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LESSON OF THE MONTH

Successful Delayed Revascularisation for Renal Artery Occlusion

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Key Words: Renal artery occlusion; Revascularisation of kidney.

Introduction

The presentation of renovascular hypertension with renal artery occlusion and renal failure is rare in the paediatric population.[1–3] Management of non-traumatic neonatal and adult renal artery occlusion with renal hypertension includes nephrectomy or revascularisation.[1–8] The most common cause (>70%) of renal artery occlusion in adults is arteriosclerosis.[9–13] In children of western cultures, fibromuscular dysplasia (FMD) has been described in over 70% of cases of renal artery stenosis and hypertension.[14]

Both acute and chronic renal artery stenosis are usually subsequent to renal artery occlusion, as 40% of renal artery stenosis cases with >75% stenosis progress to occlusion.[9,12,15–17] As a result of stenosis and ischemia, collateral blood flow may develop. Collateral blood flow may be sufficient to maintain a viable kidney at time of occlusion. Several criteria have been suggested for predicting successful revascularisation.[1,4,15,18–21] These include:

(1) Kidney length >9.5 cm[1,18,21]
(2) Collateral blood flow (by angiography)
(3) Normal parenchyma (vs glomerulosclerosis).

Successful reconstruction is measured by improvement in renal function, urine output, decreased blood pressure, and termination of dialysis.[9,16,20,22]

Case Report

A 16-year-old female patient with cerebral palsy and a solitary kidney was transferred to our hospital for treatment of uncontrollable hypertension, renal failure, and anuria. Treatment included haemodialysis and medical therapy to reduce blood pressure.

The patient had suffered from uncontrolled renovascular hypertension since childhood. At the age of 5, she had a failed angioplasty of the right renal artery which ended in a nephrectomy. She continued to suffer from hypertension unresponsive to medical therapy. The results of investigations were as follows:

(1) A CTA showed left renal artery occlusion (RAO).
(2) An Isotope Scan demonstrated reduced absorption and signs of renal failure (Fig. 1).

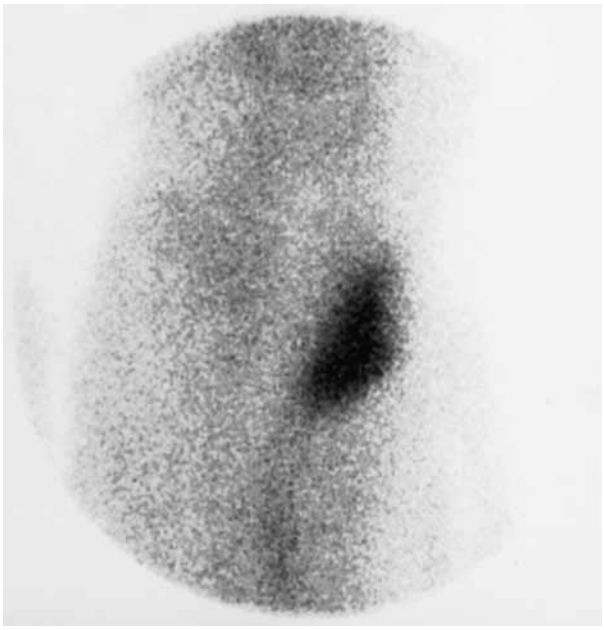

Fig. 1. Isotope scan demonstrates solitary, left kidney.

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Fig. 2. Angiography shows occlusion of left renal artery. Renal parenchyma is intact supplied by extrarenal, collateral blood flow.

(3) Angiography revealed severe diffuse arteriosclerotic disease. The diameter of the aorta measured 2 cm. The iliac and femoral arteries were narrowed and calcified. The lumbar arteries were dilated. The left renal artery was completely obstructed, with a highly developed extrarenal collateral blood supply (Fig. 2).
(4) Ultrasound of the kidney demonstrated normal size (11 cm).

The kidney length >11 cm, combined with a collateral blood supply allowed us to consider revascularisation of the ischaemic kidney.[1,4]

An aorto-left renal artery bypass was performed with a common iliac artery interposition graft. A right common iliac artery interposition Gortex 5 mm bypass was concurrently performed. Intra-operative renal biopsy revealed normal renal parenchyma.

Immediately post-op, small amounts of urine appeared. On the following day, an isotope scan showed an improvement in kidney perfusion and absorption. During the immediate postoperative period, renal function returned to normal and blood pressure decreased with medication. Eighteen months post-op, the patient was in good condition, with normal renal function and near normal blood pressure with minimal medical therapy. CTA performed 3 years later showed a patent bypass.

Discussion

In appropriately selected cases, revascularisation of an occluded renal artery is recommended for treatment of renovascular hypertension and acute renal failure. In complete renal artery occlusion, the extent of collateral circulation is crucial to enable the preservation of an ischemic kidney over a prolonged period of time.[1,4,9,12,13]

A literature review on revascularisation for complete renal artery occlusion reveals that kidney function improved and dialysis was terminated in 50–75% of the patients with acute on chronic renal failure.[4,8,10,14,15] Blood pressure decreased in 75–90% of patients with renovascular hypertension; 10–25% needed no further medical treatment postoperatively.[4,6,8] Perioperative mortality was reportedly between 1–3%.[6–8,13,14]

In our patient, renal artery reconstruction was successful. The particular revascularisation procedure performed in this case is unique in that it is not usually considered the first choice.[10,15] Diffuse arteriosclerosis involved the major arteries conventionally used in renal revascularisation (external/internal iliac arteries, etc.), rendering them inappropriate for reconstruction of the occluded renal artery. The saphenous veins were severely underdeveloped due to her cerebral palsy. In young patients, arterial grafts are preferable over venous grafts due to better patency rates. The right common iliac artery was of adequate diameter for reconstruction.

Our conclusion with regard to RAO with acute renal failure supports revascularisation performed on a kidney that meets the above mentioned criteria. This procedure performed in both children and adults can restore renal function, eliminating the need for dialysis and achieving better control of hypertension.

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