4. The diameter and the wall thickness of the rudimentary ventricle were not taken into account while deriving measurements from Laplace’s rule. This is not compatible with the laws of physics.

After correction of the aforementioned measurements incompatible with cardiac physiology, we think that the real cause of the unwanted results of Fontan procedure could be understood.

Our opinion is that this is caused by a lack of volume, which could be corrected by systems that create pulsatile pressures, applicable to human beings.

References


* Corresponding author. Address: Department of Cardiovascular Surgery, Izmir Ataturk Education and Research Hospital, Basin Sitesi, 35360, Izmir, Turkey. Tel.: +90 505 7594837.
E-mail address: mkestelli@gmail.com (M. Kestelli).

doi:10.1016/j.ejcts.2009.06.042

Reply to the Letter to the Editor

Reply to Kestelli et al.

Long-term ramifications of Fontan circulation

Constantine Mavroudis a,⁎, Carl L. Backer b, Barbara J. Deal c
a Department of Pediatric and Congenital Heart Surgery, Cleveland Clinic Children’s Hospital, Cleveland, OH, USA
b Department of Surgery, Children’s Memorial Hospital, Northwestern University Feinberg School of Medicine, Chicago, IL, USA
c Division of Cardiology, Children’s Memorial Hospital, Northwestern University Feinberg School of Medicine, Chicago, IL, USA

Received 25 June 2009; accepted 27 June 2009; Available online 18 August 2009

Keywords: Björk modification; Fontan conversion; Single-ventricle anatomy

We thank Dr Kestelli and associates for their comments and recognise their contributions regarding the Fontan circulation [1—3].

We chose to evaluate ventricular function in patients with functionally single-ventricle hearts by echocardiographic analysis of the main systemic pumping chamber without regard to the contractile effects of the diminutive ventricle in the systemic circulation or the isolated subpulmonary ventricle in the event that it was left in continuity with the systemic venous return (Björk modification).

Of the entire spectrum of hearts lacking two well-developed ventricles, only a very small subset has anatomy suitable for partitioning with incorporation of a hypoplastic ventricle in the subpulmonary position. In that case, it has been estimated that the subpulmonary ventricle must have at least 30% normal volume to begin with, in addition to the good fortune to dilate or enlarge when the systemic and pulmonary ventricles are septated. Then, the patient’s long-term course is dependent on the fate of the right atrium—right ventricle connection—either non-valved, which results in atrial enlargement, arrhythmias or pathway obstruction, or valved, in which case the prosthetic valve always eventually fails due to pathway obstruction, increased venous pressure, atrial enlargement and arrhythmias.

According to the Weipert et al. analysis [4], no better survival outcome was demonstrated for patients with either right atrium—right ventricle or right atrium—pulmonary artery Fontan modification. Although right atrium—right ventricle connection tended to result in more efficient cardiac output compared with right atrium—pulmonary artery patients after an exercise analysis, total work load and ventilatory equivalent was not significantly different between the two Fontan modifications. No additional benefit was observed for the incorporation of a residual subpulmonary ventricular chamber within the Fontan circulation [4].

We are not altogether sure why the Fontan operation fails in the long-term. Certainly, subclinical atripulmonary obstructions, arrhythmias, non-pulsatile pulmonary artery blood flow and long-standing venous hypertension play major roles. Our experience with Fontan conversion in association with arrhythmia surgery and repair of concomitant haemodynamic problems in selected patients has resulted in excellent outcomes at a time when the downward clinical spiral of Fontan failure was taking place.

References


⁎ Corresponding author. Address: Department of Pediatric and Congenital Heart Surgery, Cleveland Clinic Children’s Hospital, 9500 Euclid Avenue #41, Cleveland, OH 44195, USA. Tel.: +1 216 636 5288; fax: +1 216 445 3692.
E-mail address: mavrouc@ccf.org (C. Mavroudis).

doi:10.1016/j.ejcts.2009.06.043