# Congenital Heart Defects Cut Output in Pregnancy

BY DEBRA L. BECK
*Contributing Writer*

TORONTO — Pregnant women with congenital heart defects are not able to ramp up their cardiac output to handle the stresses of pregnancy, according to a small study out of the Netherlands. Dr. Jolien Roos-Hesselink reported the study results in a poster presentation at the 18th International Symposium on Adult Congenital Heart Disease.

"We know that cardiac output generally rises during pregnancy and we felt it important to see what happens in women with congenital heart disease as a means of explaining the increased risk of complications seen in these women and their offspring," Dr. Roos-Hesselink, a cardiologist, said in an interview. "We suspected that maybe cardiac output wasn't increasing enough in these patients," she said.

Pregnancy is a major concern in the management of women with congenital heart disease, complicated by a greater risk of fetal growth retardation, premature birth, and perinatal mortality. Normally, cardiac output increases by 40%-50% during pregnancy.

Dr. Roos-Hesselink's team at the Thoraxcenter of Erasmus Medical Center in Rotterdam, the Netherlands, studied eight patients before, during, and after pregnancy. These patients had a variety of congenital heart defects, including aortic valve replacement, tetralogy of Fallot, Ebstein anomaly, ventricular septal defect, atrioventricular septal defect, and pulmonary stenosis. Subjects underwent cardiac MRI at 20 weeks' gestation and again at 32 weeks. Measurements were compared with measurements taken 6-12 months preconception and post partum.

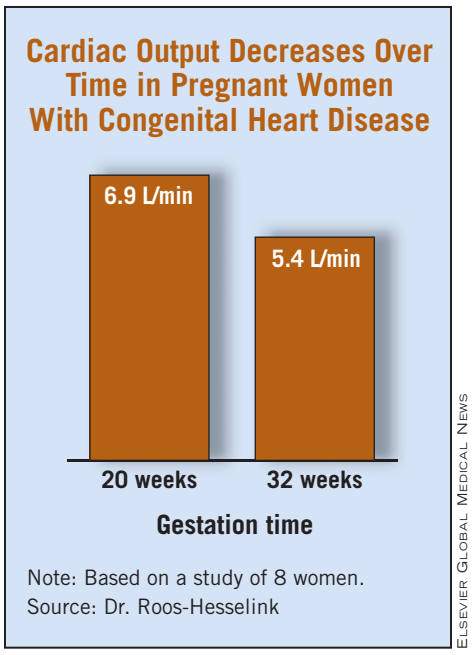
"In the first eight patients we studied, we saw that in seven of the patients, cardiac output did not rise as the pregnancy progressed, but rather fell," she reported.

Although the data presented are limited, Dr. Roos-Hesselink notes that they have now tested 25 patients and will be presenting further data soon.

Previous echocardiography studies have hinted at the issue of cardiac output in pregnancy complicated by coronary heart disease, but until cardiac MRI was determined to be safe for women in pregnancy, there was no means of accurately measuring cardiac output during gestation, said Dr. Roos-Hesselink. "It seems to be that the ventricular function in these women is not capable of handling the stress of pregnancy, although it does increase from baseline during the first trimester."

After increasing appropriately from pre- and postpregnancy baseline values up to 20 weeks' gestation, cardiac output decreased significantly, from 6.9 L/min at 20 weeks to 5.4 L/min at 32 weeks of gestation. In addition, a significant reduction in end-diastolic volume and stroke volume between 20 and 32 weeks of gestation was observed, along with a decline in left ventricular ejection fraction from 53% to 49%. Left ventricular mass increased from 87.5 grams at 20 weeks to 94.4 grams at 32 weeks.

Said Dr. Roos-Hesselink, "These findings could add to our ability to risk-stratify these patients and could explain many of the complications we see in this patient subgroup. "We haven't yet tested cardiac output with MRI during exercise prepregnancy, but if women at risk are tested before or during pregnancy and cardiac output is found to be lacking, this might be an indication to treat them more intensively," she added. ■

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# *Brain Maturation Delayed in Infants With Complex Congenital Heart Defects*

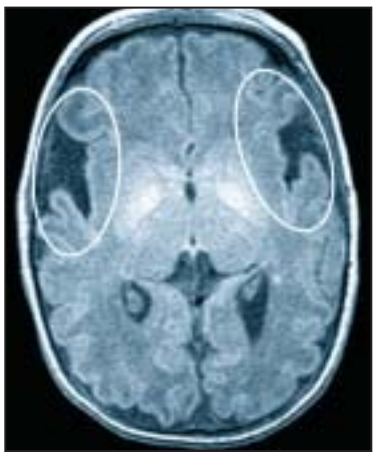
BY DOUG BRUNK
*San Diego Bureau*

SAN DIEGO — Brain development at birth is significantly delayed in full-term neonates with complex congenital heart defects, both on magnetic resonance imaging and by mean head circumference, results from a single-center study suggest.

