

Commentary: The hourglass tricuspid valve annuloplasty during a Norwood procedure—Bridging the gap



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Rapid advances have been made in stage 1 Norwood palliation for hypoplastic left heart syndrome, with hospital survival now approaching 93%.¹ Tricuspid valve regurgitation (TR) and right ventricular dysfunction, however, continue to carry very high early and medium-term mortalities.² TR significant enough to warrant intervention is observed in 25% of children with hypoplastic left heart syndrome.³ Significant TR is associated with a worse survival at 1 year,³ and successful repair can result in equivalent survival at 5 years.⁴ In those with persistent TR and right ventricular dysfunction, however, the mortality remained high at 80%.²

Concomitant tricuspid valve repair in neonates undergoing the Norwood operation has been generally avoided because of the fragile physiologic state and anatomically complex structural abnormalities of the tricuspid valve and has therefore been limited to later repair before, during, or after the bidirectional Glenn shunt.² Earlier concomitant repair could prevent right ventricular dysfunction and its high associated mortality. The interannular bridge repair adopts similar principles from the Alfieri edge-to-edge (ETE) repair and has been described in patients with single-ventricle morphology with common atrioventricular valves.⁵ Although the edge-to-edge repair has been performed successfully in patients with single-ventricle morphology and central TR, Ando and associates⁶ showed that, despite excellent early results in 95.5% of patients, the freedom from reoperation was 65% at 10 years, highlighting its limited durability.

Building on these past experiences, Kanno and colleagues⁷ have now described, in this issue of the *Journal*, the first successful application of the interannular bridge technique with a polytetrafluoroethylene strip performed concomitantly in a neonate with moderate TR undergoing a Norwood operation. While the technique may seem similar to the ETE technique, there are some subtle but important advantages. First, unlike the ETE technique, the leaflets themselves are not approximated as the polytetrafluoroethylene strip is attached solely to the annulus. Second, unlike with the ETE technique, the tricuspid valve inflow is preserved. Finally, with the interannular bridge,



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Central Message

Significant tricuspid valve regurgitation is associated with an increased morbidity and mortality after Norwood palliation. A simple, yet effective technique to fix central regurgitation is described.

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Kanno and colleagues⁷ have demonstrated durability with no stenosis or regurgitation at 45 months of follow-up.

The enthusiasm for this repair, however, should be tempered by the fact that concomitant neonatal repair can be notoriously difficult secondary to the fragile valve tissue. Further, the added ischemic time and cardiopulmonary bypass time could result in more ventricular dysfunction and morbidity. The timing of repair is therefore critical, because many patients will have an improvement in the degree of TR after volume unloading observed with a stage 2 cavopulmonary shunt alone.⁸

In summary, the Kanno and colleagues⁷ have described a simple technique applied concomitantly with the Norwood procedure to address central TR. They have demonstrated proof of concept, with durability observed at medium-term follow-up. Although the indications and timing of atrioventricular valve repair remain paramount to the success of single-ventricle palliation, the “hourglass annuloplasty” technique will add to the armamentarium of surgeons that deal with this challenging problem.

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