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BRIEF REPORT

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Renal artery stenosis associated with Crohn disease

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Abstract Although extraintestinal complications involving skin, joints, eyes and liver are common in children with inflammatory bowel disease, hypertension is rare. We report data from a 16-year-old boy with renovascular hypertension and Crohn disease. To our knowledge, a patient with renal artery stenosis associated with Crohn disease has not been previously reported. Possible causes of renal vascular lesion in Crohn disease are discussed.

Keywords Renal artery stenosis · Crohn disease · Hypertension · Child

Introduction

Crohn disease is often complicated by extraintestinal manifestations that most commonly involve the eyes, skin, liver and joints [1]. Renal involvement includes IgA nephropathy [2], thin membrane disease [2], tubulointerstitial nephritis [3], amyloidosis [4], nephrotic syndrome [5], renal tubular acidosis [6], ureteral obstruction [7], nephrocalcinosis and nephrolithiasis [8]. To our knowledge, renal artery stenosis has not been described previously in a patient with Crohn disease. We report the case of a 16-year-old patient with an association of Crohn disease and renovascular hypertension due to renal artery stenosis.

Case report

The 16-year-old boy was admitted to our hospital because of generalized convulsions and hypertension. He was doing well until 4 years before admission, when he developed diarrhea and periumbilical pain. A diagnosis of Crohn disease was established at the age of 13 years, based on findings of aphthous colitis on endoscopy and characteristic granuloma on colonic biopsy. Treatment with 5-acetylsalicylic acid (5-ASA) and prednisone was introduced. Over the next 3 years he had mild bowel symptoms intermittently. Due to the steroid dependent disease, short stature and no weight gain, at the age of 16 years azathioprine was introduced, together with mesalamin. Prednisone was gradually tapered and stopped 3 months prior to the current admission. Blood pressure was regularly monitored during corticosteroid therapy and it was in the normal range. He had no family history of hypertension or renal disease.

Three days prior to the present admission the boy had complained of headache, impaired vision and nausea. Before that he did not have fever, arthralgia, malaise, weakness, polyarthritis, muscle aches or intermittent claudication. He had generalized convulsions and on admission he was confused and agitated, with a blood pressure of 180/120 mmHg and a pulse of 140/min. There were no disparities in blood pressure measurements of the four extremities. The chest was clear to percussion and auscultation. Heart sounds were normal, without murmur. Abdominal examination was normal. There were no audible bruits over the abdomen, in the lumbar region, or along the vascular axes. Pulsations of the peripheral arteries were palpable. The skin was unremarkable, with no café-au-lait spots or other birthmarks.

Initial laboratory studies showed C-reactive protein 21 mg/l; complete blood cell count (CBC), electrolytes, blood urea, creatinine, calcium, phosphate, liver tests, and lipidogram were normal. Urinalyses revealed no proteinuria, hematuria or other pathological findings. Serum catecholamine concentrations and 24-h urine collection for vanillylmandelic acid and homovanillic acid were normal, as well as thyroid function tests and serum aldosterone level. Plasma renin activity was 8.17 ng/ml/h (normal range 0.2–2.8 ng/ml/h). Von Willebrand factor associated antigen (vW factor), C3, C4, CH50, and immunoglobulins were normal. Antineutrophil cytoplasmic autoantibodies (ANCA), antinuclear antibody, and rheumatoid factor were negative. Conventional B-mode renal ultrasonography findings were unremarkable. Chest X-ray was normal, and fundoscopic examination showed spasm of the retinal arteries. Echocardiography revealed left ventricular hypertrophy and normal morphology of the heart and of the aortic arch. The brain CT scan displayed a moderate cerebral edema. Cerebral MR, abdominal and chest CT scans were normal.

The patient was intubated and treated with thiopental, diazepam, mannitol, and furosemide, and blood pressure was stabilized with infusion of nitroglycerin, oral nitrendipine, captopril and hydrochlorthiazide. By the third hospital day he became alert, had no further seizures and on the 4th day was extubated. Azathioprine, 5-ASA and enteral nutrition were continued. Blood pressure was controlled with captopril and hydrochlorotiazide.

