

Experience of laparoscopic of retrocave ureter plasty at Hospital General de México Dr. Eduardo Liceaga

Experiencia de la plastia laparoscópica de uréter retrocavo en el Hospital General de México Dr. Eduardo Liceaga

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Abstract

Introduction: The retrocave ureter is a rare congenital anomaly that requires surgical management. **Objective:** Report the results in laparoscopic management for retrocave ureter and literature review. **Method:** Retrospective, descriptive, cross-sectional study in patients with a diagnosis of retrocave ureter who were sometimes a laparoscopic retrocave ureter. **Results:** Four patients sometimes underwent laparoscopic plasty for diagnosis of retrocave ureter, 1 man and 3 women, with a mean age of 40.7 years. The mean operative time was 138.2 minutes. The mean intraoperative quantified blood loss was 23.7 ml. No patient presented transoperative or postoperative complications. The patients remained hospitalized until their progress with an average of 2.5 days. All patients visualize improvement in their symptoms. **Conclusion:** The retrocave ureter is a rare condition and there is still no consensus on its diagnosis, treatment and follow-up. Laparoscopic surgical management is an option for the treatment of these patients.

Keywords: Retrocave ureter. Laparoscopy. Surgery. Inferior vena cava.

Resumen

Introducción: El uréter retrocavo es una anomalía congénita rara que requiere manejo quirúrgico. **Objetivo:** Reportar los resultados en el manejo laparoscópico para uréter retrocavo y hacer una revisión bibliográfica. **Método:** Estudio retrospectivo, descriptivo, transversal, en pacientes con diagnóstico de uréter retrocavo que fueron sometidos a plastia laparoscópica de uréter retrocavo. **Resultados:** Cuatro pacientes sometidos a plastia laparoscópica por diagnóstico de uréter retrocavo, 1 hombre y 3 mujeres, con una media de edad de 40.7 años. La media del tiempo operatorio fue de 138.2 minutos. La pérdida de sangre cuantificada transoperatoria media fue de 23.7 ml. Ningún paciente presentó complicaciones transoperatorias ni posoperatorias. Los pacientes permanecieron hospitalizados hasta su egreso una media de 2.5 días. Todos los pacientes presentaron mejoría de su sintomatología. **Conclusiones:** El uréter retrocavo es una condición rara y aún no existe un consenso sobre su diagnóstico, tratamiento y seguimiento. El manejo quirúrgico laparoscópico es una opción para el tratamiento de estos pacientes.

Palabras clave: Uréter retrocavo. Laparoscopia. Cirugía. Vena cava inferior.

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Introduction

Retrocaval ureter is a rare congenital anomaly, with an incidence of 1 per 1,500 live births. Standard surgical correction involves removal of the ureter retrocaval segment, with uretero-ureteral or uretero-pelvic relocation and reanastomosis¹⁻⁵.

Retrocaval ureter, also known as circumcaval ureter, is a congenital anomaly caused by an error in inferior vena cava embryogenic development, resulting from the persistence of the posterior cardinal vein caudal to the renal vein, which causes proximal ureter external compression^{1,6}. During fetal development, inferior vena cava prerenal, renal, and post-renal segments develop from the right vitelline, right subcardinal, and right sacrocardinal veins, respectively^{2,6,7}. The aberrant embryology behind the preureteral vena cava is the persistence of the posterior right cardinal vein, rather than the right subcardinal vein, as inferior vena cava renal segment^{8,9}. Since the right posterior cardinal vein is ventral to the ureter, the ureter effectively lies in a “retrocaval” or “circumcaval” position¹. The anomalous vessel causes compression of the right ureter, leading to varying degrees of hydronephrosis, which results in different clinical presentations¹⁰⁻¹².

This pathology is more common in males than in females, with a ratio of 3:1¹, and is almost exclusively found on the right side. It is generally associated with secondary hydronephrosis, with clinical presence of right flank pain and discomfort¹¹⁻¹⁴. Patients may also refer urinary tract infections, hematuria, or fever.

