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Robotic repair of retrocaval ureter: A case series

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KEYWORDS

Robotic;
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Abstract

Objective: To present our technique and experience of robotic repair of symptomatic retrocaval ureter.

Subjects and methods: This is a prospective case series of five consecutive patients who underwent robotic retrocaval ureter repair at our institute from August 2006 to September 2009. Pre-operative imaging included intravenous urogram, contrast enhanced CT scan and diuretic renography. All cases were done through a transperitoneal approach using 4 ports. Follow-up was done with intravenous urography and diuretic renography. Relevant data were collected and analyzed regarding perioperative morbidity, complications and functional outcomes.

Results: Five cases of robotic retrocaval ureter repair were performed. Four were male and one was female. The mean operative time was 92 min which included anastomosis time of 40 min. The mean estimated blood loss was 55 ml. The drain was removed on postoperative day 1 in all patients. The average hospital stay was 2 days. On average follow-up of 13.5 months all patients were pain free and renal dynamic scan showed non-obstructed clearance.

Conclusions: Robotic retrocaval ureter repair without excision of the retrocaval segment is feasible and an effective alternative to open or laparoscopic retrocaval ureter repair with good anatomical and functional outcome. It may become the procedure of choice along with laparoscopic surgery for retrocaval ureter.

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Introduction

Retrocaval ureter, also known as circumcaval ureter, is a rare congenital anomaly with an approximate incidence of one in 1000 live births. It is three to four times more common in males than in females [1]. Traditionally, surgical correction of retrocaval ureter involves excision of the retrocaval segment with relocation and ureteroureteral or ureteropelvic reanastomosis through an open approach. However, recently laparoscopic repair has evolved as the new standard of care replacing open repair. There have been isolated case reports on robotic repair of retrocaval ureter [2]. Since the introduction of the Da Vinci robotic system in our institute, we have been performing retrocaval ureter repair robotically. Herein we present our experience of robotic retrocaval ureter repair. This is the largest series of pure robotic repair of retrocaval ureter to our knowledge.

Subjects and methods

This is a prospective case series of five consecutive patients who underwent robotic retrocaval ureter repair from August 2006 to September 2009 in our institute. All patients were evaluated with IVU, CECT/MRI (magnetic resonance imaging) and diuretic renography. The CT image of one patient is shown in Fig. 1. Robotic repair of retrocaval ureter was done in all the cases.

Technique

The patient was catheterized in the supine position and the catheter was clamped to keep the bladder distended to aid in the subsequent placement of JJ stent. The patient was then changed to the left lateral position. Pneumoperitoneum was created using a Veress needle. Four ports were then placed then placed. A 12 mm camera port was placed along the lateral border of the rectus abdominis above the umbilicus and two 8 mm robotic ports were inserted in the mid clavicular line, one under the costal margin and one at the spinoumbilical line. A fourth 12 mm port was placed in the mid-line either above or below the umbilicus for the assistant to help in suction and retraction. We did not use a fourth arm in any of our patients. The Da Vinci robot was then docked from the back of the patient. The hepatic flexure of the right colon was identified and mobilized to provide exposure to the right sided retroperitoneal structures. The right renal pelvis and inferior vena cava were identified. The right renal pelvis and proximal ureter were freed of soft tissue attachments. The proximal ureter was seen disappearing behind the inferior vena cava. In two patients transection was performed at the pelvis and in the other three patients at the proximal ureter. The retrocaval segment of the ureter was not excised and left in situ. Ureteroureterostomy was performed in three patients and pyelopyelostomy in the other two. After transection at the pelvis or

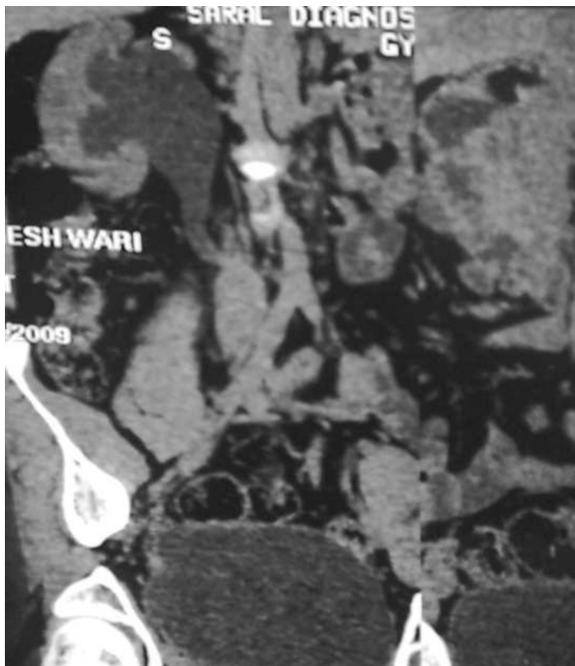


Fig. 1 CT scan image of one patient before surgery showing retrocaval ureter.

