Successful management of patent ductus arteriosus in severely malnourished boy

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Abstract. Background: Patent ductus arteriosus is a vascular structure that connects the proximal descending aorta to the roof of the main pulmonary artery near the origin of the left branch pulmonary artery results in congestive heart failure, pulmonary hypertension, recurrent pneumonia and severe malnutrition. Transcatheter closure of PDA usually performed for the body weight above 6 kilograms, this is our first case in our hospital to close PDA in a child with the body weight less than 6 kilograms with satisfactory result.

Case presentation: A one-year-old boy suffered from large PDA and its complications Anthropometric measurement from body weight per age was similar as a 6-months-old boy. Chest X ray revealed infiltrate in the right lung, increased pulmonary vascular pattern, and cardiomegaly. Echocardiogram showed large PDA with diameter of 3.5 mm (left to right shunt) and pulmonary hypertension. He already received treatment for congestive heart failure also nutritional intake based on the WHO formula. He underwent transcatheter closure of PDA after 13 days hospitalization due to pneumonia with his body weight was 5.2 kilograms (less than 6 kilograms). After the intervention was done there were no residual PDA and no complication occurred.

Conclusion: Trancatheter closure of PDA was done without residual PDA was observed and the pneumonia gradually improved. Patient discharged after the procedure without any complication was occurred.

Keywords: patent ductus arteriosus, congestive heart failure, recurrent pneumonia, severe malnutrition, transcatether closure of PDA

Background

Patent ductus arteriosus is a vascular structure that connects the proximal descending aorta to the roof of the main pulmonary artery near the origin of the left branch pulmonary artery results in congestive heart failure, pulmonary hypertension, recurrent pneumonia and severe malnutrition. PDA is one of the most common congenital heart defects, accounting for 5%-10% of all congenital heart disease in term infants. Incidence of PDA in term neonates is only 1 in 2,000 births, accounting for 5%-10% of all congenital heart disease. The treatment of significant PDA consists of management of congestive heart failure, improving nutritional state and definitive therapy including surgical ligation and transcatheter closure. This study reported a successful management of PDA in severely malnourished boy and recurrent pneumonia by transcatheter closure of PDA.
Case Presentation

A one-year-old boy suffered from shortness of breath since 3 days before admission. He experienced increased respiratory rate and chest wall retraction. The shortness of breath become worsen within 3 days. He had difficulty in breathing and sweating while being breastfed. He drank about 100 cc breastmilk in 30 minutes. He looked pale 3 days before admission accompanied with fatigue. There was no history of fever, nausea, and vomiting. Patient was poorly-fed then his parents brought him to a Paediatrician and got treatment for CHF. There was no weight gain since he was seven months old. According to his mother, there were no weight gain after he had suffered from pneumonia result in respiratory failure and on mechanical ventilation 20 days at other hospital. His body weight was 6.2 kilograms and decrease until 5.4 kilograms during hospitalized there. He had been diagnosed as PDA since he was 2 months old. He was regularly visit pediatric cardiology outpatient clinic every month. There was no history of congenital heart disease in his family. Anthropometric status body weight (5.4 kg), height (69 cm), head circumference (47 cm) and upper arm circumference (11 cm). These conditions indicated malnutrition for children aged 1 year because it showed the growth of children aged 6-months-old.

Figure 2. Echocardiogram
Echocardiogram examination showed Dilatation of LA-LV

Figure 3. Echocardiogram
Echocardiogram examination showed large patent ductus arteriosus with diameter of 4.35 mm with left to right shunt

Initial physical examination of hospitalization at our hospital revealed GCS was 456, respiratory rate was 63 times per minutes, pulse rate was 125 beats per minutes with strong and regular beats, and axillary temperature was 36.7 degree Celsius. His blood pressure was 90/60 mmHg. From heart auscultation revealed continuous murmur in upper left sternal border grade 3/6. He had baggy pants, and CHF Ross
class III. Laboratory examination within normal limit. Chest X-Ray showed infiltrate in the right lung, increased pulmonary vascular pattern and cardiomegaly. Echocardiogram examination revealed large patent ductus arteriosus with diameter of 3.5 mm with left to right shunt and pulmonary hypertension.