Two types of retrocaval ureter have been described according to radiological findings: type 1 or low loop has an S-shaped appearance up to the level of obstruction, and is the most prevalent variety (90%), and type 2 or high loop, which comprises only 10% of cases and occurs a smooth sickle-shaped curve of the right ureter, with the level of obstruction at the lateral margin of the third lumbar vertebra^{12,14,15}.

Ultrasonography, intravenous urography, nuclear scintigraphy, computed tomography urography and magnetic resonance urography have been used in the diagnosis of this anomaly; among them, computed tomography urography, owing to its capacity to represent the anomaly in three dimensions, is the reference method for its diagnosis^{10,12,16}.

When symptomatic, the condition is surgically treated via laparoscopic route or open surgery^{14,17}. Open uretero-ureterostomy remained the gold standard surgical approach for treating retrocaval ureter for many

years, but in the last decade, with the intensive growth of minimally-invasive surgery, laparoscopic procedures have almost replaced open surgery due to associated faster recovery, shorter in-hospital stay, and excellent cosmetic results. In early reports, retrocaval ureter laparoscopic repair was described as having a prolonged surgical time, largely due to initial difficulties with intracorporeal suture techniques^{15,18}.

Method and results

As first step, an advanced search was carried out in PubMed focused on the surgical approach of patients with retrocaval ureter, combining the terms “Retrocaval ureter”, “laparoscopy” and “surgery”, which yielded 62 articles among reviews, clinical trials, and case reports. The reviewers worked in pairs, sequentially evaluated the titles, abstracts, and then the full text of all identified publications, and selected 25 articles that were related to the use of surgery for retrocaval ureter, out of which six were case-series that involved laparoscopic management.

Subsequently, a review of medical records of the urology department of the General Hospital of Mexico Dr. Eduardo Liceaga for the last 5 years was carried out in order to identify those patients diagnosed with retrocaval ureter who underwent laparoscopic surgical treatment. Four patients (one male and three females) with retrocaval ureter were found between December 2015 and March 2019. Mean age was 40.75 years (range: 27-56 years). Body mass index had a mean of 24.41 kg/m² (range: 16-34.44 kg/m²). Two of the four patients had a history of bilateral tubal occlusion, and one patient had a history of cesarean sections. Two of the four patients had a history of right renal-ureteral lithiasis. All patients had right low lumbar pain as main symptom, two patients had nausea and vomiting, and one patient showed lower urinary tract symptoms with fever; none of the four patients were incidentally diagnosed. Mean time from symptom onset to surgery was 28 months (range: 4-72 months). No alterations were identified on physical examination. Mean serum creatinine values was 0.78 mg/dL (range: 0.6-1.1 mg/dL) and mean glomerular filtration rate estimated using the 2009 CKD-EPI equation was 104.25 mL/min/1.73 m² (range: 75-119 mL/min/1.73 m²). All patients were evaluated with CT urography, and in two of them, ascending pyelogram was carried out. Radiological findings were typical, with hydronephrosis and S-shaped ureter (Fig. 1), classified as type I in all patients according to the criteria proposed by Bateson and Atkison¹⁹.

