Re: Does the shunt type determine mid-term outcome after Norwood operation?

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There is always a debate as to which shunt is better in a Norwood procedure [1–4]. Some say the modified Blalock-Taussig (MBT) shunt is better than the right ventricle-pulmonary artery (RV-PA) shunt, while others say the RV-PA shunt is better than the MBT shunt. Photiadis et al. [1] compared their experience of MBT shunts with that of RV-PA shunts in 109 patients. They concluded that there was no significant difference in the survival rates between the two shunt types. However, the incidence of shunt-related interventions was significantly increased with the RV-PA (Sano) shunt group. Ohye et al. [2] reported the results of the first multicentre, randomized trial of the Norwood procedure with comparison of an RV-PA shunt and MBT shunt. They summarized that the 12-month transplantation-free survival was higher with the use of an RV-PA shunt than with the use of an MBT shunt. However, the RV-PA shunt was associated with a higher rate of unintended cardiovascular interventions and complications during the first 12 months after randomization. Their conclusion was that there was no significant difference between the two groups with respect to transplantation-free survival beyond 12 months.

The Norwood procedure using an MBT shunt creates pulmonary atresia from aortic atresia, while the idea of an RV-PA shunt is to create tetralogy of Fallot from aortic atresia. Postoperative management after the implantation of an MBT shunt in patients with pulmonary atresia was not easy because it is important to keep a balance between systemic and pulmonary circuits. Babies with an MBT shunt sometimes collapse suddenly in the ward or at home. However, almost no babies experience a sudden collapse in tetralogy of Fallot. While many surgeons and many centers report almost no or minimal mortality in patients with MBT shunt, and that it is easy to keep a balance between systemic and pulmonary circuits, the discharge mortalities in neonates after MBT shunts were 7.2% and 10.6%, in the Society for Thoracic Surgeons database [5] and in the European Society for Cardio-Thoracic Surgery database (http://www.eactscongenitaldb.org/index.php?LANG=en&level=1&struct=14), respectively. These data clearly show that the MBT shunt has a high mortality, and this is the reality of the situation.

Creating a tetralogy of Fallot instead of pulmonary atresia was the simple idea behind the RV-PA shunt when I started using the RV-PA shunt to treat the hypoplastic left heart syndrome. This was because postoperative management after the implantation of a MBT shunt was not easy.

We all worry about the adverse effects on RV function after a ventriculotomy; however, there are many papers that have demonstrated no adverse effects in the use of a RV-PA shunt [3, 6]. The site and size of the ventriculotomy as well as the size of the shunt are important. Initially, we created an RV hole by...
using a knife and a pair of scissors and this was changed to a coronary puncher to create uniform and minimally sized holes. Furthermore, pulmonary blood flow is controlled using a clip on the graft with oxygen saturation staying at around 80–85%; on room air. These changes may affect long-term RV function. The authors and others also alluded to a higher rate of unintended cardiovascular interventions and complications with the use of the RV-PA shunt. A ring-enforced polytetrafluoroethylene (PTFE) graft is the option to avoid proximal graft stenosis [7]. Recently, we have begun to use ring-enforced PTFE grafts frequently instead of a ringless graft. By adopting these modifications, we may be able to decrease the mortality and morbidity after a RV-PA shunt.

All available data show no difference in mortality between the two different shunts. Some surgeons prefer to do an MBT shunt and some prefer to do an RV-PA shunt. Whichever shunt is used, more efforts should be made to improve mortality and morbidity.

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**REFERENCES**


