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CASE REPORT

Additional renal artery as a rare cause of abdominal pain in an adolescent male – a case report

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ABSTRACT

We report the unusual case of abdominal pain in a 16-year-old male who was suspected of nephrolithiasis. The pain was dependent on the position of the body and fluid intake. Initial abdominal ultrasound (US) revealed only mild dilated renal pelvis, but further US demonstrated hydronephrotic left renal pelvis. Computed tomography without contrast media excluded kidney stones; however, modelling of the left dilated renal pelvis on the vessel was suspected. Ultrasound Doppler also showed an additional artery, which crossed the ureteropelvic junction. A computed tomography angiogram clearly showed the additional left renal artery, which compressed the ureteropelvic junction. We conclude that intermittent abdominal pain that is dependent on the position of the body and fluid intake in an older child should give rise to suspicion of the presence of a crossing renal vessel. Ultrasound Doppler and computed tomography without contrast media are good methods in the investigation of intermittent abdominal pain and initial assessment of renal vessels.

KEY WORDS:

adolescent, hydronephrosis, additional renal artery.

INTRODUCTION

Abdominal pain is one of the most common complaints in children. It is usually a self-limiting, benign condition caused by gastroenteritis, constipation, and viral illness. Sometimes it can be a sign of serious diseases including peptic ulcers, cholecystitis, and pancreatitis [1, 2]. The differential diagnosis should also include cardiac, pulmonary, metabolic, and neurological diseases. The challenge for the physician is to identify children who have uncommon and potentially life-threatening conditions. Some patients with abdominal pain may not receive a definitive diagnosis on first evaluation because of the early stage of the disease or subtle and atypical signs [3].

Among genitourinary diseases, the common causes of abdominal pain in children are urinary tract infection and nephrolithiasis. However, in rare cases, anatomical disturbances in the urinary tract are also a reason for abdominal pain, especially in adolescents when rapid growth affects the appearance of disorders.

In the present study, we report the unusual case of abdominal pain caused by an accessory renal artery in an adolescent male.

CASE REPORT

A 16-year-old boy was admitted to the Department of Paediatric Nephrology in Poznan University of Med-

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ical Sciences in Poland due to left abdominal pain and suspicion of nephrolithiasis. The pain was dull and confined to the left upper quadrant anteriorly and posteriorly. The patient complained of left back pain. In addition, nausea and vomiting occurred. Biochemical analysis revealed blood urea nitrogen level of 26 mg/dl and serum creatinine level of 0.89 mg/dl. Urinary sediment was normal (leukocytes 1–2 and red blood cells 0–1 per average high-power field). Kidney ultrasonogram showed a marked dilatation of the left pelvicalyceal system and partially separated, dilated left renal pelvis with dimensions 37 × 28 × 30 mm (anterior–posterior). The right kidney showed normal appearance.

Abdominal ultrasound (US) done one month earlier in another hospital revealed mildly dilated left renal pelvis with anterior-posterior dimension of 18 mm. Urinary tract infection was excluded. The patient was suspected of neuralgia due to a slight curvature of the lumbar spine. After applying analgesic treatment, the symptoms subsided and the patient was discharged home. However, after about three weeks the pain returned and, according to the medical history, it was intermittent for seven months. The pain was most often experienced during the later hours of the day and during the night, especially after ingestion of large quantities of fluids. It was not accompanied by fever or haematuria.

During the current stay in our department after initial diagnostic tests due to suspicion of nephrolithiasis, computed tomography without contrast media was performed. Kidney stones were not shown; however, modelling of the left dilated renal pelvis on the vessel was suspected. A computed tomography angiogram (CTA) clearly showed the left aberrant renal artery to the lower pole, which compressed the ureteropelvic junction. Interestingly, CTA revealed also two accessory, asymptomatic arteries to the right kidney. Colour-Doppler ultrasonography was made after CTA, and it also showed an additional artery to the lower pole of the left kidney with normal blood flow (the resistive index was 0.57). The repeated abdominal US demonstrated further dilation of left renal pelvis in AP dimension 55 mm, which was correlated with the severity of abdominal pain (Fig. 1).