These observations "should stimulate discussion on the optimal timing of labor induction for those infants with prenatally diagnosed heart defects," Dr. Daniel J. Licht said at the annual meeting of the American Association for Thoracic Surgery.

"Historically, the timing of delivery for neonates with prenatally diagnosed congenital heart disease was determined by lung maturity and surgical logistics. The current study suggests that neonates with complex CHD should be delivered as close to term as possible."

Dr. Licht, a child neurologist at Children's Hospital of Philadelphia, noted that previous studies have shown that at birth, term infants with complex congenital heart defects have smaller head circumferences and, on MRI, have been shown to have structural simplicity of the brain as seen by open operculum. Dr. Licht and his associates hypothesized that term infants with complex forms of congenital heart defects have structurally delayed brain development as measured by smaller head circumferences and a lower total maturation score (TMS), a validated MRI metric for assessing full brain maturity.



Courtesy Dr. Daniel J. Licht

**Open operculum, indicating structural simplicity of the brain, was seen in 86% of neonates with congenital heart defects.**

A 3-Tesla MRI was used to evaluate 29 full-term infants with hypoplastic left heart syndrome (HLHS) and 13 with transposition of the great arteries (TGA) just prior to heart surgery. Infants with evidence of perinatal distress, shock, or intrauterine growth retardation were excluded from the study "as these were felt to be independent risks for brain injury," said Dr. Licht, who had no conflicts of interest to disclose.

Clinical studies were reviewed by a single neuroradiologist who was blinded to the clinical data and TMS were rated by two MRI readers who also were blinded to the data. The findings were compared with published normative data of similar gestational age.

The mean gestational age of the 42 infants studied was 39 weeks and 64% were boys. Their average birth weight was 3.4 kg.

The average head circumference for infants in the study was 34.5 cm, which is a full standard deviation below the expected normal of 35.5 cm. In addition, open operculum was seen on MRI in 36 of the infants (86%), and would be expected in less than 5%-10% of normal full-term infants.

The average TMS for infants in the study was just over 10, which is significantly lower than reported normative TMS of 11.1 in non-cardiac infants with a gestational age of 36-37 weeks.

"This average TMS … places our term infants with congenital heart defects at 35 weeks of gestational age, a time where white matter remains vulnerable and myelination is just beginning," Dr. Licht said. "This group of otherwise healthy term babies with congenital heart defects has immature brains as evidenced by the high prevalence of small head circumferences and open opercula and corroborated with the finding of reduced TMS scores, suggesting a delay in brain maturity of a full month."

The study was funded by the National Institute of Neurological Disorders and Stroke and by the Dana Foundation. ■

# PVR Timing Is Tricky In Tetralogy of Fallot

BY DEBRA L. BECK
*Contributing Writer*

TORONTO — There are three main reasons to send an adult with tetralogy of Fallot for pulmonary valve replacement: moderate to severe pulmonary regurgitation, evidence of right ventricular overload, and a clinical context suggesting the need for the procedure.

Pulmonary valve replacement (PVR) should only be undertaken in patients in whom all three reasons are present, Dr. Gary Webb said at the 18th International Symposium on Adult Congenital Heart Disease.

The clinical situations that might drive a decision to replace a leaky pulmonary valve include exercise intolerance attributable to the pulmonary regurgitation or congenital heart defect, sustained atrial flutter or fibrillation, sustained ventricular tachycardia or resuscitated sudden death, or an asymptomatic patient with "excessive" right ventricular dilation.

"Ten years ago, we replaced the pulmonary valve for exercise intolerance, sustained arrhythmias, and 'progressive' right ventricular dysfunction," said Dr. Webb, the director of the Philadelphia Adult Congenital Heart Center. "However, using these criteria for surgery, we learned that we had waited too long for many of these patients, and in the end they had suboptimal results."

The decision of when to intervene in pulmonary regurgitation has evolved and continues to evolve, said Dr. Webb. "Even mild left ventricular systolic dysfunction is an indication for surgery for aortic and mitral regurgitation, so ideally, if we could see that right ventricular systolic function was declining from normal, then we could apply the same criteria. But, of course, it doesn't work in tetralogy patients because the right ventricle is not normal."

Efforts to risk-stratify these patients, therefore, have focused instead on right ventricular diastolic volumes.

Although there are risks to waiting too long before PVR, Dr. Webb does not think a low threshold for replacing a leaking pulmonary valve is wise. Indeed, 10-year and 30-year survival after repair of tetralogy of Fallot in one large study was 97% and 89% in patients surviving at least 1 year (J. Am. Coll. Cardiol 1997; 30:1374-83).

"If we have 11% mortality over 30 years in this cohort of survivors we don't want to be pulling the trigger too impulsively on these patients," he said. ■

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