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Value of multidetector ct in preoperative assessment of ureteropelvic junction obstruction

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Abstract

Ureteropelvic junction (UPJ) obstruction may be caused by the presence of an aperistaltic dysplastic segment at the UPJ. Besides this intrinsic etiology, extrinsic factors, mainly crossing vessels, may be the causative factor. The controversy regarding the functional significance of vessels crossing at the UPJ is not a new one, though this debate has been resurrected in recent years because of improved detection due to advent of advanced imaging techniques like multidetector row computed tomography (MDCT) and fast magnetic resonance imaging. We present two similar cases where MDCT proved the crossing renal vessel (CRV) to be the cause for UPJ obstruction.

Keywords: Ureteropelvic junction; Crossing renal vessel; Multidetector row computed tomography

1. Introduction

Unilateral hydronephrosis in a child or young adolescent is most likely due to ureteropelvic junction (UPJ) obstruction, which in turn, may be attributable to intrinsic or extrinsic causes. An intrinsic muscular defect causing impaired peristalsis and urine drainage is the commoner cause. An aberrant or accessory vascular branch leading to the lower pole of the kidney and crossing anteriorly to the UPJ or upper ureter is the most common extrinsic cause of UPJ obstruction. The surgical treatment rests on the exact etiology of UPJ obstruction. Multidetector row computed tomography (MDCT) with three-dimensional (3D) reconstruction improves outcome in patients with UPJ obstruction by identifying crossing renal vessel (CRV) as the cause of UPJ obstruction preoperatively. Vascular UPJ obstruction presents specific clinical and imaging features within the spectrum of congenital hydronephrosis. Its intermittent nature may explain why it is detected later in life. Moreover, knowing that the patient has UPJ obstruction due to crossing renal vessel is essential in choosing the appropriate surgical treatment. We report two cases where 16-row MDCT scan angiography with 3D reconstructed images proved the CRV as the etiology of UPJ obstruction and confirmed on surgery.

2. Case report

A 13-year-old healthy boy and 24-year-old young man presented to the outpatients' department with intermittent loin pain of more than 2 years duration. Past medical history was uneventful.

Physical examination revealed fullness in the left and right renal angle respectively and mild tenderness on palpation. Hematological indices were normal. Urine examination revealed four to five pus cells per high-power field (HPF) and one to two red blood cells per HPF in the former case and three to four pus cells per HPF in the latter case. Biochemical indices including blood urea, creatinine and electrolytes were normal.

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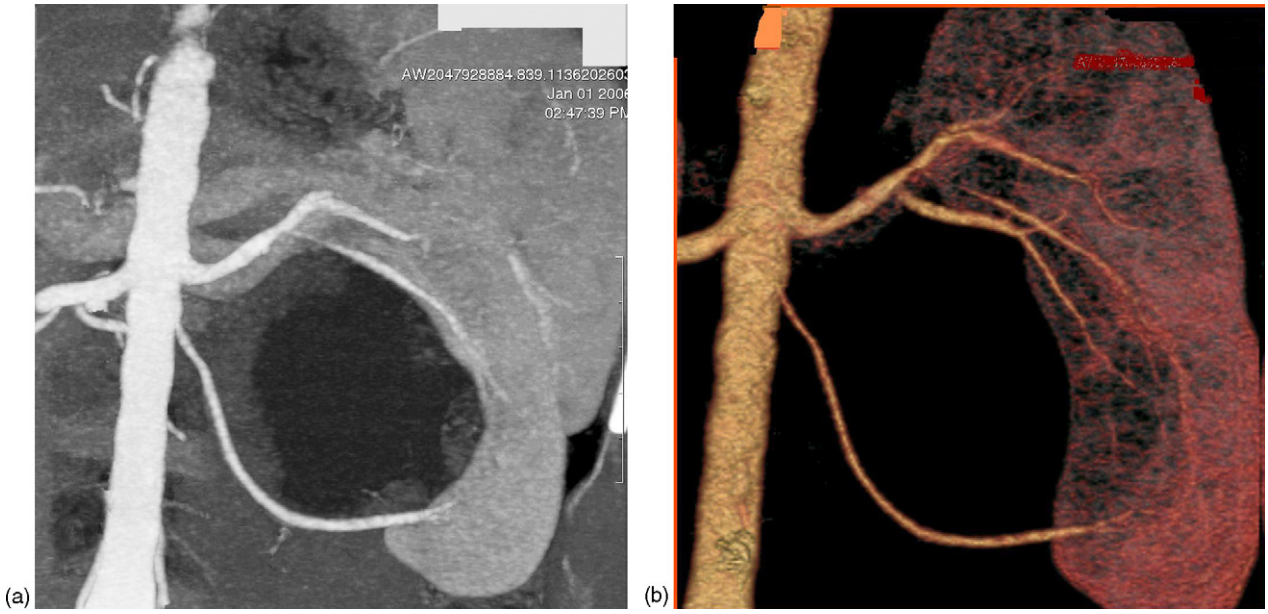