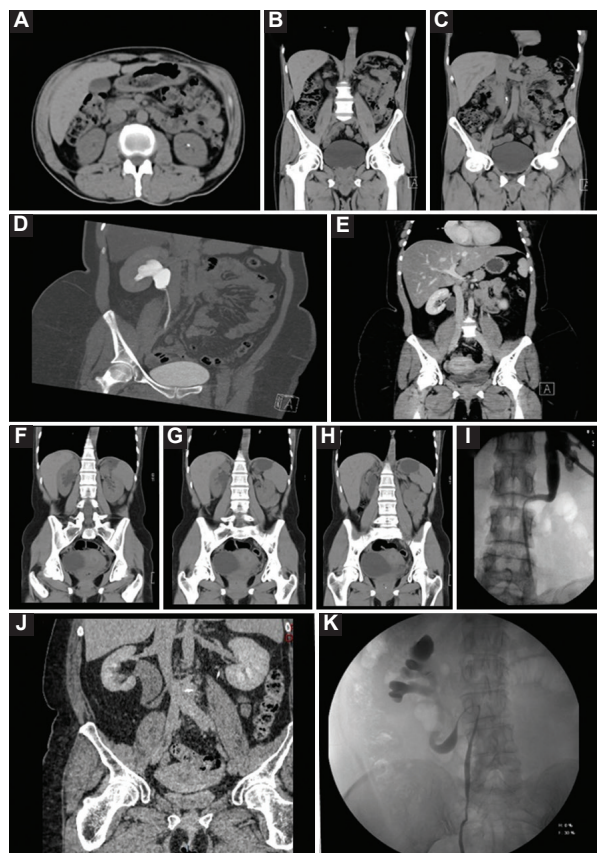


Figure 1. Typical radiological findings, with S-shaped ureter, classified as type I in all patients according to the classification proposed by Bateson and Atkison¹⁹. A-C: patient 1. D and E: patient 2. F-I: patient 3. J and K: patient 4.

All patients underwent laparoscopic reconstruction with transperitoneal approach. All surgeries consisted of ureteropyeloanastomosis with resection of the compromised ureteral segment (Fig. 2). In one case, laparoscopic ureterolithotomy was carried out for a 1 cm stone located at right ureter upper third. Pneumoperitoneum was performed with closed technique with a Veress needle in half the cases, and with open technique with Hasson trocar in the other half. In all cases, three trocars were inserted using the triangulation technique: two 5-mm and one 10-12-mm paraumbilical trocars. After ureter identification and dissection, the ureter distal to the compressed segment and proximal ureter redundant portion, as well as the renal pelvis, were cut. The ureter was placed in anterior position to the inferior vena cava. With the help of a hydrophilic guidewire, a double J ureteral catheter was inserted. Anastomosis was performed with 4-0 MONOCRYL®. All patients were left with a Penrose-type drain; mean number of days until drainage removal was 3.5 days

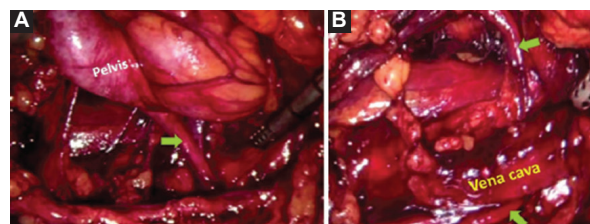


Figure 2. A: The pelvis and ureter are observed (arrow). B: The vena cava and ureter are observed in the retrocaval position (arrows).

(range: 2-6). Mean time for double J ureteral catheter removal was 30 days (range: 14-46 days). Patients were followed up at the urology department outpatient clinic. All procedures were completed by the laparoscopic route without the need for conversion to open surgery. Mean surgical time was 138.25 minutes (range: 102-210 minutes). Mean quantified perioperative blood loss was 23.75 mL (range: 15-30 mL). No patient had perioperative or postoperative complications; there was no need for blood transfusion either. Patients remained hospitalized until discharge for a mean of 2.5 days (range: 2-3 days). Mean follow-up period was 17 months (range: 1-39 months). All patients had pain improvement and one reported complete pain resolution. One patient underwent right ureteroscopy due to a ureteral stone located at ureter middle third, with complete resolution.

