

Received: February 15, 2017

Accepted: March 10, 2017

Published: March 27, 2017

## Urgent Aortic Stenting for Acquired Atheromatous Coarctation of Aorta Presenting as Acute Aortic Obstruction and Multiorgan Failure

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### 1 Abstract

65 years gentleman presented to emergency department with upper body hypertensive urgency, heart failure and renal shut down. He had recently undergone aortography and CT angiography which revealed severe atheromatous narrowing of upper descending thoracic aorta, well below the origin of left subclavian artery, with maximal stenosis of 85% at D5-D6 vertebrae level. Urgent aortic stenting with covered stent saved this patient with acquired atheromatous coarctation presenting as acute aortic obstruction and multiorgan failure.

### 2 Introduction

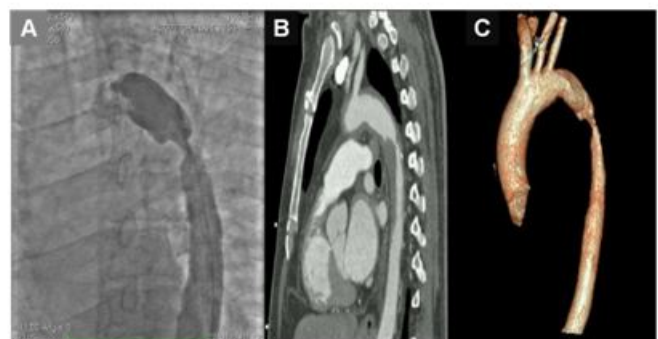
Narrowing of aorta can occur due to various aetiologies. It can be localised or segmental depending on the etiology [1]. The most common congenital reason for this narrowing of aorta is Coarctation of Aorta (COA) [1]. The other etiologies are pseudocoarctation, aortoarteritis, takayasu's arteritis, middle aortic syndrome, atherosclerosis, coral reef aorta etc [1-5]. We are reporting a case of acquired atheromatous coarctation of aorta presenting as acute aortic obstruction and multiorgan failure caused by severe atheromatous narrowing of aorta which was treated on an urgent basis with aortic stenting.

### 3 Case Report

65 years old gentleman presented with breathlessness (NYHA class III) and accelerated hypertension with

a Blood Pressure (BP) of 182/104 mmHg. He had undergone coronary angioplasty with stents to LAD and LCX 4 years ago. Electrocardiography showed non-specific ST-T changes while his echocardiography was normal except for grade 3 diastolic dysfunction. All laboratory tests were normal. Both kidneys were ultrasonographically normal.

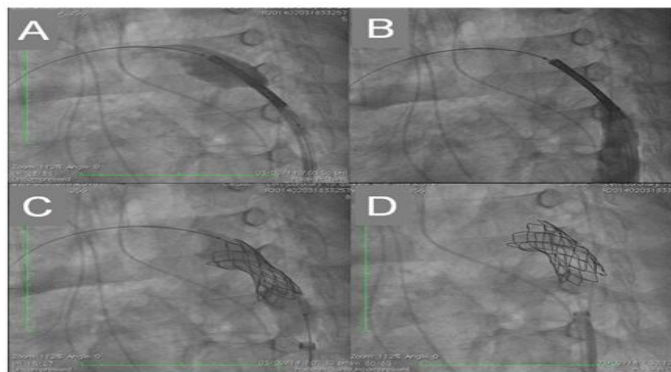
Transfemoral coronary angiography revealed patent stents with no critical obstruction; renal angiography also was normal. His femoral pulses were feeble and there was difficulty in negotiating 0.035" Terumo guidewire and 5F diagnostic catheter through upper descending thoracic aorta during coronary angiography. So aortography was performed with 5F pigtail catheter which demonstrated long segment severe stenosis of upper descending thoracic aorta well below the origin of left subclavian artery (Figure 1, panel A). Mutli-slice CT angiography revealed gross



**Figure 1 (Panel A) Baseline aortography** - long segment severe stenosis of upper descending thoracic aorta well below the origin of left subclavian artery; **(Panel B & C) CT a-angiography of aorta** - gross irregular thickening and atheromatous narrowing of upper descending thoracic aorta.

irregular thickening and atheromatous narrowing of upper descending thoracic aorta with maximal stenosis of 85% at D5-D6 vertebrae level (Figure 1, panel B & C). Measurements of aorta at various levels were as follows: arch - 23mm, immediately after origin of left subclavian artery - 16.8mm and diaphragm - 22mm. The length of significantly stenosed segment of aorta was 6-7cm. Patient was given the options of surgery and elective aortic stenting. Patient opted for aortic stenting. In view of financial constraints, patient was discharged at request on anti-ischemic and anti-hypertensive medications.