Renal scan with diethylenetriaminepentaacetic acid (DTPA)-labeled technetium-99m showed a smaller left kidney with marked

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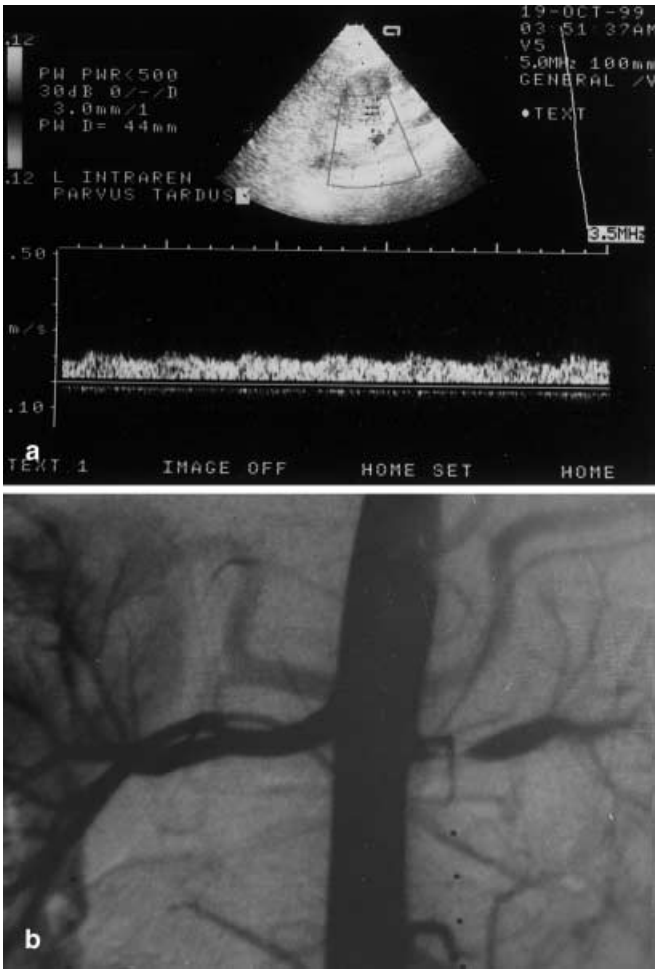

Fig. 1 **a** "Parvus and tardus" Doppler spectra in intrarenal artery of the left kidney. **b** Angiography of renal arteries shows high-degree stenosis of the proximal left renal artery

hypoperfusion and 10% of the total function. Color duplex-Doppler of renal and intrarenal arteries revealed a markedly elevated peak systolic velocity (PSV >2 m/s) and turbulent flow in the proximal part of the main left renal artery, as well as parvus and tardus spectra in the intrarenal arteries of the left kidney (Fig. 1a). The Doppler finding was typical for the high-degree, hemodynamically significant stenosis of the left renal artery. Doppler evaluation of the right renal artery was normal. Digital subtraction aortography (DSA) showed a normal aorta. Selective DSA of the renal arteries demonstrated a smooth, funnel-shaped subtotal stenosis (ca. 1 cm in length) of the proximal left renal artery, close to its origin, with poststenotic dilatation of the distal segment of the renal artery (Fig. 1b). The right renal artery was normal. Cerebral MR angiography showed an absence of any associated intracranial vascular abnormalities. Percutaneous transluminal angioplasty (PTA) of the left renal artery was performed. Following PTA, the child's blood pressure improved markedly, and the blood pressure medications were gradually withdrawn. A follow-up DTPA-technetium-99m renogram, obtained 3 months after the procedure, showed the left kidney accounting for 28% of the overall function. Thirteen months after PTA the patient is normotensive, and both the Doppler finding of blood flow velocity in the main renal artery and the morphology of the intraarterial Doppler spectra are normal.

