

**Background:** Prenatal detection of transposition of the great arteries (TGA) improves outcome, but mortality still occurs in the pre-operative period due to inadequate mixing of the pulmonary and systemic circulations. Prenatal prediction of cases requiring emergency balloon atrial septostomy (BAS) remains difficult. It has been postulated that presence of oxygenated blood in the pulmonary artery causes relaxation of the pulmonary vasculature with subsequent increased pulmonary venous return predisposing to early postnatal closure of the interatrial communication. The objective is to identify prenatal markers which may predict the need for emergency BAS.

**Methods:** The last 40 cases of prenatally diagnosed isolated TGA in singleton pregnancies were reviewed. The appearance of the atrial septum (AS), the foramen ovale (FO) length and foramen ovale: total septal length (FO:TSL) were assessed at the third trimester fetal echocardiogram. The pulmonary valve, branch pulmonary arteries and arterial duct were measured from inner edge to inner edge in systole at maximal diameter and z scores calculated. Assessments were made without knowledge of the postnatal outcome. Comparison to a gestation-matched control group were performed.

**Results:** An emergency BAS was required in 12/40 cases (table 1). All 3 cases with limited movement of the AS required emergency BAS. A hypermobile AS was not associated with emergency BAS ( $p=0.8$ ). An aneurysmal AS was identified in 31/40 cases and was seen more frequently in those cases which did not require an emergency BAS.

The FO length and the FO:TSL were significantly smaller in those who required an emergency BAS. The sensitivity for FO:TSL  $<0.5$  was 99%. There was no significant difference in arterial duct, pulmonary valve, branch pulmonary artery size in those cases requiring emergency BAS and those that did not.

### Conclusions:

1. FO length is similar in normal fetuses compared to those with TGA with unrestrictive atrial septum
2. Likelihood of an emergency BAS increased by:
  - Third trimester FO:TSL  $<0.5$
  - Fixed appearance of the flap valve
3. Hypermobile and/or aneurysmal atrial septum do not indicate inadequate postnatal mixing in our group.

	Emergency BAS	No emergency BAS	Controls	P value
No. of cases	12	28	40	
Foramen ovale length (mm) (mean $\pm$ sd)	6.8 $\pm$ 2.8 *	9.1 $\pm$ 3.0	8.8 $\pm$ 1.7	0.008
Foramen ovale: total septal length	0.36 $\pm$ 0.13 *	0.51 $\pm$ 0.14	0.54 $\pm$ 0.09	0.003
No. of cases with aneurysmal AS	8/11	23/28	24/40	0.5
No. of cases with hypermobile AS	4/11	6/25	4/40	0.8
No. of cases with fixed AS	3/12*	0/28	0/40	0.02
Arterial duct diameter (mm) (median, range)	4.3 (1.0 - 5.1)	4.3 (0 - 5.5)		0.9
Pulmonary valve z score (median, range)	-0.6 (-2.7 to 1.6)	-1.0 (-3.4 to 2.6)		0.6
LPA z score (median, range)	1.2 (0.4-3.1)	1.6 (-0.5 to 3.7)		0.4
RPA z score (median, range)	1.0 (0.4-1.6)	0.8 (-0.6 to 2.6)		0.6