Coarctation Balloon Angioplasty in A Four Months Old Infant Following End to End Coarctation Repair: A Case Report

NURUN NAHAR FATEMA

Introduction
Aortic coarctation indicates a narrowing at some point along the course of aorta. Discrete coarctation is much commoner than tubular hypoplasia. Bonnet divided coarctation into infant type, occurring proximal to the aortoductal junction with patency of ductus and as adult type, tending to occur distally to the point of insertion of arterial ligament1. An infant with severe coarctation of the aorta may present with symptoms of congestive heart failure, having been well days before. Subsequently they may develop renal failure and feature of hypoperfusion to other organs. So the infant becomes acutely, seriously and even critically ill2. Any infant with such critical symptoms need urgent intervention which includes medical management, surgical intervention and balloon angioplasty. Here we are reporting a case of coarctation of aorta who needed balloon angioplasty at 4 month of age after end to end anastomosis surgery for complete cure.

Case Report
A 4 months old female baby had history of respiratory distress since 10 days of her life. She had her first echocardiographic examination of heart on 12th day of life and ventricular septal defect was detected. She developed renal failure on next day and subsequently diagnosed as a case of discrete coarctation of aorta on 15th day. She was then operated in a private hospital where an end to end anastomosis of aorta was performed after excision of coarct segment. Patient’s renal function improved, but she remain persistently hypertensive since her immediate post-operative period. She was taking Nifedipine 10 mg daily but there was no improvement. Later she reported to paediatric cardiologist of Combined Military Hospital (CMH) Dhaka at the age of 4 months. Her echocardiography showed severe residual coarctation of aorta with peak pressure gradient of 95 mm Hg across coarct segment. Diameter of coarct area was 2.5 mm. Next day on 7th December, 2008 she was taken into the catheterization laboratory of Combined Military Hospital Dhaka with an intention of balloon angioplasty. She was sedated with injection Ketamine and injection Midazolam and drapped properly. Right femoral vein and artery were cannulated with 5 French sheath. Aortogram was performed with a multipurpose catheter and a pinhole opening noticed at coarct segment (Fig.-1). Pressure gradient across coarct segment was 70 mm Hg. Catheter was exchanged with 0.035 wire. Gradual balloon dilatation was performed with 4 mm x 2 cm, 6 mm x 2 cm and 8 mm x 2 cm balloon (Fig.-2). Post balloon angioplasty pressure gradient was 14 mm Hg. No complication was observed in catheterization laboratory and in post cath observation room. Special precaution was taken to manage hypertensive crisis, but patient’s blood pressure returned to normal after successful balloon angioplasty. She was discharged from hospital on next day with tab Nifedipine 2.5 mg twice daily dose. Her echocardiography before discharge showed no residual coarctation. Follow up was advised at 1, 3, 6, 9, 12, 18, 24 months and yearly thereafter for three years.

Fig.-1: Aortogram showing coarctation area before balloon angioplasty
Discussion

The management of patients presenting with coarctation in infancy is revolutionized by the invention of prostaglandin E and its use to maintain and restore the patency of the ductus\(^1\). Infants presenting with preductal coarctation have heart failure, shock and deteriorating renal function, which could be reversed by maintaining the lower body circulation through ductus\(^1-4\). In any infant, becoming shocked within the first few weeks of life and in whom lower limb pulses are absent, it should be mandatory to start prostaglandin along with other resuscitative maneuvers while expert assistance is sought. Coarctation of aorta can occur as an isolated defect or in association with a patent ductus arteriosus (PDA), ventricular septal defect (VSD), or aortic stenosis. It can often be a part of Taussig Bing anomaly or shones complex\(^5\). It can be a discrete or long segment defect associated with variable degree of hypoplasia of the isthmus or transverse arch. In present case, coarctation was discrete and preductal in location. The indications for balloon angioplasty of the aorta are: 1. Native or recurrent obstruction with a gradient of >20 mmHg. 2. Coarctation where there is left ventricular hypertrophy or systemic hypertension.

In neonates and infants < 1 year of age with native coarctation surgical resection and repair are recommended\(^1-5\). Transcatheter therapy is the treatment of choice in >1 year age with a well developed isthmus. Balloon angioplasty is one of the modality of transcatheter treatment\(^6\). A balloon catheter 2-3 times the diameter of coarctation segment but not exceeding the diameter of the adjacent arch proximal to the narrowed segment is selected and inflated across the coarctation site\(^7-10\). In this case coarctation had a pinhole opening only and diameter was 1.5 mm. So, gradual dilatation of the coarctation area was performed with 4 mm x 2 cm, 6 mm x 2 cm and 8 mm by 2 cm balloon. Stent implantation in the coarctation area is another modality of treatment for older children. Published reports of balloon angioplasty demonstrates that this procedure results in short term effective relief of gradient in 75-90% of patients and a low mortality of 0.7-02.5%\(^11,12\). Long term follow up revealed re-stenosis in 25-36% cases\(^13-17\). VACA (Valvuloplasty and Angioplasty for Congenital Anomalies) registry data reported suboptimal outcome in 19% of native and 25% of recurrent lesions\(^11\). The study was conducted among 970 patients from 25 centres. The major draw back of the angioplasty alone is recoil of the vessel wall with recurrence of stenosis\(^5\). Balloon angioplasty may cause aortic wall dissection in 1-4% of patients and aneurysm formation in 4-11.5% patient\(^18,19\). Another study reports that the immediate gradient reduction was similar in both surgery and angioplasty case but the incidence of aneurysm formation and re-stenosis is more after balloon angioplasty\(^20\).

Conclusion

Transcatheter therapy for native and recurrent coarctation is effective with good short and intermediate term result. The current trend is for primary stent implantation, however the results of balloon angioplasty in children and young adult are equivalent to those with primary stent placement. A neonate and young infant should be treated immediately to avoid complications like renal failure and other organ damage from effect of hypoperfusion. In present case, first echocardiography report was incorrect, she then developed renal failure and work up for that revealed coarctation of aorta. End to end anastomosis surgery performed in a private hospital was not successful and later on balloon angioplasty cured her. Message here is that, aortic arch of every infant and children should be studied during echocardiography and this kind of critical cases
should be managed in proper hospitals rather than in private clinics.

References