CASE REPORT

Kissing stenting of aorto-ostial lesions in juxtaposed renal arteries

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SUMMARY

Percutaneous angioplasty with or without stenting has become an established procedure for treatment of renal artery stenosis for control of hypertension or progressive renal dysfunction. Anatomic variation of renal arteries is common with dual blood supply of unilateral kidney noted in almost 25% of the general population. Renal angioplasty of these anatomic variants of renal arteries is challenging. We present an unusual case of juxtaposed renal arteries with aorto-ostial lesion where direct kissing stenting was done with excellent technical and clinical outcome.

BACKGROUND

Percutaneous revascularisation with balloon expandable stent placement and/or balloon angioplasty has been proven to be an effective alternative for renal artery bypass surgery in the management of renal artery stenosis.¹⁻² Despite this high success rate, renal angioplasty with stenting remains a challenging procedure in patients with tight ostial lesion, distal bifurcation lesion and in patients with stenosis involving juxtaposed arteries.³⁻⁶ The challenges in patients with aforementioned lesions lie in precise stent placement and avoiding side branch occlusion. In the present case report we describe an unusual case of direct stenting of aorto-ostial lesion of juxtaposed dual left renal arteries using kissing stent technique.

CASE PRESENTATION

A 44-year-old man reported for evaluation of recent worsening of well-controlled hypertension while on an optimal dose of three antihypertensive agents (ramipril 10 mg twice a day, indapamide 1.5 mg once a day and amlodipine 10 mg twice a day). Examination revealed a non-obese individual (body mass index 26 kg/m²), with blood pressure (BP) of 190/120 mm Hg, and grade 2 hypertensive changes in fundus examination. Systemic examination was unremarkable.

INVESTIGATIONS

Serum biochemistry revealed a blood urea level of 21 mg/dL and serum creatinine of 0.9 mg/dL. ECG showed left ventricular hypertrophy, which was confirmed on echocardiography. Ultrasound of the abdomen revealed a small sized left kidney as compared to right (left kidney 7.5 cm vs right kidney 9.2 cm and a small cortical cyst in the upper pole of right kidney) with an inconclusive renal artery Doppler. A CT scan of the abdomen showed bilateral dual renal arteries; the juxtaposed dual left

Figure 1 CT scan showing juxtaposed dual left renal arteries with aorto-ostial stenosis.

renal arteries had 99% ostial stenosis (figure 1). There was no other abnormality noted on the CT scan. A DTPA scan subsequently revealed a glomerular filtration rate (GFR) of 22 mL/min on the left side and 48 mL/min on the right side. Other work up for secondary hypertension was negative.

DIFFERENTIAL DIAGNOSIS

Secondary hypertension should be suspected in patients with recent onset severe hypertension in young patients (<40 years) or if there is worsening of previously well-controlled BP. The common causes of secondary hypertension include disorders affecting the kidneys (nephritic syndrome, chronic kidney disease, polycystic kidney disease), blood vessels (renal artery stenosis, coarctation of aorta, preeclampsia) and endocrine organs (pheochromocytoma, hyperaldosteronism, hypothyroidism, hyperthyroidism, hyperparathyroidism). Miscellaneous causes include alcohol abuse, consumption of medication like oral contraceptive pills or non-steroidal anti-inflammatory drugs and sleep apnoea syndrome.

TREATMENT

In view of the recent worsening of hypertension while being on three antihypertensive drugs, contracted left kidney with significant ostial stenosis and differential renal function on DTPA scan, the patient was taken up for elective renal angioplasty after obtaining informed consent. In view of the ostial bifurcation lesion noted on CT scan, three elective vascular accesses were obtained using the right femoral, left femoral and left brachial arteries. The patient was given 5000 units of unfractionated heparin and an abdominal aortic angiogram was performed using a 6 F pig tail catheter. Renal

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arteries on the left side were juxtaposed with significant ostial stenosis.

A 6 F renal double curve guiding catheter (Cordis Corp., Miami, Florida, USA) was introduced from left femoral artery to hook the left anterosuperior renal artery. The left posteroinferior renal artery with an oblique downward alignment with respect to the aorta was hooked using the left brachial artery route with a 6 F Judkin right coronary guiding catheter. The position and coaxial alignment of the guiding catheters were confirmed by aortic angiogram performed using a 6 F pigtail catheter (figure 2). Two 0.014 inch BMW coronary guide wires were used to cross the lesions through the respective guiding catheters. Two 4 mm×13 mm Coroflex Please (B Braun Melsungen AG) balloon mounted paclitaxel eluting coronary stents were taken over the wire through the respective guiding catheters. The stents were positioned across the lesions with 1–2 mm of stent overhang in the aorta to ensure ostial coverage. After positioning the stents the guiding catheters were pulled back 2–3 mm and the position was confirmed by aortic angiogram through the pigtail. The stents were deployed at 8 atms simultaneously with good result (figure 3). The final angiogram after withdrawing the balloons revealed optimal deployment of the stents (figure 4).

