

The Treatment of Renal Artery Stenosis with Angioplasty Using a Rendezvous Procedure in a Paediatric Patient

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Abstract

Purpose: Renovascular hypertension is a rare cause of paediatric hypertension. It is however, a potentially treatable cause particularly when caused by renal artery stenosis (RAS). We describe a hitherto unreported method of treatment of treating difficult RAS.

Technique: A 22G needle was used to puncture an infero-posterior intra-renal arterial branch of the right kidney under ultrasound guidance. Using a 4Fr angiographic catheter, a co-axial crossing catheter and a 0.18" wire the occlusion was crossed and snared in the aortic lumen. This allowed for balloon angioplasty with a 5 x 20 mm cutting balloon followed by placement of a 6 x 20 mm balloon mounted stent. The trans-renal tract was sealed on removal of the catheter with embolization coils in an attempt to reduce the risk of retroperitoneal renal haemorrhage. Completion angiography demonstrated excellent filling of the right kidney and no immediate complication.

Keywords: Renal Artery Stenosis (RAS); Angiography; Renovascular Hypertension

Introduction

Hypertension is rare in the paediatric population, however renal artery stenosis (RAS) is the most common renovascular cause [1]. It is most commonly encountered with fibromuscular dystrophy, neurofibromatosis (NF), vascular malformation, Moyamoya disease, Takayasu's arteritis and, rarely, from atherosclerosis [2,3].

Early treatment is warranted to prevent the adverse consequences of hypertension. The treatment options for RAS include open surgery and percutaneous transluminal angioplasty (PTA) [4,5]. The latter may be performed with minimal complications and with minimal invasion. PTA typically uses a conventional balloon, with or without stent placement, for revascularisation. Surgery is reserved for cases of RAS that are resistant to PTA. In cases of RAS where there is near occlusion at the ostium crossing the lesion with a wire during PTA can be challenging and sometimes impossible. In these cases, an autotransplantation is sometimes considered.

In the present report we describe a case of RAS, secondary to neurofibromatosis, where the renal artery ostial occlusion could not be crossed and treated via the standard antegrade route. Instead, we describe a rendezvous procedure allowing the occluded artery to be crossed and angioplasty and stent placement to be performed.

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Case Presentation

We present the case of a 17-year-old female with neurofibromatosis (NF) type 1 who suffered from hypertension secondary to bilateral RAS. She already suffered from end-organ dysfunction with concentric left ventricular hypertrophy on echocardiogram and was taking 3 different antihypertensive medications. An initial attempt at PTA, 1 year previously, with plain balloon and cutting balloon angioplasty of the renal angioplasties via a femoral artery approach was technically successful but failed to provide a lasting result and recurrent RAS was demonstrated on subsequent MR angiography (MRA) performed 7 months later. MRA demonstrated a single occluded right renal artery and two left sided renal arteries; the dominant upper pole artery was stenosed (< 50%) and the smaller lower pole branch appeared normal. DMSA was performed and demonstrated a slight split in function with a dominant left kidney (56% vs 44%).

A repeat PTA was attempted via both femoral and brachial access but the stenosis could not be crossed despite various catheter and wire combinations. A discussion made following the procedure was for a repeat attempt at PTA on another occasion using a rendezvous procedure via direct renal artery puncture. Under a general anaesthetic an aortogram performed via right femoral artery access with a long 6Fr sheath (Destination®, Terumo Europe) confirmed a total chronic occlusion of the dominant upper pole right renal artery (Image 1). The previously treated left sided renal arteries showed < 50% stenoses and were not treated again. A Neff percutaneous access set (22G needle; Cook Medical©) was used to puncture an infero-posterior intra-renal arterial branch of the right kidney under ultrasound guidance. Using a combination of a 4Fr Bolia angiographic catheter (Terumo Europe), a co-axial crossing catheter (CXI®, Cook Medical©) and an 0.18" CTO wire (Victory™, Boston Scientific) the occlusion was crossed and snared in the aortic lumen (Image 2). This allowed for balloon angioplasty with a 5 x 20 mm cutting balloon (Victory™, Boston Scientific©) (Image 3) followed by placement of a 6 x 20 mm balloon mounted stent (Formula 418®, Cook Medical©) (Image 4). The trans-renal tract was sealed on removal of the catheter with embolization coils in an attempt to reduce the risk of retroperitoneal renal haemorrhage. Completion angiography demonstrated excellent filling of the right kidney and no immediate complication.



