

THE PULMONARY ARTERY ANEURYSM AND COEXISTENT CORONARY ARTERY DISEASE: REPORT OF TWO CASES

Y. ENC, MD,
O. GÜRER, MD,
F. YAPICI, MD,
A. ŞERBETÇİOĞLU, MD,
O. SOKULLU, MD,
S. SANIOĞLU, MD,
F. BİLGEN, MD

From:

Department of the
Cardiovascular Surgery, Dr.
Siyami Ersek Thoracic and
Cardiovascular Surgery
Center, Istanbul, Türkiye

Pulmonary artery aneurysm is a rare lesion in adults and there is still controversy about the surgical indications and the optimal treatment for this disease.

In the coexistence of poststenotic pulmonary aneurysm and coronary artery disease, atherosclerotic coronary artery stenosis and valvular pulmonary stenosis must be corrected and aneurysmorrhaphy must be applied due to increased oxygen demand of right ventricular outflow tract. Otherwise, sudden death due to myocardial infarction or pulmonary artery rupture is inevitable.

We report two cases of aneurysms of the pulmonary trunk secondary to congenital valvular stenosis that are coexistent with severe coronary artery disease.

Key words: *Pulmonary artery aneurysm, coronary artery disease, surgery*

Adress for

reprints:

Dr. Yavuz ENC
Bağlarbaşı Mah. Fetih Sok.
No: 9 Danca / Gebze
41700- Türkiye
tlf: +90 262 7454242
fax: +90 216 3486237
e-mail: erenenc@superonline.com

Pulmonary artery aneurysm is a rare lesion in adults and may be congenital in origin or acquired. It is most commonly associated with congenital cardiac lesions such as patent ductus arteriosus, ventricular septal defects, atrial septal defects, hypoplastic aortic valve, pulmonary stenosis, and mitral stenosis (1, 2). Other causes include syphilis, mycotic aneurysms, atherosclerosis, collagen vascular disease, cystic medial necrosis, trauma, and idiopathic in nature (2). Patients may have symptoms of congestive heart failure, bronchial compression, hemoptysis, pulmonary artery rupture (which is often fatal), or other symptoms related to the underlying disease.

We report two cases of aneurysms of the pulmonary trunk secondary to congenital valvular stenosis that are coexistent with severe coronary artery disease.

CASE REPORTS

The first case was a 63-year-old woman admitted to our center due to coronary artery disease. The pulmonary artery aneurysm was suspected when routine posteroanterior chest radiograph was seen and electrocardiogram showed right axis deviation. Magnetic resonance imaging showed an aneurysmatic dilatation of the pulmonary trunk and left main pulmonary artery, 5 cm in diameter at its widest point. The right ventricular pressure was measured as 70/15 mmHg, the pulmonary capillary wedge pressure was 14 mmHg and the pulmonary artery pressure was 28/11 mmHg in cardiac catheterization. The transpulmonary valve pressure gradient was measured as 42 mm Hg. Pulmonary valvular stenosis and post stenotic dilatation of the pulmonary trunk was showed by pulmonary angiographic examination. Left ventriculography demonstrated normal contractility, but coronary angiography revealed a 95 % proximal stenosis of the left anterior descending coronary artery, and a 75% stenosis of right coronary artery at bifurcation of the well developed acute marginal branch of the right coronary artery (Figure 1).

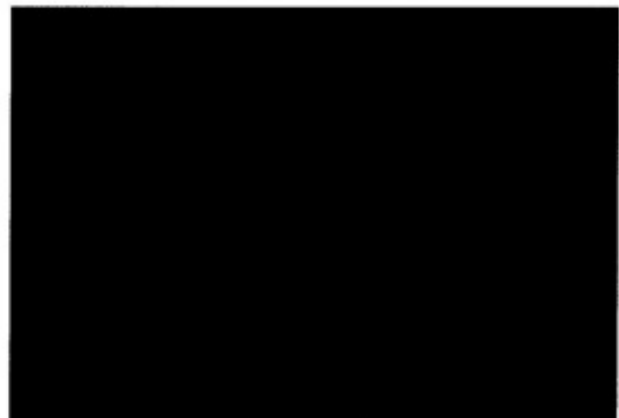
The second case was a 65-year-old man also admitted to our hospital due to coronary artery disease. Routine posteroanterior chest radiography showed enlargement of the pulmonary conus and routine general examination was unremarkable. A grade of 3/6

