

Abstract Title: Hybrid Septoplasty Technique for Neonates with Hypoplastic Left Heart Syndrome and an Intact or Highly Restrictive Atrial Septum

Author(s): J. Curt Fudge, Kevin Hill, Piers Barker, James Jagers, John Rhodes

Institution(s): Duke University, University of Florida

Address 1: 1600 SW Archer Road

Address 2: HD-303

City: Gainesville

State: Florida

Zip Code: 32610

Country: United States

E-mail Address: jcfudge@peds.ufl.edu

Abstract:

Introduction: Infants with hypoplastic left heart syndrome (HLHS) and restrictive or intact atrial septum (RAS) require urgent postnatal intervention to alleviate atrial septal obstruction and improve oxygenation. We present a hybrid approach with direct transatrial puncture and cutting balloon dilation of the atrial septum (AS) in two patients with HLHS and RAS. **Background:** Despite the use of numerous management strategies, infants with HLHS and RAS continue to have a poor prognosis with high mortality. Prenatal intervention provides the potential for improved outcomes; however, it often results in incomplete relief of atrial septal obstruction and the need for emergent neonatal intervention. Emergent surgical intervention with septectomy or Norwood completion requires cardiopulmonary bypass in an already critically ill infant. Postnatal catheter intervention can be technically difficult resulting in prolonged procedural times and a high rate of complications.

Methodology: A median sternotomy was performed and the pericardium was divided to expose the heart in each case. Under TEE guidance, direct right atrial puncture was performed and the access needle was advanced through the mid-portion of the AS into the left atrium (LA). An 0.014 inch Ironman wire was advanced into the LA under TEE guidance. A 7 mm x 2 cm cutting balloon was advanced over the wire to a position within the AS and inflated. The atrial communication was then dilated with a 12 mm x 2 cm Tyshak II balloon. Upon completion of the procedure, the chest was closed. **Results:** Both patients demonstrated an immediate improvement in arterial oxygenation. Patient 1 had an increase in paO₂ from 24 to 31 mmHg, while patient 2 had an increase in paO₂ from 21 to 37 mmHg. There was a mean gradient of 4.5 mmHg following septoplasty in patient 1 who presented with an intact septum. Patient 2 had a mean gradient of 13 mmHg at baseline and a mean gradient of 3 mmHg following septoplasty. Total procedural times were less than 50 minutes with less than 25 minutes to completion of the septoplasty. In each case, there was resolution of acidosis within 24 hours of the procedure. Patient 2 experienced transient junctional tachycardia with inflation of the larger balloon; however, this resolved spontaneously.

Conclusions: The hybrid transatrial approach to septoplasty provides a simplified and rapid technique for creation or enlargement of an atrial septal communication. **Implications and future directions:** The technique utilizes a

direct, controlled approach which can potentially increase procedural success and reduce the risk of complications. Future directions include utilizing this technique in the setting of a hybrid catheterization lab to provide additional therapeutic options such as atrial septal stenting.