Significance of Premature Restriction or Closure of Foramen Ovale in the Fetus

Uzun O. (1), Babaoglu K. (1,2), Ayhan Y.I. (1,3), Massias S. (1), Conner C. (1), Beattie B. (1).
University Hospital of Wales, Cardiff, UK (1); Kocaeli University Medical Faculty, Kocaeli, Turkey (2);
Goztepe Hospital, Istanbul, Turkey (3).

Aims: To review the frequency and consequences of restrictive foramen ovale (RFO) in foetuses with
and without structural heart disease.
Methods: 10 year review of 2324 foetuses that were referred for cardiac screening to the University
Hospital of Wales.
Results: Premature restriction or closure of foramen ovale was encountered in 35 fetuses, of which 25
had isolated restrictive foramen ovale (IRFO) and right ventricular dilatation but the remaining 10
foetuses had associated congenital heart defects (CHDs). In fetuses with CHDs there were four with
hypoplastic left heart syndrome, two with critical aortic stenosis, two with transposition of the great
arteries, one with congenitally corrected transposition, and one with pulmonary atresia and intact
ventricular septum. Two fetuses died in utero, three died after surgery, and four fetuses are alive after
surgery. In fetuses with normal hearts, dilated right heart structures, redundant-aneurysmal primum
atrial septum, and posterior angulation of the ductus arteriosus were the most consistent and striking
features. A small aortic isthmus mimicking coarctation of the aorta, relatively small left ventricular
cavity imitating hypoplastic left heart, partial obstruction of left ventricular inflow, and premature atrial
contractions were other additional findings. One fetus who was born prematurely at 26 weeks died
after birth, two foetuses had to be delivered early at 37 weeks of gestation due to severe restriction of
mitral inflow but remaining 22 fetuses were delivered at term (mean 38.68+/−0.46 weeks). Appearance
of redundant-aneurysmal atrial septum, and right heart dilatation both resolved rapidly in all newborns
with no significant cardiac problems occurring in the follow up.
Conclusion: IRFO results in disproportionately large right ventricle and imitates serious congenital
heart disease in the foetus. IRFO should be considered among the causes of right ventricular
dilatation. Although restrictive foramen ovale confers a significant risk to foetuses with structural heart
disease, IRFO appears to be well tolerated with favourable outcome in foetuses with structurally and
functionally normal hearts.