Open Access

Case Report

Pak Armed Forces Med J 2017; 67 (Suppl-2): S260-62

TRANSCATHETER STENTING OF SEVERE COARCTATION OF AORTA -TECHNIQUE TO PRESERVE FLOW TO LEFT SUBCLAVIAN ARTERY

Mehboob Sultan, Maad Ullah, Nadeem Sadiq, Amjad Mehmood, Hajira Akbar, Asif Akbar Shah, Intisar Ul Haq

Armed Forces Institute of Cardiology/ National Institute of Heart Disease/ National University of Medical Sciences (NUMS)
Rawalpindi, Pakistan

INTRODUCTION

Coarctation of aorta is a common cardiac anomaly with reported incidence of about 4-8% of overall congenital heart defects[1,2]. Isolated coarctation of aorta has varied clinical presentations depending upon its severity and age of presentation. Neonatal or infantile form is usually most serious and causes congestive cardiac failure & impairment of left ventricular functions and mandates immediate intervention. In adolescent and adults, coarctation presents with systemic hypertension with radio-femoral pulse delay and stenting of coarctation is now accepted modality of treatment even in native coarctation, and defiantly in post-operative re-coarctation. One of the challenges in coarctation stenting, particularly in covered stents, is to preserve flow to left subclavian artery as its usually originates very close to coarctation segment. We are reporting a case of young boy who underwent stenting of severe coarctation with a maneuver to keep left Subclavian artery flow unobstructed.

CASE REPORT

A-13-year-old boy presented first time to us with system hypertension. He was normally grown up with presenting complaints of headache and exertional dyspnea. However, there was no history of fits, limb weakness, eye symptoms or renal symptom. His physical examination revealed radio-femoral delay & systemic hypertension with right upper limb blood pressure of 190/110 mmHg and in in lower limb of 90/50 mmHg along with grade 3/6 ejection systolic murmur over left sternal border. His 12 lead ECG showed signs of left ventricular hypertrophy. His 2D transthoracic echo showed

Figure-1: Descending aortogram showing severe coarctation of aorta.

marked left ventricular hypertrophy with good systolic function along with severe juxta-ductal coarctation of aorta very close to origin of left Subclavian artery with peak instantaneous gradient of 120 mmHg. Otherwise his aortic valve was trifoliate and there were no atrial or ventricular septal defect or patent ductus arteriosus. He underwent CT Angiography to better delineate the anatomy and CT confirmed the diagnosis of severe coarctation just distal to origin of left Subclavian artery.(as shown in fig-1 and fig-2). Family was counseled about the problem and was advised stenting of coarctation.

On the day of procedure, he was kept nil by mouth for six hours. Under sedation & local anesthesia, right femoral artery was entered with 6F sheath. Coarct segment was crossed with 6F MPA catheter and Aortogram done with pigtail 6F which showed tight coarctation just distal to left Subclavian artery. 39mm covered CP Stent (Numed) mounted on 14mm x40mm VACS-III balloon & upper 40% of stent was manually uncovered to allow flow to left Subclavian artery.

Correspondence: Dr Mehboob Sultan, Armed Forces Institute of Cardiology/ NIHD Rawalpindi, Pakistan

Stent & balloon assembly passed through 12F cooks Mullins sheath and positioned across the coarctation segment. After confirming optimal position, Stent was deployed with VACS-III balloon at 8 Atm pressure. Post procedural Aortogram showed well dilated coarct segment and preserved flow to left Subclavian artery. Peak to peak pressure gradient reduced from 95 mm Hg to 16 mm Hg.

He made very good recovery after the procedure. He had absence of distal pulse in right lower limb for about four hours and was treated with intravenous heparin infusion as per our institution protocol. He was kept in for observation for 48hrs and was discharged on oral Propranolol. At follow up after two weeks his echo showed well placed coarctation stent (as shown in fig-3) with residual PG of 15 mmHg and pulsatile flow abdominal aorta and preserve flow in left Subclavian artery.

DISCUSSION

Morgagni first described coarctation in 1770[3] and its presentation depends upon age, site & severity of narrowing. Juxta ductal coarctation is the common site of narrowing and results in upper limb hypertension and discrepancy in upper & lower limb pulses. One old study documented mean age of death without intervention of 34 years in 465 cases who survived infancy[4]. There is still some controversies recording best therapeutic occupation for coarctation[4]. Modality of treatment depends upon age & mode of presentation as well as center expertise. Treatment options include surgical repair, balloon angioplasty or stenting of coarctation segment[1]. In our institution, surgical repair is reserved for small children and neonates with severe coarctation. In older children (age >8 years & weight >25 Kgs), we usually prefer stenting of COA. Per current guidelines, peak-to-peak gradient ≥20 mmHg across coarctation or when there is significant anatomic evidence of narrowing on imaging with extensive collateral flow are indication of intervention[5].

