

Surgical Treatment of Congenital Heart Diseases Corrective Surgery for Tetralogy of Fallot

Masghiro Saigusa, M. D.

Dr. Lee, Dr. Yu, members and guests.

It is a great honor for me to have an opportunity to present a special lecture at this Annual Meeting of Korean Thoracic and Cardiovascular Surgical Society.

Slide 1. Until the end of 1974, 2,012 cases of congenital heart diseases were operated on in our Department.

Most popular anomalies in this group of disease have been atrial septal defect, ventricular septal defect, tetralogy of Fallot, and patent ductus arteriosus.

Slide 2. Today I will limit my talk to surgical treatment for tetralogy of Fallot.

Since 1951, when professor Kimoto succeeded in the first Blalock-Taussig operation in Japan, 396 cases of tetralogy were operated on in our Department.

Among them, 234 were palliative and 162 were corrective operations. Majority of palliative operations were Blalock-Taussig's anastomoses.

Slide 3. As the corrective surgery can be performed more and more safely, the number of patients who undergo corrective operation is increasing.

At present, we perform corrective surgery for all cases with tetralogy, except tiny infants with frequent anoxic spells and cases with the extremely hypoplastic pulmonary artery branches.

Operative results has improved since 1964, and recent hospital mortality is below 10%.

Naturally the basic to improve the operative results of corrective surgery is complete repair of the anomaly. However, this is not a simple task to achieve in some patients.

Slide 4. We classified tetralogy into four anatomic groups based on the morphology of infundibular stenosis and the location of VSD. This classification omits the presence or absence of pulmonic valve stenosis.

The type III in the slide which has hypoplastic pulmonary artery in addition to severe infundibular stenosis. In this type of disease it is necessary to enlarge the right ventricular outflow tract up to the branches of the pulmonary

artery using a patch, since residual pulmonic stenosis frequently leads to unfavorable prognosis.

Slide 5. This slide is an example of such plastic procedure done with success. The pericardial patch was placed from the right ventricular outflow tract up to the right branch of the pulmonary artery.

Slide 6. In this patient whose left pulmonary artery was originated from the aorta by way of the ductus. The reconstruction of the pulmonary artery was performed by anastomosing the graft between the right ventricular outflow patch and the left pulmonary artery after the ductus was divided.

Slide 7. When one closes VSD, one should be careful not to injure the His bundle which traverses along the posterior lower rim of the VSD, in order to prevent surgical AV Block. At this vulnerable area, we place buttress stitches more than 0.5 cm away from the border of the defect.

Slide 8. Recently we investigated long-term follow-up results of tetralogy operated 7 to 24 years ago.

I would like to talk about the results. Case materials are 201 cases operated between 1951 to March, 1968, which include 149 cases of palliative surgery and 52 cases of corrective surgery.

Slide 9. Let me start with late results of palliative surgery. Methods of palliation were Blalock-Taussig operation in 145, Brock operation in 3 and Potts operation in 1. I would like to limit my talk to cases with Blalock-Taussig shunts, since experiences of other methods are small in number.

Slide 10. Present status of 145 cases with Blalock shunt are shown in this slide; alive with initial shunt in 31, reoperation in 81, late death in 19, and undetermined in 14.

Causes of late deaths include cerebral embolism and abscess in 5 cases, heart failure in 5, respiratory infection in 3, and subacute bacterial endocarditis in 1. These 14 cases died because the anomaly was left uncorrected notwithstanding the creation of Blalock shunt. This fact really indicates the limitation of the palliative surgery. While cerebral complications and respiratory infections are complications that can occur any time from early postoperative period, heart failure is an terminal complication.

Slide 11. Although the symptom of patients improves consistently after Blalock's operation, long-term follow-up results show that such symptoms as cyanosis and exercise intolerance recurs in most of patients. Excellent late results were obtained in only 7 cases as compared with good or fair results in 24 patients.

