

Reverse Double Switch Operation for the Borderline Left Heart

Objective:

The reverse double switch operation (R-DSO) or ventricular switch is a novel alternative to single ventricle palliation in patients with borderline left hearts that utilizes the morphologic right ventricle as the systemic chamber and the hypoplastic left ventricle as the subpulmonary ventricle. In this study, we investigated rates of systemic right ventricle and valve dysfunction early after R-DSO.

Methods:

This retrospective review analyzed the patient characteristics and early outcomes of children who underwent R-DSO between 2017 and 2023.

Results:

R-DSO was performed in 26 patients at a median age of 3.1 years (8 months–12 years) who presented with variants of hypoplastic left heart syndrome (n=16), or double-outlet right ventricles or transposition of the great arteries (n=10). 17 patients had previously undergone bidirectional Glenn. In pre-operative MRIs (n=18), median indexed LVEDV was 41 mL/m² (17–98). Procedures performed included hemi-Mustard with bidirectional Glenn (n=18), full atrial switch operation (n=8), and concomitant takedown of a prior Damus-Kaye-Stansel (n=7).

At a median follow-up of 10 months (29 days–7.2 years), no mortalities or heart transplants had occurred. Reinterventions included pulmonary artery banding that relieved severe tricuspid regurgitation (n=1), VSD closure (n=1), transcatheter valve replacement (n=1), and permanent pacemaker for new-onset CHB (n=1).

21 patients had a follow-up echocardiogram at a median of 377 days (29 days–6.1 years) after R-DSO. Moderate or greater RV dysfunction was detected in only one patient, in whom mild-to-moderate RV dysfunction was present prior to R-DSO (Fig. 1A). Three patients had moderate or moderate-to-severe tricuspid regurgitation at follow-up, of whom 2 of 3 had mild or moderate pre-operative TR (Fig. 1B), and 2 of 3 had no measured LVOT gradient.

7 patients had follow-up cardiac catheterization a median of 1.6 years (262 days–6.1 years) after R-DSO. Among these, median cardiac index (CI) was 5.3 L/min/m² (2.5–5.5) and median sub-pulmonary LVEDP was 10 mm Hg (7–25); median inferior vena cava/baffle pressure was 10.5 mm Hg (8–11.5).

Conclusions:

R-DSO is viable alternative for the borderline left heart, with no mortalities or transplants at a median of 10 months after surgery. Early outcomes show that RV and tricuspid valve function do not significantly deteriorate and IVC pressures remain acceptable.

Additional Resources

- https://files.aievolution.com/prd/aat2101/abstracts/abs_8378/Figure1.pdf