

SURGICAL REMOVAL OF AN EMBOLIZED RASHKIND UMBRELLA

B. FARSAK, MD,
A. SARIGÜL, MD,
Ü. ERSOY, MD

From:

Department of Thoracic and
Cardiovascular Surgery,
Hacettepe University,
Faculty of Medicine,
Ankara, Türkiye

**Adress for
reprints:**

Dr. Bora Farsak
Hacettepe Üniversitesi Tıp
Fakültesi Göğüs Kalp ve
Damar Cerrahisi Ana Bilim
Dalı
06100 Ankara, Türkiye
Tel: +90 312 3117377
Fax: +90 312 3110995
e-mail: afarsak1@akbank.com.tr

Patent ductus arteriosus (PDA) which has an important role in fetal circulation, can be persistent due to many structural or biochemical factors. After the diagnosis, PDA can either be closed by surgical intervention or embolized by a transcatheter umbrella. Although currently, transcatheter umbrella closure has gained importance in most of the centers, both of the techniques have advantages and disadvantages. Herein we reported a 9 year old girl in whom transcatheter umbrella closure of patent ductus arteriosus (PDA) has failed, she was taken into operation for the removal of the Rashkind umbrella and surgical closure of PDA.

Key words: Patent ductus arteriosus, transcatheter umbrella closure, surgical closure

Patent ductus arteriosus has an important role in fetal circulation. In full term infants functional closure occurs within 10-15 hours after birth but anatomical closure may not be complete for up to 3 months which may take longer, depending on some etiological factors. Ductus arteriosus can be persistent in 0.04-6% of live births (1); it has a male to female ratio of 2:1.

Normal closure may fail because of either structural or biochemical abnormalities (which may be of genetic or environmental origin). Among these factors, there are chromosomal aberrations, when it is concomitant with birth asphyxia, birth at high altitude and congenital rubella. In the majority of cases, however, no cause is identifiable. Pathophysiology of PDA results in shunting of blood from one side of the circulation to the other. Shunt volume depends on the length and internal diameter of the duct and on systemic and pulmonary vascular resistance.

Most patients are asymptomatic and malformation is recognized when the characteristic murmur is detected. On physical examination,

growth retardation is present and in about one third of these patients pulse pressure is widened and diastolic pressure is lowered. Examination of the precordium reveals an active cardiac impulse, a forceful cardiac apex being displaced to the left. The continuous machinery murmur of the uncomplicated persistent ductus is best heard in the left infraclavicular area. The murmur is rough and thrilling. Additional murmurs may be present due to increased flow across the aortic and mitral valve. ECG, radiography, echocardiography is important in differential diagnosis, but most cardiologists would not consider cardiac catheterization as a necessary investigation for patients with typical clinical findings of a PDA.

CASE REPORT

An one-month-old girl had been admitted to the hospital with recurrent respiratory tract infection and taken under investigation when classical murmur was heard. An echocardiogram was made and the diagnosis was PDA+ventricular septal defect (VSD). Cardiac catheterization was performed for confirming the diagnosis. In her history, there

was no prematurity, birth asphyxia and maternal rubella but during her infancy there were feeding difficulties and recurrent upper respiratory tract infections.

She was 155 cm tall, weighing 45 kg, and nine years old with a healthy appearance when readmitted to the hospital. On physical examination, there was a continuous murmur on the left infraclavicular area and the other physical findings and laboratory data were within normal limits.

Transcatheter umbrella closure was performed with Rashkind technique but the procedure was abandoned and the umbrella was embolized into the left pulmonary artery.

The device was snared with a basket but it was not possible to retrieve it and cardiologists decided on the surgical removal of the umbrella and the closure of PDA.

There was a spider like radiopaque image of the umbrella on her x-ray (Fig 1). On ECG, there was evidence of left ventricular hypertrophy with dominant R waves in all standard leads. The patient was taken into operation with left anterolateral thoracotomy. The aorta, left pulmonary artery and PDA was dissected and freed from surrounding structures. On the left pulmonary end of the PDA, the legs of the umbrella were able to be seen externally in the pulmonary artery wall.