Discussion

A search in international literature was carried out, with six case-series of retrocaval ureter that received laparoscopic management being identified^{16,20-24}. We compared the clinical and surgical characteristics reported in these publications with the findings of our study (Table 1). In three of these studies, the approach was retroperitoneal^{21,23,24}, while in the others it was transperitoneal^{16,20,22}; most experience in our hospital is with transperitoneal approach, which is why all our patients were approached by this route. Mean age reported by the studies is 31 to 40.5 years, while in our study it was 40.75 years. As for gender, our study had a 1:3 ratio in favor of the female gender, while previous studies report having a predominance of the male gender. Mean surgical time in our study is 138.25 minutes, which is within the established range of previous studies, which goes from 82 to 199.6 minutes. Mean days of hospital stay until discharge in our study is 2.5 days, which is much lower than that reported in other studies, which ranges from 4 to 9.3 days.

Table 1. Results of publications on retrocaval ureter laparoscopic management. Clinical and surgical characteristics

Study	Patients (n)	Age (years)	Gender (M-F)	Approach	Surgical time (min)	Blood loss (mL)	Complications	Days of hospital stay	Symptom improvement (%)
Our study	4	40.75 (27-56)	1-3	TP	138.25 (102-210)	23.75 (15-30)	No	2.5 (2-3)	100
Seo et al. ²⁰ (2019)	10	40.5 (16-66)	7-3	TP	199.6 (97-240)	154.4 (33-332)	No	9.3 (6-14)	100
Liu et al. ²¹ (2016)	9	34.4 (27-53)	6-3	RP	103 (89-110)	NA	No	7 (6-9)	100
Ding et al. ²² (2012)	9	35 (19-47)	9-0	TP	135 (70-250)	Minimal (< 60)	No	7.3 (7-10)	100
Chen et al. ²³ (2011)	12	35 (19-45)	8-4	RP	112 (89-158)	35 (21-60)	No	6 (5-7)	100
Li et al. ²⁴ (2010)	10	31 (9-48)	6-4	RP	82 (60-110)	Minimal (< 10)	No	6.5 (5-7)	100
Simforoosh, et al. ¹⁶ (2006)	6	31 (16-50)	3-3	TP	180 (150-210)	Minimal (< 50)	No	4 (3-5)	100

F: female; M: male; NA: not available; RP, retroperitoneal; TP: transperitoneal. Values are presented as means and ranges.

Another aspect to consider is that, both in our study and in the other six case series, none of the patients had complications and all achieved symptom improvement.

In 2017, a study was published, in which nine patients with retrocaval ureter underwent open approach with an average surgical time of 95.6 ± 22.0 minutes (range: 60-130 minutes), which is lower than ours (mean: 138.25 minutes; range: 102-210 minutes). They reported that perioperative bleeding had a mean of 106.7 ± 32.2 mL (range: 50-160 mL), while our perioperative blood loss was lower, with a mean of 23.75 mL (range: 15-30 mL). Another point to highlight is that mean hospitalization time was 15.3 ± 1.2 days (range: 14-17 days), which is higher than that of our study, with a mean of 2.5 hospitalization days (range: 2-3 days)²⁵.

Our results are similar to those found in other laparoscopically-managed case series; however, when comparing them with those reported for open surgery, our study shows that laparoscopic surgery offers the advantage of less perioperative bleeding and fewer hospitalization days, even when surgical time is longer. The first retrocaval ureter laparoscopic reconstruction was performed in 1994 by Baba et al.²⁶, who reported a surgical time of 9.3 hours^{20,21}. Technological advances and increasing experience in laparoscopic management have decreased surgical times and improved final results.

Conclusions

Retrocaval ureter is a rare condition, which limits information, as well as evidence and recommendations for diagnosis, treatment, and follow-up. Both open surgery and minimally-invasive surgery have been used to treat patients, with symptom improvement being achieved. The transperitoneal laparoscopic minimally-invasive approach is suggested as an option that offers the advantages of less perioperative bleeding and a shorter hospital stay in comparison with open surgery. Although laparoscopic surgery surgical times have decreased, they continue to be longer than those of open surgery. Further studies are required that allow the best treatment for patients to be identified.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this research.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained informed consent from the patients and/or subjects referred to in the article. This document is in the possession of the corresponding author.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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