proximal ureter, the distal segment was transposed anterior to the inferior vena cava. Then pyelopyelostomy or ureteroureterostomy was performed using a 4-0 continuous polyglactin suture. After completion of either the anterior or posterior layer of the anastomosis, antegrade stenting was done using a 6F JJ stent. The rest of the anastomosis was completed over the stent and a 14F Romovac suction drain was placed.

Results

Five cases of robotic retrocaval ureter repair were performed, four patients were male and one was female. The mean age of the patients was 27.8 years. The mean operative time was 92 min which included anastomosis time of 40 min. The mean estimated blood loss was 55 ml. The drain was removed on the first postoperative day in all patients. The mean hospital stay was 2 days. The JJ stent was removed after 6 weeks in all the patients. The average follow-up period was 13.5 months. All the patients were pain free on follow-up and radio-isotope renography showed no obstruction.

Discussion

Formation of the infrahepatic vena cava involves development and regression of three pairs of embryonic veins: the posterior cardinal, the supracardinal, and the subcardinal. It is postulated that the normally developed IVC results from the persistence of the right subcardinal vein suprarenally and the right supracardinal infrarenally. The prevailing theory of the development of this anomaly is that the right subcardinal vein persists as the infrarenal IVC, thus crossing anterior to the midportion of the ureter and resulting in its circumcaval course [3]. Others have suggested that the persistence of the posterior cardinal vein as the infrarenal cava is responsible for this anomaly [4]. Symptomatic patients typically present in the third or fourth decade of life with flank pain, urinary tract infection, hematuria or stone.

The majority involve the right ureter, although left-sided circumcaval ureter has been reported in association with a duplicated IVC and in association with situs inversus [5,6]. Circumcaval ureter has been classified using different parameters based on IVU or retrograde pyelographic findings. Bateson and Atkinson classified a ureter with an S-shaped, fish hook, or shepherd's crook appearance as type I and a less angulated "sickle-shaped" ureteral deformity as type II [7]. The diagnosis can be confirmed with CT and MRI [8–10]. Diuretic renography is used to confirm the presence of obstruction and determine its functional impact. Treatment of retrocaval ureters has been open surgery, involving ureteral division, with relocation and ureteroureteral or ureteropelvic reanastomosis, usually with excision or bypass of the retrocaval segment. Open surgery is usually successful and has been the gold standard for many years for completely correcting this disease [11] but requires a large skin incision and causes significant postoperative pain with a prolonged convalescence. Recently, reconstructive laparoscopic techniques have been reported. Laparoscopic procedures have almost replaced open surgery because of their associated rapid recovery, early discharge from the hospital [12,13] and excellent cosmetic results. Matsuda et al. [14] first performed laparoscopic ureteroureterostomy (LUUS) for a retrocaval ureter in 7.5 h using five laparoscopic ports. The robotic approach to retrocaval ureter was first published for a pediatric patient by Gundeti et al. in 2006 [15]. Standard surgical correction involves excision of the retrocaval segment with relocation

and ureteroureteral or ureteropelvic reanastomosis. Recently, a few studies have shown similar outcomes following surgery in which excision of the retrocaval segment was not done. In the present study, relief of ureteric obstruction was achieved without excising the retrocaval segment. We did not encounter any problem during any of the procedures. The overall success rate was equivalent to that of open or laparoscopic retrocaval ureter repair. The high costs of the robot prevent its routine use particularly when similar outcomes are possible with the conventional laparoscopic repair. However, robotic assistance provides potential benefits to the surgeons. In busy centers it provides benefits by decreasing operating time and surgeon's fatigue.

Conclusion

Robotic retrocaval ureter repair with pyelopyelostomy or ureteroureterostomy without excision of the retrocaval segment is an effective and safe procedure with results equivalent to that of laparoscopic and open retrocaval ureter repair. It is associated with minimal postoperative morbidity and short hospital stay.

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