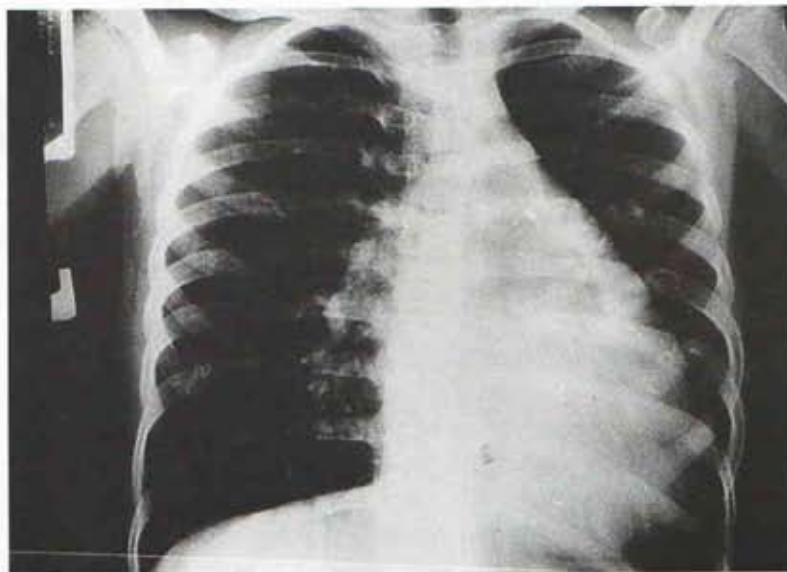


Figure 1. Preoperative chest x-ray of the patient with an radiopaque spider like apperance (umbrella).

After placing partial clamps on the both sides of PDA, pulmonary arteriotomy was performed. The legs of the umbrella was freed and the umbrella was taken out. Subsequently, PDA was excised, division was performed. Both the pulmonary artery and aortic ends were closed with Teflon stitched sutures. She stayed one night in ICU; and after an uneventful week, she was discharged.

DISCUSSION

There are several techniques for the closure of PDA. In 1939, Robert Gross had successfully ligated a PDA. In 1960 Bickford, in 1979 Trusler used the technique of transfixion and double ligation. Many authors prefer division for PDAs that exceed 7-10 mm in diameter (2). Other than these procedures, balloon closing, umbrella closing can be performed as well. Most of the pediatric cardiologists prefer transcatheter umbrella closure for isolated cases (3-6).

Surgery for PDA is a low risk intervention with very low morbidity and mortality, but currently transcatheter embolism with an umbrella is the procedure of choice in many centers. Although it is a safe procedure, embolism of the umbrella out of the ductus may cause serious problems. Apart from its complications, in experienced hands, it is thought to be a low risk (5,7), cheap, minimally invasive and usually effective alternative to surgery especially in developed countries. But in our opinion, surgery still remains the procedure of choice in developing countries, as it still remains as the cheaper option.

REFERENCES

1. Mitchell SC, Korones SB, Brendes HW. Congenital heart disease in 56 109 births incidence and natural history. *Circulation* 1971;43:323-7.
2. Trusler CA. Surgery for PDA. In: Tucker BW, Lindensmith GG. Congenital heart disease, Grune and Stratton NY, 1979, pp 39-45.
3. Ali Khan MA, Al Yousef S, Mullins CE, Sawyer W. Experience with 205 procedures of transcatheter closure of ductus arteriosus in 182 patients, with special reference to residual shunts and long-term follow-up. *J Thorac Cardiovasc Surg* 1992;104:1721-5.
4. Hosking MCK, Benson LN, Musewe N, Dyck JD. Transcatheter occlusion of the persistently patent ductus arteriosus; forty-month follow-up on prevalence of residual shunting. *Circulation* 1991;82:2313-8.
5. Latson LA, Hofschire PJ, Kugler JD, Cheatham JP. Transcatheter closure of patent ductus arteriosus in pediatric patients. *J Pediatr* 1989;155:549-53.
6. Rashkind WJ, Cuaso CC. Transcatheter closure of a patent ductus arteriosus: successful use in a 3.5 kg infant. *Pediatr Cardiol* 1979;1:3.
7. Latson LA. Residual shunts after transcatheter closure of patent ductus arteriosus: a major concern or benign "technomalady". *Circulation* 1991; 84:2313.