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Case Report
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Laparoscopic Ureteral Pyeloplasty for Hydronephrosis due to Crossing of the Posterior Ureter by the Inferior Polar Renal Artery

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Abstract

A supernumerary renal artery is a common arterial variation that warrants consideration in a variety of urologic and retroperitoneal operations. Hydronephrosis is very common and is usually due to physiological or pathological obstruction of the urinary tract. However, hydronephrosis caused by supernumerary renal arteries is very rare. We report the case of a 21-year-old female with hydronephrosis caused by crossing of the posterior ureter by the inferior polar renal artery that was treated with laparoscopic ureteral pyeloplasty and had a good recovery.

Keywords: Hydronephrosis; Laparoscopic ureteral pyeloplasty; Inferior polar renal artery

Abbreviations

CT: Computed Tomography; CTA: Computed Tomography Angiography; UPJO: Ureteropelvic Junction Obstruction

Introduction

Hydronephrosis refers to aseptic dilatation of the kidney due to obstruction of the outflow of urine. While hydronephrosis is usually due to physiological or pathological obstruction of the urinary tract, this condition may also occur without obstruction [1]. The major causes of hydronephrosis are different for different age groups [2]. Here, we report a very rare case of hydronephrosis that was caused by crossing of the posterior ureter by the inferior polar renal artery in a patient who was treated with laparoscopic ureteral pyeloplasty.

Case Presentation

A 21-year-old female presented with recurrent right flank and upper abdominal pain with occasional bouts of fever and rigor. She had undergone investigations that revealed a dilated right-sided hydronephrosis and proximal ureter, and the distal ureter was poorly visualized on Computed Tomography (CT) (Figure 1a, 1b). There were several supernumerary renal arteries surrounding the right kidney, particularly a supernumerary inferior polar renal artery, identified on Computed Tomography Angiography (CTA) (Figure 1c). Ureteroscopy showed that the ureteropelvic junction had an external compression mark. Hence, we proceeded with laparoscopic exploration of the ureteropelvic junction. When Gerota's fascia and the perirenal fat were opened, a considerably dilated right renal pelvis and a dilated right ureter with active peristalsis were visualized; the ureter was seen coursing under the inferior polar renal artery (Figure 1d).

The inferior polar renal artery was gently freed from the surrounding adventitial tissue, and the pelvis and ureter were grasped and traced to the position where the ureter crossed the inferior polar renal artery. After the pelvis and ureter were freed, the atretic portion was incised distally; the proximal ureter was incised as well. The cut edge of the lower ureter was flushed out. The upper end of the distal ureter was spatulated, and stay sutures using 4-0 Vicryl were used to approximate both upper edges of the ureter. The heel of the anastomosis was next laid in with the sutures placed out-in in the proximal ureter and in-out in the distal ureter, with the knots on the outside. After the heel and toe sutures were placed, a 5-F double-J stent was introduced percutaneously through a hydrophilic conducting filament and inserted distally up to the bladder and proximally up to the pelvis. Then, the posterior layer of sutures was completed with the needle placed externally out-in and in-out. Finally, the anterior edge was also sutured with 4-0 Vicryl.

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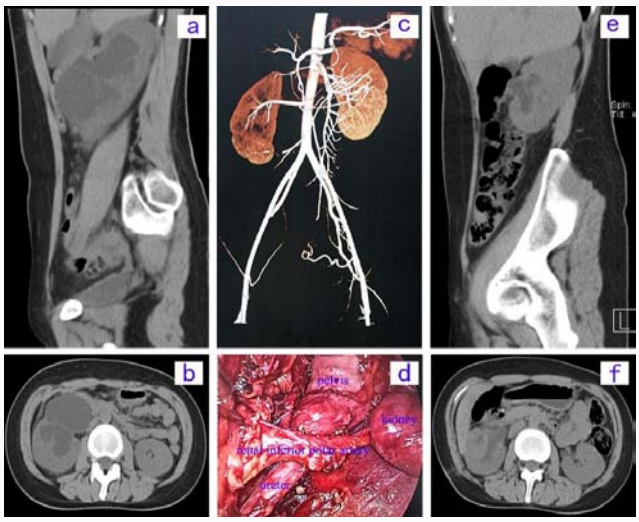

Figure 1a, 1b: Right-sided hydronephrosis and a dilated proximal ureter on Computed Tomography (CT); **1c:** A supernumerary inferior polar renal artery on Computed Tomography Angiography (CTA); **1d:** The ureter was visualized crossing under the inferior polar renal artery; **1e, 1f**: The right hydronephrosis significantly alleviated, and no renal atrophy or other complications were observed on CT during the six-month follow-up period.

The patient was followed up for 24 months. Who has no gross hematuria, no low back pain, and no fever, rigor, or other symptoms? The double-J tube was removed one month after the operation. CT indicated that the right hydronephrosis was significantly alleviated, and there was no renal atrophy or other complications during the six months of follow-up (Figure 1e, 1f).

Discussion

Hydronephrosis caused by crossing of the posterior ureter by the inferior polar renal artery is very rare. Multiple renal arteries are common variations, with a prevalence of approximately 30% in the general population [3]. Previous anatomic works have shown that vessels crossing within 1.5 cm of the ureteropelvic junction are most commonly anterior to the ureteropelvic junction [4]. Supernumerary arteries usually course into the renal hilum to perfuse the upper or lower renal poles, and retro-ureteral variants are likely to be associated with UPJO and hydronephrosis [3,5].

However, crossing of the posterior ureter by the inferior polar renal artery causing hydronephrosis was rare, and there is limited experience with related treatments. Adams treated ureteric compression by an aberrant artery by releasing the ureter, folding the lower pole of the kidney to the upper pole, and finally relocating the artery to the upper level of the pelvis [6]. We treated this patient with laparoscopic ureteral pyeloplasty and preservation of the inferior polar renal artery, and the patient achieved good recovery.

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