Correction of tetralogy of Fallot in an adult using a stented bioprosthetic valved conduit

Keiko Kiyokawa, MD · Kazutomo Goh, MD, PhD
Nobuyuki Akasaka, MD, PhD
Takayuki Kadohama, MD, PhD · Kei Kazuno, MD
Tadahiro Sasajima, MD, PhD

Abstract A 55-year-old man with tetralogy of Fallot successfully underwent correction using a valved conduit. He was diagnosed as having congenital heart disease during childhood, but no surgical intervention was performed. Cyanosis and dyspnea on effort had progressed gradually. Catheterization showed a left ventricular end diastolic volume of 126 ml, and the pulmonary arteries had sufficient diameters. To prevent postoperative pulmonary regurgitation, we planned to use a bioprosthetic valved conduit for right ventricular outflow tract reconstruction. At 4.5 years after the operation he is in New York Heart Association functional class I. The catheterization performed 1.5 years after the surgery showed no pressure gradient between the right ventricle and the pulmonary artery. Thus, total correction of tetralogy of Fallot in an adult can be achieved safely, and the use of a bioprosthetic stented valved conduit can be beneficial.

Key words Tetralogy of Fallot · Stented bioprosthetic valved conduit · Adult

Introduction

Although it is rare to treat adult patients with tetralogy of Fallot (TOF), because of the recent widespread practice of medical checkups there are some cases of TOF discovered in adults who had had no treatment. We report a patient with TOF who underwent intracardiac repair in his fifties with an excellent result.

Case report

A 55-year-old man was diagnosed as having congenital heart disease during childhood, but no surgical intervention was performed. Cyanosis and dyspnea on effort progressed gradually when he was in his fifties and, eventually it became impossible to walk for even a few meters. One year prior to the current admission, he had an epileptic attack and was admitted to a nearby hospital. Congenital heart disease was again diagnosed, and surgical intervention was proposed.

He had a history of a brain abscess at the age of 23 years and lung tuberculosis at the 39 years. A grade 3 systolic ejection murmur was detected at the left edge of sternum in the fourth intercostal space. Marked cyanosis and clubbed fingers were noted. The blood hemoglobin level was 23.1g/dl, and the hematocrit was 71.8%. The blood gas analysis showed PaO$_2$ of 40 mmHg and SaO$_2$ of 77% at 21% oxygen concentration.

Preoperative chest radiography showed a cardiothoracic ratio (CTR) of 48%. Electrocardiography revealed...
right ventricular (RV) hypertrophy and right axis deviation. The QRS width was 0.08 s; no ventricular tachycardia was detected on a Holter recording. Catheterization showed that the RV pressure was 114 mmHg, and there was severe RV outflow tract obstruction (Fig. 1). The left ventricular (LV) end-diastolic volume was 126 ml, and the Nakata index was 254; these parameters were considered sufficient for total correction. One major collateral vessel from the aorta was detected on aortography, and it was successfully embolized with coils 1 day before surgery (Fig. 2).

The operation was conducted with the patient in the supine position. The chest was opened through a median sternotomy. Cardiopulmonary bypass (CPB) was established using an arterial return cannula in the ascending aorta and a venous drainage cannula in the superior vena cava and inferior vena cava. Cardiac arrest was obtained with cold blood cardioplegia, and the right atrium and pulmonary artery were dissected. The pulmonary valve was bicuspid and was 6 mm in diameter. The RV outflow tract (RVOT) was also severely stenotic. The length of the right ventricle was 90 mm, and the right ventriculotomy was 27 mm. The ventricular septal defect was closed using a $20 \times 10$ mm oval Dacron patch via the right atrium and right ventricle. The RVOT was reconstructed using a valved conduit that was made in advance using a 28-mm woven Dacron graft (Gelweave; Vascutek, Glasgow, UK) and a 25-mm stented porcine bioprosthetic valve (Medtronic Mosaic; Medtronic, Minneapolis, MN, USA). Cardiac return through the collateral vessels was calculated as 13% of the systemic flow. Weaning from the CPB was uneventful, and the RV/LV pressure ratio was 0.6 (Fig. 3).