Subadventitial hematoma of a patent ductus arteriosus and thrombus formation within the aorta secondary to cardiac catheterization

Rıza Doğan[1], Arman Bilgiç[2]

[1]Department of Thoracic and Cardiovascular Surgery, and [2]Cardiology Unit, Department of Pediatrics, Hacettepe University Faculty of Medicine, Ankara, Turkey

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An 18-month-old boy with patent ductus arteriosus (PDA) underwent surgical closure of PDA. Cardiac catheterization determined the PDA was not suitable for transcatheter closure. After the chest was opened, subadventitial hematoma was seen on the aortic end of the PDA. Incision of the aorta revealed a thrombus secondary to intimal laceration. The thrombus was extracted and the PDA was closed using division technique. Because no similar report was found in English-language literature, the technique and the surgical strategy are discussed.

Key words: patent ductus arteriosus, cardiac catheterization, complication.

Persistent patent ductus arteriosus (PDA) is a common congenital cardiac abnormality, occurring in approximately 0.01 to 0.08 percent of live births[1]. Congestive heart failure is an urgent indication for PDA closure, if antifailure treatment is not successful. In children without congestive heart failure, PDA closure can be planned electively. All PDAs should be closed because of a small but definite risk of endarteritis (estimated incidence of 0.45/year)[2].

The first successful PDA operation was performed in 1939 by Gross[3], and since that time, closure of PDAs by ligation or division has been done throughout the world[4-5]. In addition to the surgical closure techniques, transcatheter closure of PDAs using different devices has been widely used over the last 20 years.[6-8] This technique is accepted as an alternative to surgery in all except pre-terms. Inadvertent embolization, residual shunts, hemolysis and vascular trauma are the main complications of transcatheter ductus closure[7-9]. Although vascular trauma is a rare occurrence, it is a possible risk of catheterization procedures.

Herein we report a case of an 18-month-old boy who underwent an elective transcatheter closure of PDA.

Case Report

In October 1998, an 18-month-old boy with PDA was admitted to Hacettepe Medical Center for elective transcatheter closure of the PDA using a controlled-release coil. Transthoracic echocardiography demonstrated a moderately large PDA. Cardiac catheterization was performed according to the protocol of the Pediatric Cardiology Department. However, the PDA was found to have a larger diameter than 5 mm at its narrowest point, and the patient was determined not suitable for such a procedure (Fig.1). The patient was then scheduled for elective surgical closure of his PDA.

The operation was performed according to our standard technique, including posterolateral thoracotomy made through the fourth intercostal space on the left side, two months after the catheterization. The lung was gently retracted medially, and a hematoma around the aortic end of the ductus was unexpectedly found. After the posterior pleura was opened, dissection was continued above and below the level of the ductus. The dissection was then slightly more extensive, and the two teflon slings were passed around the aorta above and

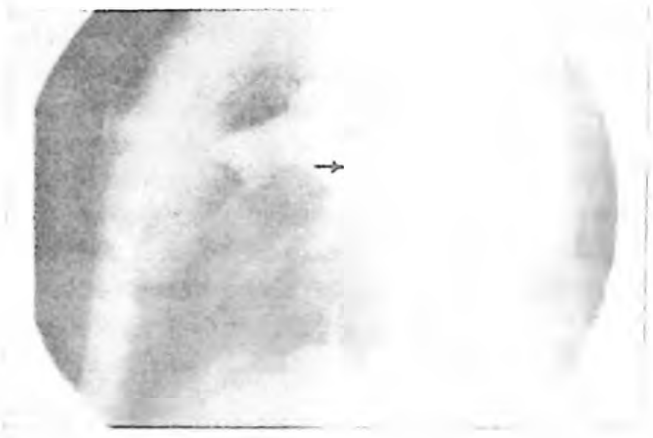

Fig. 1. Lateral aortography showing large patent ductus arteriosus.

below the ductus. A curved dissector was then used, and it was well seen that a subadventitial hematoma, was clearly seen on the posterionferior side of the aortic end of the ductus. Two vascular clamps were applied on the aorta and another one was placed on the pulmonary end. The aortic end of the ductus was opened on its transverse plane, revealing an unsuspected partially organized thrombus. The thrombus were extracted by releasing the vascular clamps and washing out the clots. The residual clot was easily dissected with a coronary dissector. An intimal laceration of 2-3 mm was than noted seen on the posteroinferior portion. The aortic end and then the pulmonary end were oversewn with a double row of continuous sutures. A pledget of Surgicell® was left between the divided ends of the PDA to keep the suture lines from rubbing each other.

The postoperative course was uneventful and the patient was discharged home five days after operation.

Discussion

Surgical closure of PDAs by ligation or division is effective, safe and economical treatment[5,7,8]. Hospital mortality in recent years has in fact approached zero.

Within the past 20 years, of transcatheter and thoracoscopic closure of PDAs have rapidly gained popularity[6-9,10] as an alternative to surgical correction, and they avoid thoracotomy, incision scar, convalescence and the psychological impact of surgery on the child.

The major complications of the invasive procedures are hemorrhage, dissection, false aneurysm on the catheter side, embolization, diminished extremity pulse, hemolysis and infections[7,8,9]. However, to the best of our knowledge, there is no report of subadventitial hematoma and thrombus formation within the aorta after a catheterization made for a PDA.

In some circumstances in which the PDA is short and wide or calcified, division should be indicated, because ligation of such a PDA may cause rupture of a friable duct. It is well known that division is performed by applying fine vascular clamps or, alternatively, a partial occlusion clamp is used at the aortic end to obtain more length for division.

In the case of PDAs, in which a subadventitial hematoma develops after the catheterization or an invasive procedure, it should be kept in mind that a thrombus may cover the ductal orifice and intrude into the aorta. The ductus should not be clamped before the aorta is cross-clamped and opened due to the risk of embolism of thrombotic material. To our knowledge this is the first report of subadventitial hematoma and thrombus formation within the aorta at the aortic end of a PDA due to intimal laceration.

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