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Retrospective study of PDA stenting in Artemis Hospital, Gurugram

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Abstract: **To reduce the number of Blalock-Tausing shunts and its complications and also to reduce in-hospital stay duration.**

Objective- The objective is to let the small branch PAs (pulmonary artery) grow in patients having small branch PAs, by increasing the blood flow either by surgically created shunts or Stent deployement to some naturally existing channel like PDA or Any amenable MAPCA.

Keywords: **PDA (patent ductus arteriosus), RPA (right pulmonary artery), PAs (pulmonary artery), LPA (left pulmonary artery).**

1. METHOD

Our approach is via left carotid for left PDA. We usually perform CT pulmonary angiography to profile the length, diameter and tortuosity of the PDA. We preferably used balloon mounted drug eluting coronary stents for keeping the PDA patent. Further we start heparin infusion immediately after stent deployment @ 20 IU/kg/hr and titrate it accordingly.

2. TECHNIQUE

After taking the aortogram in appropriate angles, we try to hook the PDA with BMW coronary wire . It is the most crucial step and once it gets hooked we try to stabilize the wire alone or if possible put another wire and park them in LPA/RPA. After measuring the PDA and corroborating the size with the CT measurements, we take the appropriate stent of the same calibre as per our measurements; we take the stent and inflate it till 8-10 atmosphere pressure. Final angiogram is taken and the stent flow is checked on echocardiography also.

3. CASES

Case1.- A 10 months old baby, case of Complete AVSD, pulmonary atresia. Aortogram on hand injection in the arch of aorta revealed the ductus in AP views and LAO 30 views showed 4 mm ductus supplying branch PAs with distal constriction. Branch PAs were 3.5 mm. PDA stenting was done using 4mm x 16 mm coronary stent. Stent was positioned from Aorta to LPA. Post procedure hand injection showed good flow across stent to LPA and flow into RPA also seen. Post Procedure echo showed Good flow across PDA stent. Good ventricular function. No pericardial effusion.

Case 2.- A 3 yrs old child, case of Pulmonary atresia. His Aortogram revealed PDA supplying branch LPA, Ampulla of duct was 4.0 mm, distal LPA end was 5 mm. PDA stenting was done using 6 mm x 15 mm coronary stent. Good flow across PDA stent seen on post procedural echo with Good ventricular function

Case-3.- A 4 months baby, case of pulmonary atresia, Aortogram revealed PDA supplying branch PAs, Ampulla of duct was 4.0 mm, distal PA end was 2.2 mm. PDA stenting done using 4 mm x 12 mm coronary stent. Good flow across PDA stent was seen on post procedure echo with laminar flow across atrial septal defect.

Case-4- A 12 day baby, case of Pulmonary atresia. Aortogram from left carotid artery showed double aortic arch, second arch terminatining in PDA. Zynes 4mmx8mm coronary stent deployed in second arch , PDA and RPA origin and inflated upto 12 atm. Post stent deployment showed good flow in branch PAs.

Case-4- A 12 day baby, case of Tricuspid atresia, pulmonary atresia. Aortogram revealed PDA supplying branch PAs, Ampulla of duct was 4.0 mm, distal PA end is 2.2 mm. Balloon septostomy of atrial septum was done with 5 mm balloon**.** PDA stenting done using 4 mm x 12 mm coronary stent was done. Good flow across PDA stent seen on post procedure echo with laminar flow across atrial septal defect. Good biventricular function.

Case 5- A 5 months TOF with severe PS, Aortogram revealed PDA supplying branch PAs, Ampulla of duct was 4.5 mm, distal PA end is 2.4 mm. PDA stenting done using 4.5 mm x 19 mm Biomine drug eluting stent. Good flow across PDA stent was seen in post procedure echo.

Case 6- A 1 year, Tricuspid atresia , pulmonary atresia. Aortogram revealed PDA supplying branch PAs, Ampulla of duct was 4.4 mm, distal PA end is 2 mm. PDA stenting done using 4 mm x 18 mm bare-metal stent. Good flow across PDA stent on echo.

Case-7- 4 month, DILV, Pulmonary atresia. Aortogram revealed PDA supplying branch PAs, Ampulla of duct was 4.0 mm, distal PA end is 2 mm. PDA stenting done using 4 mm x 22 mm bare-metal stent. Good flow across PDA stent seen on echo.

4. COMPLICATIONS

1. Immediate stent thrombosis- While on table, we had one case of immediate stent thrombosis. We managed this with bolus dose of heparin, glycoprotein IIb/3a receptor antagonist injection at the site of thrombosis via catheter.

2 . Partial Late stent thrombosis- We made a special protocol to treat and prevent Partial Late stent thrombosis by starting early and adequate dose of heparin infusion under ACT monitoring and overlapping with clopidogrel and aspirin combination.

3. Hematoma formation- At the site of carotid puncture we had two cases of hematoma formation which were later prevented by adequate manual pressure.

4. Death- One case died on 6th post procedure day due to sepsis, Disseminated intravascular coagulation and multiorgan dysfunction.

5.Restenting- One case the stent migrated distally and the ductus got stenosed at the aortic end. We had to take the child to cath lab and another stent was deployed over the stenosed part.

5. TECHNICAL ISSUES

1. Tortuosity of PDA- All PDAs were tortuorous. We always performed CT pulmonary angiography to assess the appropriate length of PDA as it has propensity to change its length after straightening due to stenting. This was confirmed on table with angiography. We never had to use overlay double stents to accommodate the PDA lengthening as we always meticulously had appropriate measurements.

2. Immediate desaturations- While on table, we two cases of desaturations due to deep sadation or PDA contraction. We managed this by avoiding delay of stent ballooning and deployment.

6. CONCLUSIONS

PDA stenting is a very successful, effective and uncomplicated procedure to improve saturations, PA growth and good bridge for buying time for complete repair.

Carotid approach is the best approach because entry to PDA is direct and stent deployment is easy.

Stent size 4 mm x 2cm is appropriate for most patients. Coronary drug-eluting stents are the best.

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