systolic murmur was audible over the left sternal border. Echocardiographic examination showed right ventricular hypertrophy and a 50 mmHg pressure gradient on the pulmonary valve. Right ventriculography revealed high trabeculation of the ventricle and severe stenosis of the pulmonary valve. Poststenotic pulmonary artery dilatation, 5 cm in diameter, was demonstrated by right ventriculography. The right ventricular pressure was measured as 80/10 mmHg, the pulmonary capillary wedge pressure was 12 mmHg, and the pulmonary artery pressure was 40/12 mmHg in cardiac catheterization. In this patient, the transpulmonary valve pressure gradient was 40 mmHg. Normal contractions of the left ventricle was shown on the left ventriculography and the coronary angiography showed 30 % stenosis of left main coronary artery, 80 % proximal stenosis of left anterior descending coronary artery and 80 % stenosis of first obtuse margin of circumflex coronary artery. The right coronary artery was dominant and the acute marginal branch had been well developed to supply the outflow truck of the right ventricle. A 75 % stenosis of right coronary artery at midportion and a proximal stenosis of the well developed acute marginal branch of the right coronary artery was observed (Figure 2).

The patients underwent a routine cardiopulmonary bypass procedure. First, the myocardial revascularization was done in both patients. In the first patient, the acute marginal branch was bypassed by using saphenous vein

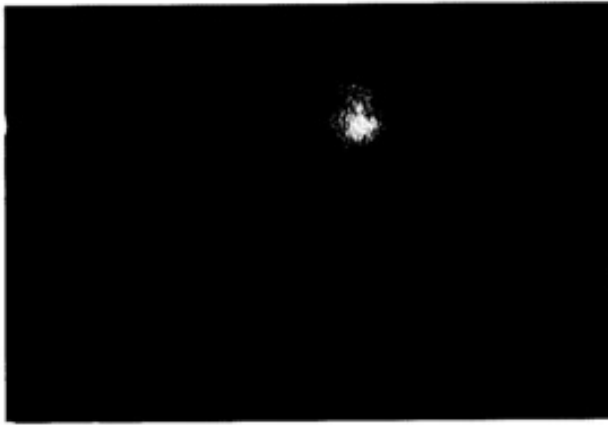


A: The first patient: 63 year old woman.



B: The second patient: 65 year old man.

Figure 1: The pulmonary artery angiographies of the patients.



A- The first patient: 63 year old woman.



B- The second patient: 65 year old man.

Figure 2: The right coronary arteries of the patients.

graft, but the distal right coronary artery (Posterior descending artery) was not bypassable. After the right coronary artery bypass, the left intercostal mammary artery was anastomosed to the left anterior descending coronary artery.

In the second patient, the same procedure was applied, the acute marginal branch, the right main coronary artery and, the first obtuse margin of the circumflex coronary artery were bypassed by 3 separate saphenous vein grafts and then, the left intercostal mammary artery was anastomosed to the left anterior descending coronary artery.

After the myocardial revascularization, main pulmonary artery aneurysm was opened longitudinally, the pulmonary valve was examined and the four pulmonary leaflets were observed in both patients. Two leaflets were excised and then, a commissurotomy was applied in both patients. The wall of aneurysm was thinned out, but we did not use teflon felt for plication because stenosis had been corrected and intravascular pressure of the main pulmonary artery was low enough to close it over and over. Therefore, arteriotomy was closed by two rows of simple continuous over-and-over suture of 4-0 Prolene (Ethicon, Somerville, NJ). Both patients were separated from the cardiopulmonary bypass uneventfully and there was no significant gradient on the pulmonary valve after cardiopulmonary bypass and no inotropic drugs were used in early post-operative period.

