

Pulmonary Artery Bypass for Fibrosing Mediastinitis

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ABSTRACT

This is a very unusual case with unexpected findings. In spite of sophisticated investigation tests such as MRI and pulmonary angiogram, it may be very difficult to identify the nature of pulmonary artery stenosis or occlusion.

Keywords: Pulmonary Artery Stenosis, Mediastinitis, Fibrosing

1. Introduction

Mrs. M.B was a 58 years old woman, recently investigated for NYHA functional class III dyspnea. Her past medical history included hypothyroidism, hypercholesterolemia, smoking (1 pack of cigarettes/day) caesarian-section, cholecystectomy, hysterectomy and one episode of angina 5 years ago which required a coronary angioplasty. She had no history of deep vein thrombosis or pulmonary embolism. Her medication profile included Levothyroxin, Atorvastatin, ASA, Lisinopril, Atenolol and Dalteparin. Upon physical examination and auscultation, apart from a loud P₂, no other abnormalities were noted.

2. Discussion

Her Chest X-Ray had always been within normal limits as well as her ECG which was performed at rest. A (TTE) trans-thoracic echocardiogram revealed signs of pulmonary hypertension. Upon further investigation with the use of a (TEE) trans-esophageal echocardiogram, a patent foramen ovale measuring 3 mm, and a left to right shunt were noted. The mitral, aortic and pulmonary valves were normal, mild tricuspid regurgitation was found (2+) and an estimated systolic pulmonary artery pressure of 55 mmHg. Pulmonary function testing revealed the following; with respect to the predicted values, FVC at 128%, FEV1 at 86%, TLC at 108% and a DLCO of 63%. Lung scan showed normal ventilation with diffuse hypoperfusion to the right lung, however pulmonary flow studies did not visualize the right pulmonary artery.

3. Method

A pulmonary angiogram (**Figure 1**) demonstrated a left pulmonary circulation entirely within normal limits. The

right pulmonary artery was severely narrowed from its proximal portion as it coursed across the middle to the right. The residual lumen was only 2-3 mm. The narrowing of the right pulmonary artery appeared to be primarily extrinsic. An MRI was performed to delineate the nature of the lesion which showed that the right pulmonary artery was almost fully obstructed within a small distance distal to its root and was recanalized shortly before the bifurcation into the lower division and the upper lobar artery. The upper lobar artery appeared virtually occluded, and her left pulmonary artery was well developed and was not pruned. The most likely diagnosis was thrombo-embolic disease, the reason being was, the obstruction appeared to be well contained within the vessels adventitia and exhibited scarring and constriction. The main PA was estimated at 28 mm dimension, the left PA 26-27 mm, the proximal right PA 13 mm, the mid right PA 4-5 mm and the distal and lower division 11 mm.

Prior to the surgery, the investigation was completed by heart catheterization and the following results were derived: cardiac index of 2.9 L/min/m², mean wedge of 12mmHg, mean right atrial pressure of 7 mmHg, moderate pulmonary hypertension (50/19) with mean of 30 mmHg, mild right coronary artery disease and 70% stenosis in the mid left anterior descending artery.

With a diagnosis of unilateral right pulmonary artery thrombosis, our surgical plan was to proceed with right pulmonary thrombo-endarterectomy, closure of PFO and coronary bypass on the LAD.

The mediastinal exploration revealed inflammatory processes involving mainly the ascending aorta and the right pulmonary artery, as well as a complete occlusion and fibrosis of the right pulmonary artery. Due to this



Figure 1. Pulmonary angiogram.

observation, a frozen section was sent to the pathology laboratory and was compatible with fibrosing mediastinitis. The severity and the density of the fibrosis process had a great impact on the dissection to the extent of making it impossible to dissect the origin of the right pulmonary artery.

We elected to perform a bypass, anterior to the ascending aorta, using a polytetrafluoroethylene graft of 8 mm between the main pulmonary artery and the inferior lobar branch of the right pulmonary artery. The bypass was performed on deep hypothermia (20°C) and circula-

tory arrest for 21 minutes. While re-warming the patient, we proceeded to perform a closure of the PFO and a coronary bypass from the left internal mammary artery to the left anterior descending artery. The patient was weaned off cardiopulmonary bypass on moderate dose of norepinephrine, milrinone and vasopressin.

4. Results

Her immediate post operative course was complicated by excessive mediastinal oozing due to a coagulopathy that resolved after the evacuation of blood clots and the

transfusion of fresh frozen plasma and platelets.

Ten days after surgery, a repeated trans-thoracic echocardiogram showed a mild RV hypokinesis, moderate pulmonary hypertension (PAPs 54 mmHg), and an intact septum that was intact along with a left ventricular ejection fraction of 65 %. A lung scan revealed an absent perfusion to the right upper lobe and perfusion to the right lower lobe and right middle lobe appeared to be intact. Decreased ventilation to the right upper lobe was observed, and an intact perfusion to the left lung was noted.

Twelve days after the surgery, the patient was discharged home on her regular medications with an addition of Coumadin.

5. Comment

This was a very unusual case with unexpected findings. In spite of sophisticated investigation tests such as MRI and pulmonary angiogram, it may be very difficult to identify the nature of pulmonary artery stenosis or occlusion. The differentiation between intra-luminal vs. extra-luminal lesion was crucial for achieving optimum management. For the extra-luminal lesion of fibrosing mediastinitis, stenting of the pulmonary artery [2] was probably the best treatment. However, for this specific case, we did not think it would have been possible due to the small lumen and dense fibrosis.

With a diagnosis of unilateral right pulmonary artery

thrombosis, a planned thrombo-endarterectomy was the best procedure; however it was not feasible in this case. Resection of the fibrotic pulmonary artery that would have allowed end-to-end graft anastomosis [1] was not possible either without damaging surrounding structures such as the aorta, left atrium, trachea and superior vena cava. In order to avoid manipulating the inflammatory process, the only option was to perform a bypass anterior to the aorta from the main pulmonary to the inferior lobar artery. We believe that long term patency of PTFE grafts might be better than Dacron grafts, especially in a low pressure system. Long term anticoagulation may help. A tissue engineered pulmonary graft could have been a better choice but is not commercially available yet [3].

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