Discussion

Although extraintestinal complications involving eyes, skin, liver and joints are commonly described in children with Crohn disease, hypertension is rare [1]. It may develop as a result of glomerular, tubulointerstitial, or other renal pathologies reported in association with Crohn disease [2–8]. Our patient showed neither signs of renal functional impairment, nor signs of active urinary sediment associated with glomerular or tubulointerstitial injury. Ultrasound examination ruled out hydronephrosis, reported in the literature as a cause of hypertension in a child with Crohn disease, occurring due to the ureteral compression by retroperitoneal extension of the phlegmonous inflammatory process of the terminal ileum [7]. Color duplex-Doppler ultrasound showed a finding consistent with high-degree left renal artery stenosis. The diagnosis was proved by angiography.

Vascular involvement in Crohn disease is rare and has been reported in association with concomitant thromboembolic disease, polyarteritis nodosa, and Takayasu's arteritis (TA) [9–14]. Both polyarteritis nodosa and TA may involve the renal arteries and present with severe hypertension due to the renal artery stenosis [15–18]. Takayasu's arteritis usually involves the aortic arch and brachiocephalic vessels. It presents with bruits, diminished pulses and symptoms attributable to diminished arterial supply. However, not all cases of TA are confined to the aortic arch or its branches, i.e., in children the descending thoracic and abdominal aorta are more commonly affected [19]. One in four children reported with Crohn disease and TA has renovascular hypertension but also extensive involvement of the abdominal aorta with aneurysmal dilatation and stenoses [9–12]. Our patient did not have diminished pulses, bruits or involvement of the aortic arch and abdominal aorta and did not fulfill the diagnostic criteria for TA defined by the American College of Rheumatology [20]. Polyarteritis nodosa also does not appear likely because the patient had no skin lesions, arthralgias, eosinophilia, pulmonary or renal parenchymal involvement, peripheral neuropathy or small vessel involvement [18]. Renovascular hypertension has also been reported in children with other forms of systemic vasculitis and Kawasaki disease [18]. Clinical and serological workup did not support the presence of any other large-vessel or medium-vessel vasculitides in our patient. His physical examination also did not reveal clinical stigmata of neurofibromatosis [21], melorheostosis [22], William syndrome [23], Marfan syndrome [24] or Klippel-Trenaunay-Weber syndrome [25], which have all been reported in association with renal artery stenosis.

The most common cause of renal artery stenosis in children is fibromuscular dysplasia, with areas of arterial narrowing alternating with aneurysmal sections being the most characteristic lesions [18]. They give a typical angiographic appearance of a "string of beads." The angiographic appearance of the stenotic lesion in our patient is smooth and funnel shaped, close to the origin of the artery, which is not typical of fibromuscular dysplasia. The other possible cause of renal artery stenosis in children is external com-

pression of the renal arteries by intrarenal tumors, paraaortic tumors, pheochromocytoma, hilar or retroperitoneal lymph nodes, or masses [24]. Abdominal ultrasound and CT scans excluded renal and perirenal tumor or masses and pheochromocytoma. There are no reports in the literature of azathioprine therapy causing renal artery stenosis.

According to the clinical and radiological findings, the vascular lesion in our patient cannot be explained by other associated pathologies. The exact nature of the pathology of the vascular lesion remains unclear. Unlike the aortic vascular abnormalities that have been described in patients with inflammatory bowel disease and Takayasu's arteritis, there have been no reports in the literature of isolated renal artery stenosis in a patient with Crohn disease. So far, 13 months after the PTA, our patient is normotensive, but it is necessary to keep him under strict observation to enable detection of any recurrent stenosis.

Conclusion

The etiology of the arterial lesion in our patient was not clearly identified; neither was its relationship to Crohn disease. However, in patients with Crohn disease and hypertension renal artery stenosis should be considered in differential diagnosis.

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