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Migration and Thrombosis of Injectable Pulmonary Valve

Enjektabl Pulmoner Kapakta Migrasyon ve Tromboz

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Öz

Pulmoner kapak replasmanı, Fallot tetralojisi operasyonları sonrası ya da sağ ventrikül çıkım yolu genişletme operasyonları sonrası gerekebilir. Tıp pratiğinde hasta konforu için girişimsel yöntemler daha çok tercih edilmektedir. Olgu sunumumuzda, 14 yaşındaki erkek hastamızda pulmoner kapak replasmanı girişimi sonrası gelişen migrasyon ve tromboz komplikasyonları ve bu komplikasyonların, ikinci bir cerrahi ile başarılı tedavisi sunulmaktadır.

Anahtar Kelimeler: Fallot Tetralojisi, Pulmoner Kapak, Tromboz

Abstract

Pulmonary valve replacement is required after tetralogy of Fallot or surgery performed for relief of right ventricular outflow obstruction. Interventional methods are more preferable for patient comfort in medical practice. Here we introduce a 14-year-old male patient who developed complications of migration and thrombosis after intervention for pulmonary valve replacement, and was successfully treated with a second operation.

Keywords: Tetralogy of Fallot, Pulmonary Valve, Thrombosis

Introduction

Approximately 20% of newborns with congenital heart disesase have anatomic dismorphism of the pulmonary valve or right ventricular outflow tract (1). Tetralogy of Fallot, common arterial trunk, or pulmonary atresia are the most common congenital heart diseases which require pulmonary valve repair or intervention. Surgery was the solely option for replacement of pulmonary valve since Bonhoeffer and his team realized the first transcatheter pulmonary valve replacement (2). Here we report a 14-year-old male patient who developed complications of migration and thrombosis after intervention for pulmonary valve replacement.

Case

A 14-year-old male patient was admitted to our institution due to severe cyanosis. On physical examination, cardiac murmur was detected in the pulmonary valve. The patient was hospitalized because of congestive heart failure and acute onset cyanosis. There was a history of surgery for total correction of tetralogy of Fallot at the age of 1.5 years old, and 6 months ago, due to pulmonary valve insufficiency, pulmonary valve replacement (PVR) (Matrix plus N) was performed with a hybrid procedure through the right ventricle using a sternotomy approach. No futher information or preimplantation measurement values of right ventricle outflow diameter could be obtained from the previous medical records. Informed consent was taken from the patient's relatives in January 2016.

Current echocardiography revealed severe pulmonary valve insufficiency, and right ventricular insufficiency. The artificial pulmonary valve was seen to have moved through the main pulmonary artery and repositioned next to the pulmonary bifurcation, and acute thrombosis of this valve inside the pulmonary artery occurred even though the patient was taking acetylsalicylic acid.

A redo cardiac surgery was performed to remove the pulmonary valve and clean thrombus material through a longitudinal pulmonary artery incision (Figure 1A, 1B, 1C, 1D). PVR using pulmonary homograft was performed. Intraoperative and postoperative follow-up were uneventful. On discharge, warfarin was administered as there was no evidence of hypercoagubility. The postoperative echocardiogram revealed no pulmonary insufficiency.

Discussion

Pulmonary valve replacement via transcatheter or directly through a right ventricle approach is safe and effective for patients suffering right ventricle outflow dysfunction. In clinical practice, there are various kinds of tissue-engineered pulmonary valves. These can be dilated by transcatheter balloon intervention to match the diameter of the right ventricle outflow tract and pulmonary anulus according to age.

However, neither mechanical nor biological valves are ideal for pulmonary valve replacement in pediatric patients. The homogeneous allogeneic pulmonary valve still remains the best option (1). Cryopreserved, homogeneous valves have good hemodynamic performance, a low incidence of thromboembolism and infection, and better

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durability than other biological replacements. The major disadvantage during follow up is the degradation of homograft valves over time. Moreover, due to the scarcity of raw materials, calcification due to the high rate of calcium turnover, can occur (1).

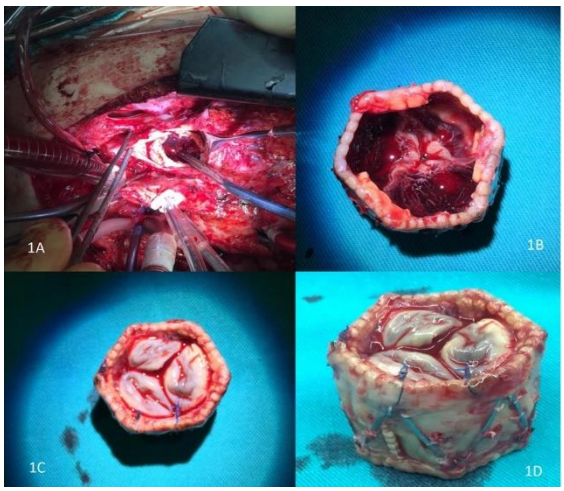

Figure 1. A: Thrombosis on the pulmonary valve, view through pulmonary arteriotomy. **B:** Intraoperative view of thrombosis on the pulmonary valve (Matrix Plus N). **C and D:** Pulmonary valve after removal of the thrombus material. Coaptation was adequate in the natural position

Frequent complications of pulmonary valve replacement are infective endocarditis and stenosis occurring in time (3). However, in our case, the reason for reintervention was displacement of the valve. In any case of pulmonary valve replacement, exact measurements should be taken of the diameter of the pulmonary anulus or right ventricle outflow tract prior to the intervention or surgery. Thus, an appropriate valve can be inserted. In cases of mismatch, the pulmonary valve stent profile may be dislodged due to the flow through right ventricle outflow tract. Although Deorsola et al. emphasized the safety of implanted oversized injectable valves in growing children (4), it can be considered that an oversized previously implanted pulmonary valve may result in the valve folding in on itself, then moving distally, which will result in obstruction of pulmonary blood flow with inevitable thrombosis formation and acute onset severe cyanosis.

In conclusion, tissue-engineered pulmonary valves are indispensable instruments after the repair of many congenital heart diseases related to the right ventricle outflow tract, with the intent to decrease the number of redo-surgeries. However, it should be kept in mind that it is important to select the appropriate size. In case of unsuitable artificial pulmonary valve insertion, spontaneous dislodgement of the valve can result in severe complications such as cyanosis.

Written consent: Written consents of the patients were obtained on 10.10.2021.

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