al introduced laparoscopic nephrectomy in a child with duplicated system.[3] Laparoscopic and robotic ureteropyeloanastomosis in the treatment of duplex system in children was first described by Kutikov et al in 2007.[4]

The treatment of PUJ obstruction in a duplex system may include observation, pyeloplasty or heminephrectomy, according to the severity of obstruction, residual function of the affected moiety and anatomical variants. In our case, the patient was firstly treated conservatively as he was asymptomatic and renal function was stable. We then decided for a surgical procedure because a worsening of dilation and obstructive pattern.

The patient underwent a URO CT scan with the attempt to clarify the anatomy and rule out aberrant vessel and/or stones undetected by US. Preoperative imaging suggested an incomplete duplicated system as the lower pole ureter wasn't visible, but we didn't suspect a bifid renal pelvis. Other authors suggest preoperative retrograde ureteropyelography to obtain anatomical details.[1] We usually perform preoperative retrograde pyelogram in similar cases. In this case we thought the 3D magnification would allow to deal with possible anatomic variant without the addition of further doses of radiation, although very low.

In cases of conserved function of the affected moiety, dismembered pyeloplasty is the treatment of choice but end-to-side pyeloureterostomy and ureterocalicostomy can both be considered potential surgical treatments.[5] In incomplete duplications, the length of the ureter between the dilated pelvis and the junction of the upper pole and the lower pole ureter is the major determinant of the reconstructive technique used. In our case, there was no possibility to perform a dismembered pyeloplasty because of the absence of the lower pole ureter.

In our department we have great experience in mininvasive surgery (MIS) and we are at the beginning of our experience with robot-assisted laparoscopic surgery.

MIS has become increasingly popular in pediatric urology even if the evolution from extirpative procedures to reconstructive ones has been slower because of skills needed in intracorporeal anastomosis. Robotic technology allows to overcome these limits and shorten the learning curve. These potential advantages are attributed to wristed instrumentation with 7 degrees of freedom, a better ergonomy of the surgeon and 3D visualization.

In our case robotic technology allowed a perfect visualization of the anatomy and easily tapered the surgical technique to the patient's condition obtaining effective treatment.

Conclusion

Reconstructive options in incomplete duplicated urinary system can be different because of the wide anatomic variants. Individualized treatment on the basis of pre and intraoperative findings is mandatory to obtain effective treatment. Robot-assisted pyeloureteroanastomosis is a feasible option in cases of bifid renal pelvis with preserved function of both upper and lower moieties.

Conflict of interest

None.

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