TC-99m DTPA renal scan revealed a markedly delayed excretion of the left kidney. After furosemide infu-

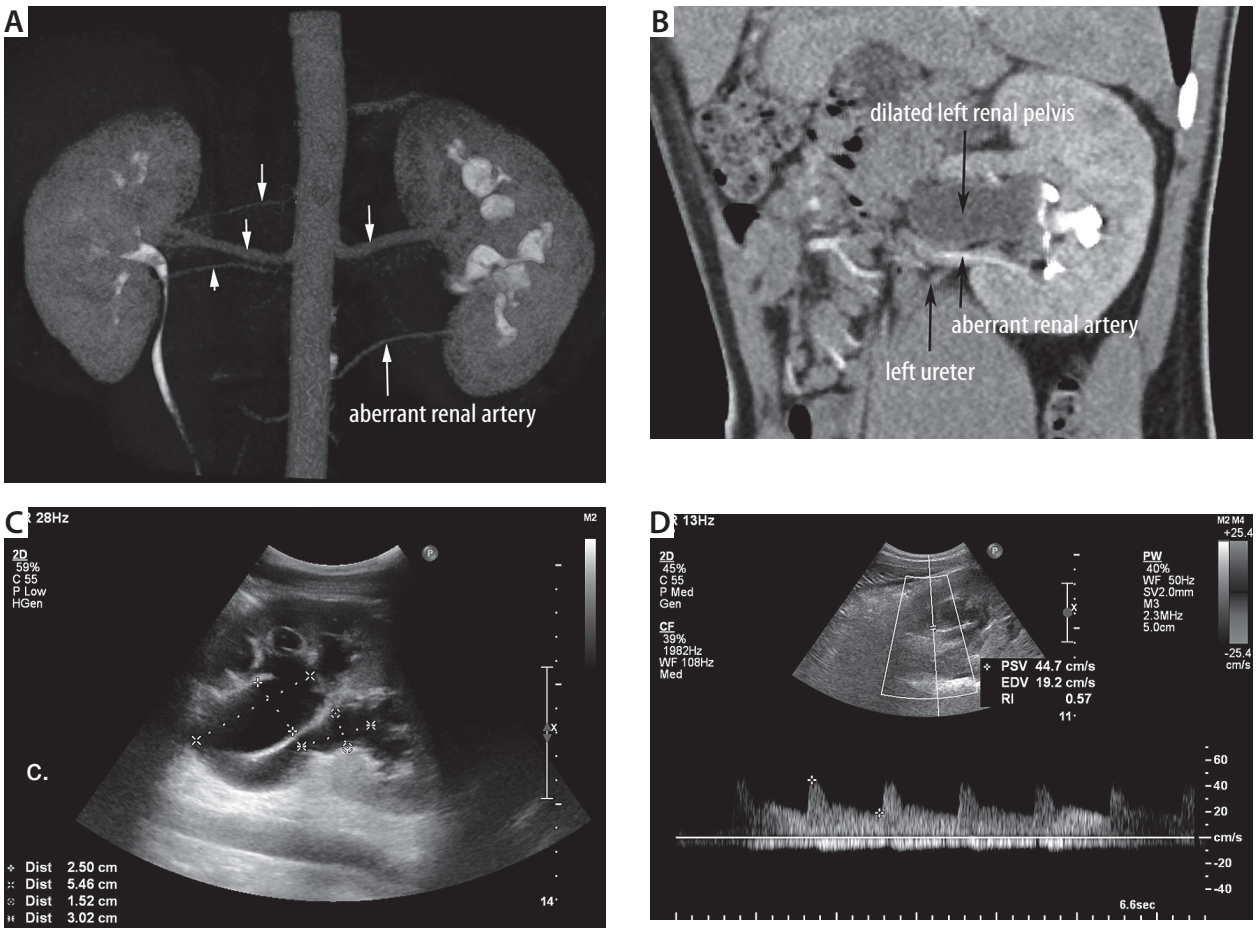

FIGURE 1. **A**), **B**) Computed tomography angiogram (CTA) demonstrates three arteries to the right kidney and two arteries to the left kidney, originating from the aorta (arrows). An inferior left additional artery is crossing over the ureteropelvic junction (arrows). **C**) Ultrasound scan shows a marked dilatation of the left pelvicalyceal system and partially separated, dilatated left renal pelvis with dimensions 25 × 55 mm and 15 × 30 mm. **D**) Colour Doppler ultrasound shows an additional artery to the lower pole of the left kidney with normal blood flow (resistive index was 0.57)

