Pulmonary endarterectomy after pulmonary infectious embolisms

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Abstract

Pulmonary endarterectomy (PEA) is a well-established procedure in the treatment of chronic thromboembolic pulmonary hypertension (CTPH). The procedure is known to increase functional outcome and to raise the 5-year survival rate. We report 2 cases of pulmonary valve endocarditis and secondary embolisms causing sustained pulmonary hypertension. Both were treated with PEA. In none of the cases, a cleavage between the thrombotic masses and the vessel wall was obtainable, and both attempts were therefore inadequate. Based on our reports, we recommend not attempting PEA in cases of CTPH after infectious embolisms.

Keywords: Pulmonary endarterectomy • Chronic thromboembolic pulmonary hypertension • Pulmonary embolism • Endocarditis

INTRODUCTION

Pulmonary endarterectomy (PEA) is the operation of choice for chronic thromboembolic pulmonary hypertension (CTPH) and is, in contrast to medical treatment, potentially curative [1]. The disease often follows acute episodes of pulmonary embolisms of which infectious embolisms from the pulmonary valve are a rare cause [2]. Since the 1950s, the procedure has been implemented worldwide, and Aarhus University Hospital is currently performing around 20 PEA procedures each year, accounting for more than 200 procedures for the last 15 years [3]. Many studies show its benefits in both short- and long-term evaluations [1, 3]. Knowing that PEA most often is an effective treatment [1], we report 2 unique cases in which PEA should have been avoided.

PATIENTS AND METHODS

Case I

A 27-year old woman was liver transplanted in 2004. Postoperatively, she suffered from wound infection and, in March 2005, she was readmitted with a Candida albicans endocarditis at the tricuspid and pulmonary valve causing bilateral infectious pulmonary embolisms. There were no signs of ongoing endocarditis at discharge.

In late December 2005, the patient was admitted at Aarhus University Hospital Skejby with cough and severe dyspnoea, equalling New York Heart Association IV. Echocardiography revealed dilated right chambers, peak gradient of the tricuspid valve of 75 mmHg and thickening of the pulmonary valve. Blood samples showed regrowth of C. albicans, so antibiotic and fungicide treatment were reintiated. Furthermore, continuous pulmonary embolisms were observed. Scintigrafies showed impaired perfusion of the lower left lobe, and a total lack of perfusion of the lower right lobe. Therefore, she was offered surgical replacement of the pulmonary valve and PEA in March 2006.

Through a median sternotomy, extracorporeal circulation was established, enabling hypothermia to 18°C. Systemic cooling was combined with local, external cranial cooling. A cross-clamp was placed on the aorta at a temperature of 25°C, cold crystalloid cardioplegia was used during the whole procedure. The pulmonary arteries were explored during a total period of circulatory arrest of 20 min. The procedure was started proximally within the normal part of the artery, but inability to dissect into the intima layer made PEA impossible. Despite quite a thorough attempt, only a minor part of the most proximal thrombotic material in the right pulmonary artery was removed, and in the left artery, surgery was unsuccessful as well. The pulmonary valve was replaced without further trouble.

Seven months postoperatively, the patient suffered from sustained dyspnoea, equal to NYHA II, and she reported a new episode of unexplained haemoptysis. Right-sided catheterization revealed elevated pulmonary pressure of 42/16(25) mmHg, but, in addition, a dilatation at the left pulmonary artery was visualized. Computed tomography angiography confirmed an aneurysm shortly after take off of the upper lobe branch. Except for the competent pulmonary homograft, her postoperative echocardiographies were unchanged, including the latest from January 2012.

Three years after surgery in April 2009, the patient gave birth to a healthy child after a planned C-section.
Right pulmonary angiogram from case II showing the lack of perfusion through the lower lobar vessel.

Case II

In August 2011, the department experienced a comparable case of secondary infectious pulmonary embolisms—a 66-year-old woman with rapid progression of her habitual dyspnoea. Previously, in 2006, she suffered from a colonic cancer with hepatic metastases, and a postsurgical staphylococcal endocarditis caused multiple pulmonary embolisms. She underwent stereotactic radiation for another hepatic metastasis, but all further check-ups showed no signs of relapse.

At the time of admission at Aarhus University Hospital Skejby in 2011, her only complaint was a rapidly progressing shortness of breath, equal to NYHA III. Pulmonary scintigraphy showed severely impaired perfusion of the upper, and particularly the lower lobe of the right lung (Fig. 1). Echocardiography revealed a severe insufficiency of the pulmonary valve combined with dilated right chambers and pulmonary arteries. Lastly, a rightsided heart catheterization confirmed the above-mentioned perfusion abnormalities and an elevated pulmonary pressure of 52/12 (21).

The patient underwent surgical replacement of the insufficient pulmonary valve with the intent to explore the pulmonary arteries for a possible PEA. The surgical procedure was performed as described in case I with systemic hypothermia of 18°C and local cooling of the brain. The right pulmonary artery was explored in the same manner as in case I, but after 8 min of circulatory arrest, PEA turned out to be impossible. The reason was a large degree of adherence between the embolic masses and the vessel wall, leaving no cleavage obtainable. Therefore, the arteriotomy was closed without it being possible to remove any of the embolic material. The infected valve was easily replaced.

The following echocardiographies were unchanged, showing dilated right chambers and signs of elevated pulmonary pressure. The inserted homograft was sufficient and fully functional. At 1-month follow-up, a slight decrease in tricuspid valve regurgitation was noted.

DISCUSSION

As demonstrated in the case stories, our department experienced 2 cases of pulmonary valve endocarditis with secondary pulmonary infectious embolisms. When it comes to performing PEA in these patients, previous experiences are sparse, making our cases unique. We describe 2 cases of CTPH in which PEA should not have been attempted. In none of the cases, a plane of resection could be determined, which, most likely, is caused by fibrosis and formation of collagen into the media layer of the vessel wall. Therefore, the usual dissection of the inner part of the intima layer was not possible. We do not normally experience these kind of challenges with non-infectious pulmonary embolisms.

There is one recently published study by Lafci et al. [4] that reports a case that has some resemblance to our cases. They describe 3 CTPH cases operated with the use of moderate hypothermia without circulatory arrest. One patient, a 28-year-old postpartum had pulmonary endarteritis at a non-chronic stage, and experienced what could be a single, major embolus. She was operated on with an excellent outcome. The better outcome may be owed to the lower complexity when dealing with a single acute embolism. Furthermore, it is unclear whether the reported embolism was infectious or non-infectious.

Adding to the complexity of our first case, the infectious specimen was fungi. It is our experience that antifungal therapy should be combined with surgical valve replacement as soon as possible. Fungal endocarditis involves a young population and is a life-threatening condition with high rates of mortality [5]. Combined with PEA, the severity of the condition is enhanced even further.

In conclusion, based on our experiences embracing >200 PEA procedures in the last 18 years, PEA is generally a very beneficial procedure [1, 3], but our 2 cases may suggest caution when it comes to performing PEA in patients with multiple, pulmonary, chronic infectious embolisms. In our opinion, patients with infectious embolisms should be treated with prolonged antibiotics combined with surgical valve replacement as an alternative to PEA.

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REFERENCES