Surgical management is usually reserved for native coarctation whereas ballooning is usually reserved for severe neonatal coarctation with impaired LV dysfunctions as a rescue measure[5]. Stenting is first line of treatment for recurrent coarctation and growing role even in native coarctation in adults or grown up children with weight more than 25 Kgs[2,6]. Bare metal CP stents can be used but carries the risk of dissection of aortic wall and may need immediate placement of covered stent. Two main complications associated with surgery or angioplasties are

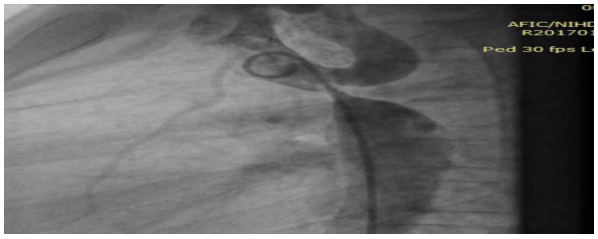

Figure-2: Ascending aortogram showing severe coarctation just distal to origin of left subclavian artery.

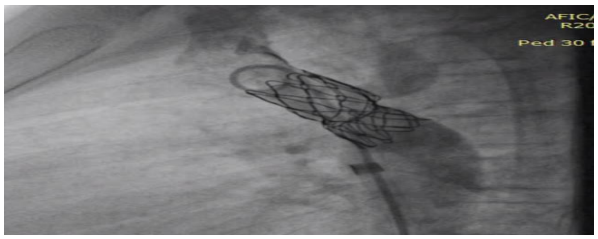

Figure-3: Post stent aortogram showed stable position of stent with relief of narrowing and preserved flow to left subclavian artery.

recurrent coarctation and aneurysm formation[4]. Covered stents are more frequently used to avoid or treat these complications[7]. Use of covered CP stent is defiantly safe but one must be very careful not to obstruct to flow to head and neck vessels. Zhang et al recently reported higher number of complications in group where left subclavian artery was obstructed by covered stent including stoke and claudication of left upper limb[8]. In our case, coarctation segment was very close to origin of left subclavian artery and to achieve best optimal result, stent had to be deployed proximal to left subclavian artery to across the Coarctation segment to descending aorta. As we were using covered CP stent so the

main challenge was to preserve the flow to left subclavian artery. The only viable option in this case scenario was to partially but very precisely remove the cover of covered CP shunt to allow dilatation of coarctation segment in covered stent but allow flow to left subclavian artery through the upper uncover part of stent. We achieved the optimal results by uncovering about upper 40% of stent cover. Other studies including Zhang et al have strongly recommended about preserving the flow to left subclavian artery to avoid significant complications[8]. We didn't fully dilate the stent to prevent vessel wall damage and we plan to re-dilate the stent within one year to full adult size. This case reports highlight the importance to innovation in interventional cardiology to achieve optimum results.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

REFERENCES

1. Rao PS. Coarctation of the aorta. Curr Cardiol Rep. 2005; 7(6): 425-34.
2. Suradi H, Hijazi ZM.Current management of coarctation of the aorta. Glob Cardiol Sci Pract. 2015; 18(4): 44.
3. Zani A, Cozzi DA. Giovanni battista morgagni and his contribution to pediatric surgery. J Pediatr Surg. 2008; 43:729–33
4. Vergales JE1, Gangemi JJ, Rhueban KS, Lim DS. Coarctation of the aorta - the current state of surgical and transcatheter therapies. Curr Cardiol Rev. 2013; 9(3): 211-29.
5. Feltes TF, Bacha E, Beekman RH, Cheatham JP, Feinstein JA, Gomes AS, et al. Indications for cardiac catheterization and intervention in pediatric cardiac disease: a scientific statement from the American Heart Association. Circulation. 2011; 123: 2607–52.
6. Torok RD, Campbell MJ, Fleming GA, Hill KD. Coarctation of the aorta: Management from infancy to adulthood. World J Cardiol. 2015; 7(11): 765-75.
7. Tanous D, Benson LN, Horlick EM. Coarctation of the aorta: evaluation and management. Curr Opin Cardiol. 2009; 24(6): 509-15.
8. Zhang L, Lu Q, Zhou J, Jing Z, Zhao Z, Bao J. Alternative management of the left subclavian artery in thoracic endovascular aortic repair for aortic dissection: a single-center experience. Eur J Med Res. 2015; 31: 20: 5.