Fig. 1. (a and b) Maximum intensity projection (a) and volume rendered (b) images showing an accessory left renal artery circumventing the distended renal pelvis.

Routine ultrasound of the abdomen revealed unilateral hydronephrosis without dilatation of the ureter suggesting UPJ obstruction. The renal pelvis was bulbous. Interestingly, no vessel could be identified at UPJ on color Doppler in both the patients.

The multidetector row computed tomography scan was performed on a 16-row multidetector CT scanner and 3D reconstructed images were obtained which showed, in the former case, an accessory left renal artery arising from the abdominal aorta and feeding the lower pole of the left kidney (Fig. 1a and b), coursing anterior and inferior to the markedly distended renal pelvis. Fifteen minutes delayed axial sections revealed filling of the distended renal pelvis by excreted contrast, differentiating it from a parapelvic cyst (Fig. 2). MDCT angiography in the latter case demonstrated an accessory arterial branch arising from main right renal arterial trunk and circumventing the bulbous renal pelvis to feed the lower pole of right kidney (Fig. 3a and b).

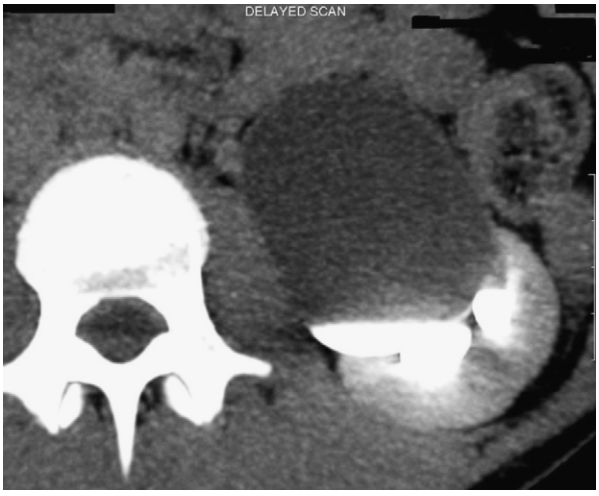

Fig. 2. Delayed axial image through the left renal pelvis showing pooling of excreted contrast in the distended pelvis.

Based on the CT scan findings, the surgical approach was changed from an endoscopic pyelotomy to an open surgical one, to avoid potential complications. An exploratory laparotomy was done in both cases and the crossing renal vessel was confirmed as the cause of the UPJ obstruction. An open surgical pyeloplasty was performed in both the patients. The patients were symptom-free after the surgery. Follow-up ultrasound examinations did not reveal any hydronephrosis.

3. Discussion

Congenital UPJ obstruction is most likely secondary to abnormal musculature that prevents relaxation and filling of the ureter. An accessory renal artery crosses the UPJ in only 11–39% of patients with UPJ obstruction [1], whereas vessels that pass within 1–2 cm of the UPJ can be found in up to 75–80% of patients with UPJ obstruction [2]. Crossing vessels are usually located anterior to the UPJ whereas posteriorly crossing vessels are less commonly found [3]. These crossing renal vessels have been defined by different authors as "anomalous", "aberrant" or "crossing". Since such vessels almost always run anterior to the UPJ, such definitions are etiologically inadequate and therefore, in reality, it would be more appropriate to speak of a "vascular bar" rather than congenital vascular anomaly [4]. Besides the crossing renal vessel causing UPJ obstruction, portosystemic collaterals have also been shown to cause similar effect [5]. Because of these reasons, UPJ obstruction remains an enigma in terms of both diagnosis and therapy [6].