DISCUSSION

In patients with pulmonary stenosis, the poststenotic dilatation of the main and/or the left pulmonary artery with a normal-sized right pulmonary artery is the most common abnormal finding on chest radiograph. Some degree of poststenotic dilatation may be seen in almost half of the patients with pulmonary valve stenosis (3). If the density seen on the posteroanterior chest radiograph has a smooth lateral border and an indistinct medial border that blends with the mediastinal structures, the differential diagnosis of the hilar mass should include abnormalities of the pulmonary artery. Computed tomography or MRI of the chest, echocardiography, or pulmonary angiography can confirm the diagnosis of a dilated pulmonary artery (4).

The long-term outcome of untreated pulmonary artery aneurysms is not well known. In the reported cases of pulmonary artery aneurysms from all causes, one third of the patients died due to the rupture of the aneurysm or pulmonary artery (5). As the Laplace's law dictated, wall tension is directly proportional to the intravascular pressure and radius of the pulmonary artery and is inversely related to the wall thickness. When the vessel wall gets thinner and the intravascular pressure become higher, there is a greater chance for rupture. Thus, a surgical repair of the aneurysm may be indicated in some cases. Today, there is still controversy

about optimal treatment for this disease (4).

According to some authors, surgical repair is recommended for large pulmonary artery aneurysms regardless of their etiology and underlying disease to prevent possible fatal ruptures (6). But other authors believe that surgery should be performed only if the patient has an acceptably low operative risk, when the progressive increase in diameter is present or when dissection of the pulmonary artery occurs (4).

Surgical treatment of the aneurysm of the pulmonary trunk includes resection and aneurysmorrhaphy, dilatation of the pulmonary valve, enlargement of the pulmonary annulus or valvotomy in the cases with pulmonary valve stenosis and homograft implantation (6-7). But, when the pulmonary stenosis occurs due to congenital valvular stenosis, right ventricular hypertrophy causes coronary flow disturbances to supply oxygen demand of the right ventricular myocardial mass. So, the acute marginal of the right coronary artery become very important for oxygen supply to right ventricular outflow tract. When atherosclerotic coronary artery disease occur in these patients, especially when the right coronary artery is diseased, acute marginal stenosis must be bypassed and revascularization to right ventricle must be complete and valvular stenosis must be corrected to prevent sudden death.

In our clinic, we operated two old patients suffering from coronary artery disease and pulmonary stenosis; complete revascularization and valvotomy-commissurotomy were done in both patients. Acute marginal branches of the right coronary arteries of both patients were two mm in diameter and mainly supplied right ventricular outflow track. Stenosis of main right coronary artery and/or acute marginal branch was revealed by aortocoronary saphenous grafts and most of the aneurysmal sac was resected and arteriotomy was closed by two rows of simple continuous over-and-over suture of 4-0 Prolene. Because we believe that the main pulmonary artery aneurysms do not need the same aggressive management as aneurysms of the aorta do especially when the pulmonary artery pressure is normal, and

when the stenosis was revealed. The patients were separated from cardiopulmonary bypass without any problem and inotropic drug therapy was not necessary in the early postoperative period.

There were no operative mortalities and no late deaths with a 24 months follow up in one and 14 months follow up in the other patient. No recurrence of the aneurysm and anginal symptoms was detected in this period. As a result, we think that the right coronary artery and if necessary its branch that supply right ventricular outflow track must be completely bypassed and the stenosis must be released and the aneurysmorrhaphy must be applied in coexistence of both the poststenotic pulmonary aneurysm and the coronary artery disease due to increased oxygen demand of right ventricular outflow track. Otherwise, sudden death due to myocardial infarction or to pulmonary artery rupture is inevitable.

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