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Retrocaval Ureter: Case Series of Five Patients Managed by Uretero-Ureteral Anastomosis

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Abstract

Background: Retrocaval ureter (RCU), also termed pre-ureteral vena cava, represents an uncommon congenital anomaly in which the ureter passes posterior to the inferior vena cava (IVC). Although the malformation originates during embryogenesis, symptoms often manifest in adulthood, typically during the third or fourth decade of life. The estimated incidence is approximately 1 in 1500 individuals, with a male predominance (M:F ratio of 3:1). Methods: This series reports five cases of retrocaval ureter evaluated for demographic profile, clinical presentation, laterality, and the extent of hydronephrosis. Each patient underwent open uretero-ureterostomy with insertion of a double-J stent.

Results: Postoperative outcomes were favorable in all cases. Stents were removed after three weeks, and follow-up at three months showed complete resolution of symptoms and satisfactory urinary drainage. Conclusion: Open uretero-ureterostomy provides excellent functional outcomes in patients with symptomatic retrocaval ureter.

Keywords: Retrocaval ureter, Inferior vena cava, Hydroureteronephrosis, Uretero-ureteral anastomosis.

Introduction

Retrocaval ureter (RCU) is an infrequently encountered congenital defect in which the ureter courses posterior to the IVC, causing variable degrees of obstruction and hydronephrosis. The anomaly develops between the fourth and eighth weeks of gestation due to aberrant formation of the infrarenal segment of the IVC. Normally, this portion of the IVC arises from the dorsally located supracardinal vein. However, when it develops from the ventrally positioned subcardinal vein, the ureter becomes trapped behind the IVC, producing the characteristic pre-ureteral vena cava configuration. Hochstetter first described this malformation in 1893, while the first clinical diagnosis was made by Harrill in 1940. The reported global incidence of RCU ranges from 0.06% to 0.17%. The present report describes five cases of retrocaval ureter managed surgically at our institution.

Case Series

Case 1

A 27-year-old male presented with abdominal pain, anorexia, constipation, low-grade fever, and dysuria. Ultrasonography revealed a 17×10 mm right mid-ureteric calculus with hydronephrosis and hydroureter. CT imaging confirmed a right retrocaval ureter with proximal hydroureteronephrosis. The patient underwent open repair through a right subcostal lumbotomy. The retrocaval segment was identified, excised, and end-to-end uretero-ureteral anastomosis performed using 3-0 Vicryl sutures around a double-J stent. The drain was placed and removed on postoperative day 6.

Case 2

A 23-year-old woman reported dull right flank pain and burning micturition persisting for two years. Laboratory parameters were within normal limits. Ultrasonography demonstrated right hydronephrosis with a 5 mm distal ureteric calculus. CT KUB revealed right hydroureteronephrosis and a characteristic "S-shaped" or "fish-hook" deformity of the proximal ureter, consistent with retrocaval ureter. The redundant retrocaval segment was excised, and an end-to-end uretero-ureteral anastomosis was performed over a JJ stent.

Case 3

A 25-year-old male presented with intermittent dull right flank pain of one-year duration, accompanied by fever and dysuria but no hematuria or weight loss. Imaging revealed an 18×16 mm right mid-ureteric calculus and proximal hydroureteronephrosis. CT urogram confirmed retrocaval ureter. Surgical excision of the retrocaval segment with primary uretero-ureteral anastomosis was performed.

Case 4

A 23-year-old male complained of abdominal pain for one year, associated with vomiting, fever, and burning urination. Imaging demonstrated a 9.2×7 mm right mid-ureteric calculus and right hydronephrosis. CT-KUB showed a type 1 retrocaval ureter at the L3 vertebral level. The retrocaval portion was resected, and end-to-end anastomosis was achieved over a JJ stent.

Case 5

A 17-year-old female experienced abdominal pain, fever, hematuria, and dysuria for one year. Ultrasound revealed an 8.8 mm right lower ureteric calculus with proximal dilatation. CT-KUB confirmed a right retrocaval ureter. Excision of the retrocaval segment and end-to-end anastomosis over a JJ stent were performed successfully.

Discussion

Retrocaval ureter, also known as circumcaval or postcaval ureter, is a developmental defect of the venous system in which persistence of the posterior cardinal vein results in an abnormal IVC course and posterior displacement of the ureter. The resulting obstruction leads to hydroureteronephrosis and recurrent urinary tract infections. CT urography plays a crucial role in diagnosis, clearly delineating the ureter's path and excluding other causes such as retroperitoneal fibrosis or ureteral stricture. Kenawi and Williamsen (1976) classified RCU into two anatomic variants: Type 1, the common form (≈94%), in which the ureter descends to L3 then loops behind the IVC; and Type 2, the proximal ureter and pelvis run horizontally, producing less pronounced dilatation. Bateson and Atkinson further described that obstruction in Type 1 is intrinsic, while in Type 2 it is extrinsic due to compression by the IVC. Surgical management depends on the degree of obstruction and renal function. Nephrectomy is rarely required, reserved for destroyed kidneys. Most symptomatic cases are treated successfully with reconstructive procedures. The open approach, involving resection of the retrocaval segment and uretero-ureteral anastomosis, remains the most established technique. Laparoscopic and robotic methods have been introduced, offering minimal invasiveness, less blood loss, faster recovery, and shorter hospitalization, although with longer operative time. Robotic assistance helps reduce operative duration by improving dexterity and visualization.

Conclusion

Retrocaval ureter is a rare congenital anomaly that presents typically in early to mid-adulthood. Diagnosis is confirmed through ultrasonography and CT-KUB. Open uretero-ureterostomy remains an effective surgical technique, providing excellent outcomes and symptom resolution in affected patients.

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