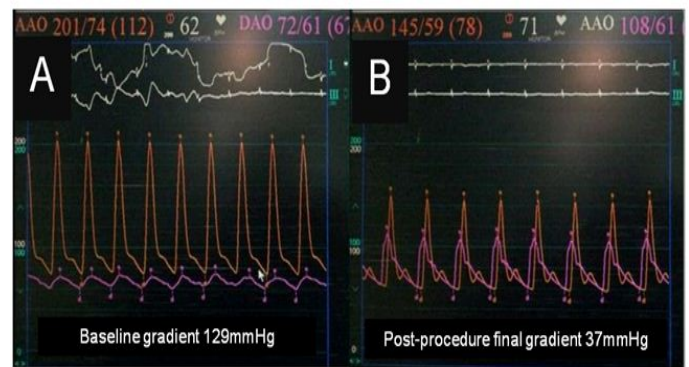
Within 1 week of discharge, patient got re-admitted in emergency department with upper body hypertensive urgency (BP 210/120 mmHg), acute heart failure and acute renal shut down. His blood urea and serum creatinine were 90 mg/dl and 2.6 mg/dl respectively. Patient was mechanically ventilated and taken up for urgent aortic stenting. The lesion in upper descending thoracic aorta was crossed transfemorally using 6F diagnostic multipurpose catheter and 0.035" Terumo guidewire. Then this was exchanged to 6F Pigtail catheter and Amplatz superstiff wire. Using 14 F Mullins sheath, Covered CP stent 60mm hand crimped on Max LD balloon 20mmx6cm was positioned across the lesion. Contrast stagnation was seen proximal to severe obstruction during this positioning (Figure 2, panel A & B).



**Figure 2 (Panel A & B) Positioning of covered CP stent** - Contrast stagnation seen proximal to severe obstruction. (**Panel C) Deployment of CP stent** - Graded dilatation of covered CP stent performed because of hard unyielding atherosclerotic plaque. (**Panel D) Final result** - well opened covered CP stent with minimal residual narrowing.

Covered CP stent was deployed at 6-8 atm (Figure 2, panel C) with temporary pacing done from right ventricle at 200bpm. Graded dilatation of CP stent was performed because of very hard unyielding nature of the atherosclerotic plaque. Still residual narrowing of the stent was seen and gradient across the lesion reduced to 80mmHg from

the baseline of 129mmHg. So post-dilatation of the stent was performed with Bard Atlas balloon 20mmx4cm at 10 atm. Finally, a well opened CP stent with minimal residual narrowing was obtained (Figure 2, panel D) and the final pressure gradient across the lesion dropped to 37mmHg from the baseline value of 129mmHg (Figure 3, panel A & B). We did not aim for gradient reduction to less than



**Figure 3 (Panel A & B) Pressure tracing** - pressure gradient across the lesion at baseline and after aortic stenting.

20mmHg in this patient so as to avoid rupture of aorta. Urgent aortic stenting led to miraculous improvement in our patient with total normalization of BP, dramatic improvement of renal failure with diuresis for next 48 hours and drastic improvement in heart failure. Patient was extubated and doing fine in the next morning.

#### 4 Discussion

The differential diagnoses of this case were (i) atherosclerotic narrowing, (ii) coral reef aorta, (iii) aortoarteritis, (iv) Takayasu's arteritis, (v) middle aortic syndrome and (vi) coarctation of aorta. The latter five diagnoses were excluded based on the clinical features and nature of lesion.

Coral reef aorta refers to hemodynamically significant supra-renal narrowing of aorta with rock-hard like dense calcifications resembling coral reef protruding into the lumen [2]. Clinical presentation of coral reef aorta could be upper body hypertension, cerebrovascular accident, congestive heart failure and acute renal failure. The clinical features of our patient resemble coral reef aorta except for the lesion lacking calcification, which is very characteristic of coral reef aorta. The patient was an elderly male and all laboratory investigations including ESR (elevated sedimentation rate), CRP (C reactive protein) and Mantoux test were normal for him. Moreover there were neither constitutional symptoms nor any other peripheral vascular involvement. Upper limb pulses were well palpable without any claudication or bruit. Hence aortoarteritis and takayasu's arteritis were ruled out [3]. Middle aortic

syndrome refers to segmental narrowing of aorta usually supradiaphragmatic but it is congenital in nature seen in young females with absent pulse in upper limb [4]. In congenital COA, there is usually shelf like projection, juxta-ductal in location which is not so in this case [1].

Very few case reports of acquired atheromatous coarctation of aorta has been reported, but the patients were usually treated surgically in these case reports [5-7]. In our case, we had performed CT angiography one week prior to the current admission and hence we knew the diagnosis beforehand. The following strategies were selected: (i) urgent aortic stenting rather than conventional corrective surgery or bypass graft procedure in view of morbid state and choice of the patient and (ii) limited use of contrast in view of renal failure. The reason for sudden clinical worsening could be due to acute renal failure resulting from contrast induced nephropathy or hemodynamic changes produced by anti-hypertensive medications in this patient with already reduced perfusion to kidneys as a result of decreased blood pressure below the level of aortic occlusion. Stent graft was not considered because of atherosclerotic nature of the lesion.

We utilized the strategy of percutaneous deployment of covered stent in aorta that too on an urgent basis for the management of this critically ill patient presenting as acute aortic obstruction and multiorgan failure. The result thus obtained was excellent.

## 5 References

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