Pediatrics

High retrocaval ureter: An unexpected intraoperative finding during robotic redo pyeloplasty

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Introduction

Retrocaval ureter is a rare congenital anomaly, resulting from persistence of the posterior cardinal vein caudal to the renal vein, which causes external compression of the proximal ureter. This is more common in males than in females and is usually on the right side. Surgical correction for retrocaval ureter by open surgery has been the gold standard for many years. However, with advances in laparoscopic techniques, especially the development of intracorporeal suturing and knot-tying techniques, open surgery has been substituted by laparoscopic techniques, which have become the minimally invasive therapeutic option. Gundeti et al. published a first case report of pediatric robotic-assisted laparoscopic correction of a retrocaval ureter in a 12 year old girl.

We present a case of an open pyeloplasty with persistent obstruction due to an unrecognized high retrocaval ureter corrected using a robotic approach.

Case presentation

The patient is a three-year-old full term boy, initially referred to our hospital at the age of 6 months. He was found to have antenatally detected severe right hydronephrosis. Initial imaging was performed with renal ultrasound (RUS) and mercaptoacetyltriglycine (MAG-3) diuretic renography scans (Fig. 1a) indicating a pelviureteric junction obstruction (PUJO). On the basis of the radiological findings, he underwent an open retrograde pyelogram revealing an S-shape proximal ureter with a short narrow segment. Using a 3-trocar (umbilical camera, midline upper abdominal and ipsilateral lower quadrant working ports) robotic approach, the proximal ureter was found to be surrounded by scar tissue and with an abnormal retrocaval course. The ureter and lower pelvis were mobilized carefully from behind the cava. After counseling with the family, robotic redo pyeloplasty was recommended. At surgery, an initial retrograde pyelogram revealed an S-shape proximal ureter with a short narrow segment. Using a 3-trocar (umbilical camera, midline upper abdominal and ipsilateral lower quadrant working ports) robotic approach, the proximal ureter was found to be surrounded by scar tissue and with an abnormal retrocaval course. The ureter and lower pelvis were mobilized carefully from behind the cava. The prior anastomosis was visibly patent. A dismembered pyeloplasty was performed with anterior transposition and partial excision of the retrocaval ureter. A double J stent was left in place and removed after 6 weeks. After 3 months of follow up the MAG-3 and RUS (Fig. 2b) revealed interval improvement in tracer washout, reduction in the degree of hydronephrosis, and preserved function.

Discussion

Embryologically, the ureteric bud passes between the supra-cardinal, sub-cardinal and posterior cardinal veins. Typically, the supra-cardinal vein develops into the inferior vena cava, the sub-cardinal into the gonadal veins and the infra-renal part of the posterior cardinal vein become atrophic. The persistence of the posterior cardinal vein is the main cause of the retrocaval ureter. This abnormality represents 21%
of cases of renal vascular anomalies. Compression of the ureter between the vena cava and psoas muscle, kinking of the ureter due to its tortuous course, or an adynamic segment leads to the upper ureteric and renal dilatation. The characteristic diagnostic findings on intravenous urography (IVU) shows as a reverse J-hook or S-shaped ureter. The role of computed tomography (CT) or magnetic resonance is mentioned in the literature for diagnosis of this condition, especially if associated with a double vena cava. The diminishing use of IVU in the investigation of hydronephrosis may result in the preoperative diagnosis being missed, as in this case. A dilated upper ureter on technetium-99 scanning should raise suspicion of this rare anomaly but in our case the retrocaval course was too high to reveal that anatomical detail. Even if the image in the preoperative retrograde pyelogram was suggestive of this variant, the high location of the retrocaval course contributed to the failed earlier recognition.

Surgical correction can be performed with a laparoscopic approach in the pediatric population. The authors described the advantages of robotic-assisted laparoscopic over conventional laparoscopy in providing an excellent three-dimensional view of the operative field, increased manual dexterity for the dissection, and a precise suturing technique for the anastomosis. The theoretical disadvantage of a lack of tactile sensation is inherent with this system but readily overcome.

In our case the unexpected finding of the retrocaval ureter was managed with the robotic approach without need to modify the surgical strategy. The video illustrates the careful step-by-step dissection with exposure of the anatomy. Critical to the procedure was the recognition of the aberrant relationship between the ureter and the inferior vena cava. This, in addition to the knowledge of the possibility of this rare variant, were the keys to management.

Supplementary video related to this article can be found at http://dx.doi.org/10.1016/j.eucr.2018.05.019.
Disclosure statement

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.eucr.2018.05.019.

Fig. 2. a: 24-month follow up after initial surgery.
(left) RUS shows persistent SFU 3 hydronephrosis.
(right) MAG3 demonstrating a frankly obstructive drainage pattern with reduction in relative function.
b: follow up 3 months after redo surgery.
(left) RUS showing resolution of hydronephrosis.
(right) MAG3 shows a non-obstructive pattern and improvement of relative function.

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