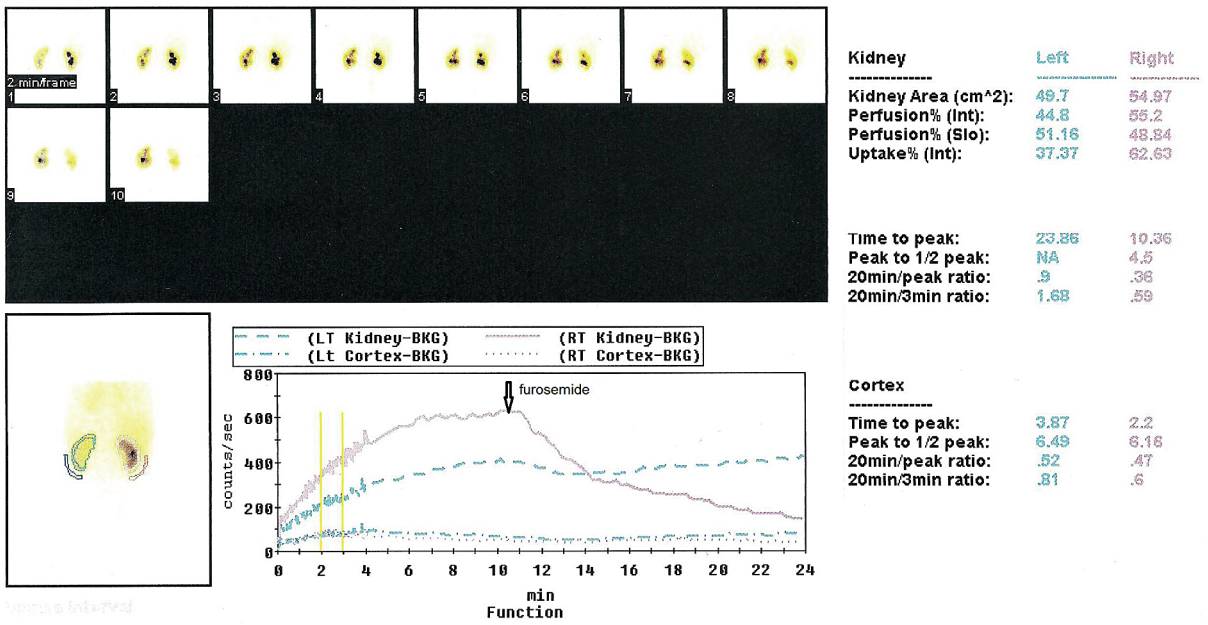

FIGURE 2. Pre-furosemide images reveal marked left pelvicalyceal dilatation with slowly accumulating tracer activity. After intravenous infusion of furosemide, the right renal collecting system shows prompt washout, but tracer continues to accumulate on the left. On time-activity curves, after furosemide infusion, there is prompt washout of pelvicalyceal activity in the right kidney, but delayed washout in the left kidney with almost total block in urine outflow

sion, the delayed left kidney excretion was not improved, indicating an almost total block in urine outflow (Fig. 2).

The patient underwent laparoscopic surgery during which the marked hydronephrotic left renal pelvis was found. The ureteropelvic junction (UPJ) was compressed by the aberrant arterial vessel reaching the lower pole of the left kidney. The renal pelvis and UPJ were cut and anastomosed in front of the arterial vessel. A double J stent was temporarily inserted into the left ureter and renal pelvis. Postoperative period was uneventful, and the renal function was improved in the follow-up visit.