Slide 12. When we take a look at changes in hematocrit value which is a good indicator of severity of this disease, the value once reduced gradually increased with recurrent symptoms and considered to be candidates for reoperation.

Slide 13. It has been reported that the outflow tract of the right ventricle could be completely occluded following Blalock's operation. We also experienced two

cases of this type of acquired obstruction of the outflow tract as shown in this slide. The case shown on your left had fused pulmonic valve, while the case on your right had completely obstructed infundibulum. Both were successfully corrected by enlargement of the outflow tract as shown in postoperative angiograms.

- Slide 14.** As you see in this slide, the excellent who can lead a normal life as healthy persons are only 5%. The remainders had recurrent symptoms, and 62% of patients underwent the second operation. These facts leads us to the conclusion that this operation is only a preliminary palliative surgery prior to corrective operation.
- Slide 15.** Then we will proceed with late results of total correction. Case materials are 52 cases operated 7 to 20 years ago between 1955 and March 1968. Age at the time of surgery was 4 to 29, and age at the time of current study was 14 to 40. Late deaths occurred in 6 cases.
- Slide 16.** Causes of deaths include persistent AV block, late AV block, and residual VSD. Two died after reoperations for residual VSD and for aneurysm of the outflow tract 1 year and 4 months after initial surgery respectively.
- Slide 17.** Aliving 46 cases were classified according to functional capacity at present and residual abnormalities, scrutinized with various methods. Thirty five patients or 76.1% are in class I and eleven or 23.9% are in class II. Excellent results are obtained in 11 patients with no abnormalities at all. Thirteen cases with minor abnormalities in the outflow tract such as slight PS and/or PI and 7 cases with small left-to-right shunt are evaluated as good. Excluding two cases in class II from the latter group of patients, 29 patients or 63% are those to whom the corrective surgery offered satisfactory results from hemodynamic as well as subjective standpoints. There are 15 patients who had significant residual abnormalities or heart block, they are classified as fair. Five patients with right ventricle-to-pulmonary-artery pressure gradient above 50mmHg, one out of four with VSD of shunt ratio more than 30%, two with AI and one of two with TI, having various subjective symptoms. The remainder are asymptomatic.
- Slide 18.** Those who had significant pressure gradient between the right ventricle and pulmonary artery when measured during surgery or in the early postoperative period, revealed significant reduction in the pressure gradient as time goes by.
- Slide 19.** Regarding residual shunt, dye dilution study revealed a diminution in shunt in a fair number of cases several years after surgery.
- Slide 20.** Late arrhythmias following corrective surgery are important because they may have influence on the prognosis of the patient. We encountered this late arrhythmias in 4 cases in this series. Case F.A. was suffered from complete AV block 6 years after surgery and underwent implantation of a pacemaker. He died suddenly 9 years postoperatively probably due to malfunction of the pac-

emaker. Others include a case with supraventricular tachycardia resulting in ventricular fibrillation and two cases of atrial fibrillation, one results from postoperative tricuspid insufficiency, another from residual VSD. It has been reported that patients who had transient arrhythmias in the early postoperative period are more prone to late arrhythmias. In two out of four cases with late arrhythmias in this series had early transient AV block or dissociation.

Slide 21. This slide summarizes occupational status at present time in patients who underwent corrective surgery. As you can see, some are working in heavy labour such as a building constructor and student of athletic college. Generally speaking, the prognosis of patients following corrective surgery is good even in cases with mild or moderate residual abnormalities. However, patients associated with severe residual abnormalities have various symptoms, and may end up with grave arrhythmias and heart failure leading to death. Therefore it is important to make sure not to leave any abnormalities at surgery. When this happens, it is mandatory to continue careful follow-ups. Here I would like to present a movie about corrective surgery for tetralogy of Fallot.

I have talked about surgical treatment for Tetralogy of Fallot. It is a great pleasure for me if my lecture would be at any help for members of the Korean Thoracic and Cardiovascular Surgical Society.

Thank you.