He received diuretics and vasodilator for CHF treatment and received paediatric nutrition care treatment during hospitalization. But there was no clinical improvement after 13 days hospitalization then he underwent transcatheter closure of PDA.

Discussion

PDA was the first example of congenital heart disease to be treated by transcatheter closure, which becomes an established form of treatment for the majority of patients with PDA and as a safe alternative to surgery.3

The percutaneous technique was first described by Portmanur et al., since then various devices such as Rashkind PDA umbrella, button device, PDA Coils and most recently the Amplatzer duct occluder have been introduced.5

Repair may be urgent for the symptomatic patient with evidence of cardiac or respiratory failure not adequately controlled with medications, or it may be delayed in the patient who is asymptomatic or well controlled on medical therapy. Postoperative results are best if the PDA is closed while the patient is younger than 3 years.3

Surgical ligation provides definitive ductal closure for symptomatic infants when medical treatment fails or is contraindicated. However, risks associated with surgery are well described, including paresis of the vocal cords, phrenic nerve palsy, thoracic scoliosis, and inadvertent ligation of the left pulmonary artery and aorta. These observations have led health care providers to consider alternative strategies of PDA closure during infancy.4

Transcatheter PDA occlusion is among the safest of interventional cardiac procedures, and is considered the procedure of choice for adults, children, and infants ≥6 kg. Although an exact lower weight limit for the safe occlusion of a PDA has not been established, previous studies have excluded infants <6 kilograms or reported few or no cases of transcatheter PDA occlusion below this weight threshold. Some manufacturer recommendations for PDA devices specify use in patients weighing >6 kilograms.4

A study by Baspınar et al in 2015 investigated the risk of transcatheter closure compared with surgical procedure in infants with PDA. Transcatheter closure of a patent ductus arteriosus (PDA) has always been considered risky for small children and infants. The FDA has limited the use of the Amplatzer duct occluder (St. Jude Medical, Plymouth, MN, USA) to patients > 6 months of age and >6 kilograms; the use of the device in infants whose age or weight is below either of these limits is contraindicated because of the great risk that is involved. In infants < 6 months of age, and in particular in preterm infants, standard surgery has been proposed for PDA. Transcatheter closure was successfully completed in 81.2% of the premature infants and 94.3% of the < 6 kilograms infants. The study conclude that transcatheter closure of PDA is relatively safe and effective in premature infants and infants who weigh <6 kilograms.5

This condition implies that after adequate antibiotics treatment for pneumonia and maximal dose of diuretics and vasodilator for CHF still no clinically improvement was achieved. Persistent recurrent pneumonia and the risk of respiratory failure were greater in this condition. It was necessary to take a definitive procedure by transcatheter closure, even though the body weight was less than 6 kilograms and after TCC of PDA the result was no residual PDA, no left pulmonary artery stenosis and no co art of aorta.

Conclusions

A one-year-old boy with PDA in severely malnourished and recurrent pneumonia with history of term delivery and congestive heart failure. Anthropometric measured was similar a 6-months-old boy. Chest xray showed infiltrate in the right lung, increased pulmonary vascular pattern, and cardiothoracic ratio 58% was suggestive for cardiomegaly. Echocardiogram examination showed large patent ductus arteriosus with diameter of 3.5 mm with left to right shunt. He was treated with congestive heart failure treatment. He received nutritional intake based on the WHO formula. He underwent transcatheter closure of PDA after 13 days hospitalization. Trancatheter closure of PDA was done without residual PDA was observed and the pneumonia gradually improved. even though the body...
weight of this patient was less than 6 kilograms with satisfactory results.

References