DISCUSSION

Ureteropelvic junction obstruction is one of the most frequent urological diseases affecting the paediatric population [4]. It is mainly caused by intrinsic stenosis due to congenital fibrosis of the junction [5]. Extrinsic causes are rare. They include tumours, postoperative adhesions, constipations and the unusual presence of crossing renal artery (CRA). CRA belongs to additional renal arteries which are found in about 30% of individuals [6]. The normal renal arteries enter the kidney through its hilum and divide into anterior and posterior divisions, to supply the respective segments of the kidney, being themselves the end arteries [7]. Additional renal arteries are also end vessels, and if they are ligated or damaged, the part of kidney supplied by them is likely to become ischaemic [8]. Due to its clinical significance renal artery variations were studied by various authors [7, 9]. It was shown that the arteries supplying the kidneys divide outside the hilum frequently. However, the only significant variation could be the polar arteries, which pierced the capsule of the kidneys [10]. Our patient showed this type of artery, which reached the lower pole of the left kidney directly from the abdominal aorta. This artery supplied the kidney without entering its hilum and could be considered as an aberrant artery.

Among the additional renal arteries, there are also accessory arteries to the main renal artery accompanying the same towards the hilus and entering the kidney through the hilum [6]. However, there is no established criterion for aberrance, and to some authors the term aberrant renal vessel applies equally to an accessory artery in the renal pedicle, or to a vessel entering the kidney at either pole [11]. Regardless of terminology, the existence of the additional arteries is accountable in cases of renal pathologies, radiological interventions, renal transplants, and other surgical approaches to them.

The symptoms of vascular ureteropelvic junction obstruction are not characteristic and may create difficulties in the diagnostic process. The pain usually suggests nephrolithiasis and can be accompanied by nausea. However, our patient did not show colicky abdominal pain. The most suggestive symptom was intermittent pain lasting for seven months without any previous symptoms. Moreover, each subsequent episode of a pain was more and more severe. The pain was usually experienced during the later hours of the day and during the night in the horizontal position, especially after ingestion of large quantities of fluids. Similar symptoms caused by aberrant renal artery were reported by other authors in the case of a young woman [12]. Other potential symptoms of ureteropelvic junction obstruction may include significant weight loss

and palpable ptotic kidney [13]. However, these symptoms were not observed in the present patient or in the mentioned woman.

In our case, the diagnostic process took several months. Initial abdominal ultrasonography revealed only mild dilated collecting system of the left kidney, without any renal stones, so the early diagnosis was not obvious. Careful history taking is very important in clinical practice; however, unless specific questions are asked regarding the periodicity of the pain and its relationship to maintained positions of the body and/or the ingestion of large quantities of fluid, the correct diagnosis may not be suspected.

The final diagnosis was established by a CT scan. The computed tomography, even without contrast media, is a good examination to initially evaluate renal vessels. Computed tomography angiogram is necessary to confirm diagnosis, but it is a more invasive method.

It should also be mentioned that an additional renal artery can be a source of false-negative results in the investigation of renal artery stenosis in patients with arterial hypertension and normal resistive index in the main renal artery. The stenosis can occur in an additional renal artery, and it can be overlooked. Our patient did not suffer from arterial hypertension, so Doppler ultrasound of renal arteries was not performed on admission. However, this investigation was done later and showed an additional artery, which crossed the ureteropelvic junction. Doppler ultrasound as a noninvasive diagnostic method can also be useful to find vascular causes of hydronephrosis [14].

CONCLUSIONS

In conclusion, abdominal pain is still a diagnostic challenge in clinical practice. Careful history taking and physical examination are very important but sometimes insufficient to establish a specific diagnosis. Intermittent abdominal pain that is dependent on the position of the body and fluid intake in older children should suggest the presence of a crossing renal vessel. Doppler ultrasound and computed tomography without contrast media are good methods in the investigation of intermittent abdominal pain and initial assessment of renal vessels.

DISCLOSURE

The authors declare no conflict of interest.

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