

Central shunt for tetralogy of Fallot after original Blalock–Tasussig shunt in a 34-year-old woman

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Abstract

A 34-year-old woman presented with original Blalock Taussig shunt and tetralogy of Fallot. The anastomosis site of the original Blalock–Taussig shunt revealed stenosis and severe cyanosis. A central shunt was performed with 6mm artificial vessel, not a radical operation. After surgery, the cyanosis improved as intended.

Introduction

The Blalock–Taussig (BT) shunt in the tetralogy of Fallot was first performed in 1946. [1] It has been improved to create a short circuit in the pulmonary artery by using an artificial blood vessel. Spontaneous prognosis after only this surgery is poor, and radical surgery is necessary to improve the long-term prognosis. However, for various reasons, some patients have only undergone surgery and not any therapeutic intervention. In this report, we describe a case of central shunt surgery to improve cyanosis in a patient who had been followed-up for a long time without radical surgery after an original BT shunt.

Case report

The patient was a 34-year-old woman (weight, 38.3 kg; height, 150 cm; BSA, 1.29) who had been diagnosed at birth with tetralogy of Fallot on the basis of severe cyanosis. The original m-BT shunt on the left was performed at the age of 2 years. During outpatient follow-up, the patient fell down the stairs and suffered a cervical spinal injury. Recently, however, cyanosis has progressed rapidly during physical movement, and we decided to treat her with surgery. The patient’s physical activities of daily living had decreased significantly, and there was concern about pulmonary artery hypoplasia; therefore, it was thought that the patient would not tolerate radical surgery. Preoperative contrast-enhanced computed tomography (CT) revealed stenosis of the subclavian artery at the anastomosis to the pulmonary artery and complete occlusion of the right ventricular outflow tract. (Figure 1 a) In surgery, dissection was performed through a midline incision approach as usual, and after establishing an artificial heart-lung machine with ascending aortic blood supply and right atrial debridement, a short circuit was created from the ascending aorta to the main pulmonary artery using a 6 mm artificial vessel. (Figure 2) The patient was easily weaned from cardiopulmonary bypass and had a good course of postoperative ICU management. The patient was weaned from the ventilator on the first postoperative day, and subsequent rehabilitation progressed smoothly despite the paralysis. Postoperatively, her SpO₂ increased to 80% and her preoperative symptoms, such as decreased SpO₂ with light exertion, improved. Postoperative contrast-enhanced CT showed that blood flow to the shunt and pulmonary artery was maintained. (Figure 1 b)

Discussion

The BT shunt was originally designed and performed to improve cyanosis in the tetralogy of Fallot, but it is not curative, and the pulmonary artery blood flow rate decreases as the body grows. In fact, the survival

rate at 25 years after surgery of patients with tetralogy of Fallot who underwent palliative surgery only is approximately 50%. [2] There have been almost no case reports of palliative central shunting in adulthood, [3] and we report here another case in which cyanosis was improved in adulthood after central shunting.

The concerns in this case were the development of postoperative congestive heart failure and hypercapnic lung injury. [4] Shunt reduces blood flow to the body and increases pulmonary blood flow, thereby increasing Qp/Qs as a surgical procedure. Although it is difficult to accurately evaluate preoperatively whether the patient's heart tolerates congestive heart failure, the 6 mm artificial vessel used in this study did not progress to heart failure due to low blood flow, although the postoperative lungs showed temporary lung damage due to high pulmonary blood flow.

The second concern is the patency of artificial blood vessels. In general, there are many reports on the patency of artificial vessels in FP bypass, but there are no reports on the patency of the central shunts in adulthood. The shorter distance of the artificial vessel and its higher blood flow rate in this procedure may be expected to result in a higher patency rate than that of FP bypass; however, this has not been clearly confirmed.

Central shunting was effective in improving SpO₂ in adult patients; however, there are many uncertainties regarding postoperative hemodynamics.

List of Abbreviations

BT, Blalock—Tasussig

CT, computed tomography

Declarations**Ethics and Consent to Participate**The study was approved by the ethics review board of our institution, and the patient provided written informed consent for the publication of this case.**Consent for Publication**Not applicable**Data Availability Statement**Not applicable**Conflicts of Interest**None.**Financial Support**This research received no specific grants from any funding agency, commercial, or not-for-profit sectors.**Authors' Contributions**Conception and design of study: KN, SK; Drafting the manuscript: KN revising the manuscript critically for important intellectual content: KN, SK, AA Approval of the version of the manuscript to be published: AA, MT

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Figure legends

Figure 1

a: Subclavian artery stenosis at the anastomosis to the pulmonary artery and complete occlusion of the right ventricular outflow tract. b: Blood flow to the shunt and pulmonary artery was preserved.

Figure 2

a systemic pulmonary shunt was created from the ascending aorta to the main pulmonary artery using a 6 mm artificial vessel.