Image 1



Image 2

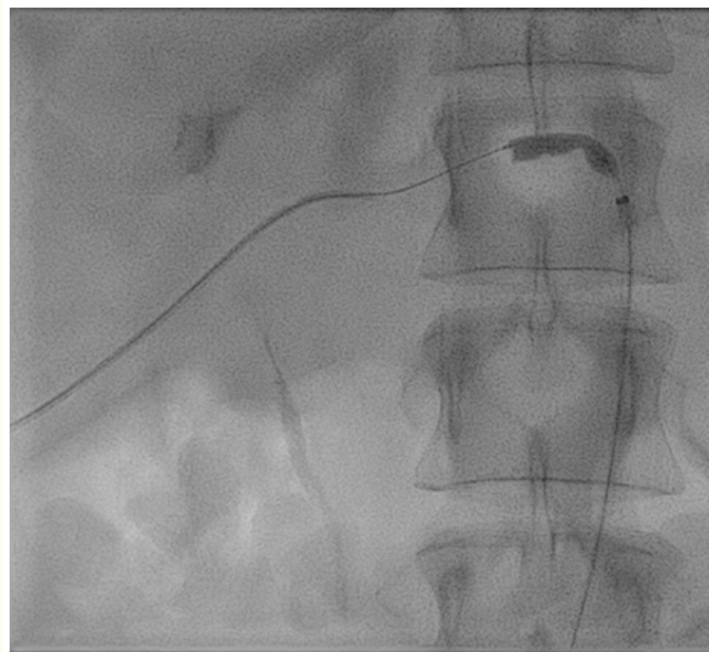


Image 3



Image 4

Discussion

We present the case of renal artery occlusion in a patient with NF Type 1 and associated hypertension in whom standard PTA via the abdominal aorta was not possible. We describe a hitherto unreported technique in the paediatric population using a rendezvous procedure via trans-renal direct renal artery puncture to allow the occlusion to be crossed, the wire snared via the aorta and for angioplasty and stent placement to be performed.

This technique can be used where traditional vessel stenosis/occlusion via an abdominal aortic route is not possible and surgical auto-transplant is wanted to be avoided. We propose that the procedure can be performed safely under a general anaesthetic in the paediatric patient using equipment that would be available in most interventional radiology theatres. The technique can equally be applied to difficult access in adult patients using the same methods. Having a transplant surgeon on hand to perform an autotransplant in the event of a complication such as vessel rupture or haemorrhage is a useful adjunct.

Conclusion

Renal artery occlusion can be successfully treated via direct transrenal renal artery puncture and a rendezvous technique to allow the occlusion to be crossed and angioplasty and stent placement to be achieved.

Bibliography

1. Tullus K., *et al.* "Renovascular hypertension in children". *Lancet* 371.9622 (2008): 1453-1463.
2. Konig K., *et al.* "Treatment of severe renal artery stenosis by percutaneous transluminal renal angioplasty and stent implantation: Review of the pediatric experience: Apropos of two cases". *Pediatric Nephrology* 21.5 (2006): 663-671.
3. Textor SC. "Ischemic nephropathy: Where are we now?" *Journal of the American Society of Nephrology* 15.8 (2004): 1974-1982.
4. Radanovic B., *et al.* "Endovascular therapy of renovascular hypertension in children: Single center analysis". *European Journal of Pediatric Surgery* 19.3 (2009): 135-140.
5. Shroff R., *et al.* "Angioplasty for renovascular hypertension in children: 20-year experience". *Pediatrics* 118.1 (2006): 268-275.

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