OUTCOME AND FOLLOW-UP

The postprocedure period was uneventful and within 48 h the patient was taken off the calcium channel blockers and his BP was well-controlled on ACE inhibitors and a diuretic. Blood urea and creatinine checked after 7 days were normal. When reviewed at 2 months his BP was found to be 140/80 mg while on a single antihypertensive drug (ramipril 10 mg once a day). DTPA scan postprocedure revealed improvement in the GFR from 22 to 36 mL/min on the left side.

DISCUSSION

Renovascular hypertension is the commonest cause of secondary hypertension and has a prevalence of about 1% among patients with hypertension.¹ Most cases of renal artery stenosis, such as

Figure 3 Simultaneous kissing stents of the juxtaposed renal arteries using balloon mounted paclitaxel eluting coronary stents.

the present case, are asymptomatic and diagnosis is established during investigation for refractory hypertension.¹

Endovascular treatment of renal artery stenosis using either angioplasty or stent placement has resulted in control of hypertension and to some extent in stemming progressive renal dysfunction.¹ For ostial lesions, which are encountered most frequently, stenting is preferred to angioplasty as these lesions are elastic and respond poorly to balloon dilatation. A meta-analysis comparing renal artery stenting to balloon angioplasty recorded a higher procedural success rate (98% vs 77%) and lower rate of the restenosis (17% vs 26%, $p<0.001$) with renal stents compared to balloon angioplasty.⁷

Figure 2 Aortic angiogram using a pigtail catheter showing selective cannulation of both juxtaposed left renal arteries with guiding catheters.

Figure 4 Angiogram postrenal artery stenting in the left anterior oblique showing optimal deployment of renal stents.

Renal angioplasty of the bifurcating renal arteries is technically challenging as there is a high risk of side branch occlusion.^{1 5 6} The technique used in such cases is dictated by the underlying anatomy. In patients with early bifurcation of renal artery trunk a single guide catheter with two wires, one for each separate branch, may be used,⁸ while in patients with separate origin of renal arteries or juxtaposed renal arteries two separate guiding catheters, each with a separate guide wire, may be used.⁹ When using separate guide catheters one needs two separate arterial accesses.^{3-5 9} Inferiorly angulated renal arteries are best approached from above, allowing natural orientation of balloon and stent with the vessel, as was performed in the present case. Traditionally, brachial access is preferred over radial as the length of the available hardware is more suited for this site.

In the present case, stenting the juxtaposed ostial lesion using the 'kissing stent' technique using two separate arterial accesses (brachial and femoral artery) achieved a good immediate result. In this technique, stent balloons are inflated simultaneously to prevent plaque shift and side branch narrowing. This is a simple technique that provides uninterrupted wire access to both branches with no need for crossing through the side of a stent for final balloon inflations. However, proximal edge dissection may be noted in some cases with this technique.^{5 6}

A high restenosis rate is noted in patients with aorto-ostial lesions and those with small renal arteries. In view of high rates of restenosis associated with small size renal arteries, drug eluting stents (DES) are the best option.³ The use of DESs has been described for RAS previously but the data of their use is limited in patients with complex renal artery stenosis with small calcified ostial and bifurcation lesions.³ At present, coronary DES are used in the renal arteries as renal medicated stents are not available. The size of the vessel to be treated has to be under 4 mm as coronary stents larger than this are not available.

An aorto-ostial lesion involving juxtaposed dual renal arteries is an unusual anatomic variation of renal artery stenosis. In selected cases of such aorto-ostial lesions, direct stenting in a 'kissing' fashion can be done to achieve good angiographic and clinical results. Despite recent randomised trials showing no benefit of renal artery stenting against medical management, the benefit of renal angioplasty still remains in selected cases of renal artery stenosis.^{2 10} Our case report highlights the procedural challenge and excellent clinical outcome achieved in a patient with juxtaposed ostial stenosis.

Learning points

- Renovascular hypertension still remains the commonest cause of secondary hypertension.
- Despite recent randomised trials showing no benefit of renal artery stenting, renal angioplasty with stenting remains the procedure of choice in select patients with severe renal artery stenosis.
- Renal angioplasty is a challenging procedure in patients with tight ostial lesion, distal bifurcation lesion and stenosis involving juxtaposed renal arteries.
- A thorough knowledge of renal anatomy along with properly selected hardware can result in excellent outcome in patients with challenging lesions.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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