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LETTERS TO THE EDITOR

Anomalous Connection of the Right Superior Vena Cava to the Left Atrium

Park et al. (1) describe a 22 year old man with hypoxemia and previous brain abscess diagnosed by technetium-99m macroaggregated albumin scan and by contrast echocardiography and confirmed by cardiac catheterization and surgery. We have previously reported (2) a 4 month old infant in whom the diagnosis of anomalous connection of the right superior vena cava to the left atrium was made by contrast echocardiography, which was confirmed by cardiac catheterization and angiography performed at the age of 8 months. As we reported later (3), this child subsequently underwent surgical correction of the defect, and the effectiveness of the surgery was demonstrated by postoperative contrast echocardiography. This communication is intended to point out that there are more than eight previously reported cases and to emphasize several aspects of this interesting and rare congenital anomaly.

1) *Differential diagnosis and use of noninvasive studies.* The differential diagnosis in a patient with cyanosis and hypoxemia with no other detectable cardiac anomalies (by physical examination and routine laboratory studies) includes pulmonary arteriovenous fistula, pulmonary artery connection to the left atrium and anomalous systemic venous connection to the left atrium. Contrast echocardiography (M-mode and two-dimensional) is very useful in this differential diagnosis.

In patients with pulmonary arteriovenous fistula or pulmonary artery connection to the left atrium, one would expect contrast echoes to appear in the right ventricle before being seen in the left atrium, left ventricle and aorta (2). Furthermore, in these entities there is no anatomic basis for differential echo contrast opacification when saline solution is injected into the veins of the hands and foot. Contrast visualization of the left atrium, left ventricle and aorta without opacification of the right ventricle with injections into both the hands, as in our patient (2), suggests drainage of the upper part of the body into the left atrium. Opacification of the right ventricle with injection into the foot, as in our infant (2), suggests normal drainage of the lower part of the body (2). Thus, with use of these contrast echocardiographic studies, one can arrive at the diagnosis of anomalous systemic venous connection to the left atrium before cardiac catheterization and selective cineangiographic studies. However, it would be difficult to determine whether an isolated right superior vena cava or persistent left superior vena cava alone or both were present. Although we did not report results of radionuclide angiography in our previous reports (2,3), they are indeed very characteristic of the anomalous connection of the superior vena cava to the left atrium (Fig. 1).

2) *Surgery and postoperative evaluation.* The surgical technique used in the case of Park and his co-workers was very similar to that used by our group (3), and the results after surgery appeared good in both the patients. In our patient, postoperative contrast studies clearly documented complete ablation of the superior vena cava to left atrium shunt (3).

3) *Embryology.* There are several possible explanations for the embryologic origin of this lesion (2,4–6); the reader is referred elsewhere (2) for further treatment of this subject.

Finally, I would like to comment on our statement on sex incidence of this rare anomaly (2): "All cases including ours were female and, therefore, it is tempting to postulate a definite sex predilection for this anomaly. We hasten, however, to add that this apparent sex predilection is probably related to the small number of cases reported and is a rare coincidence." Of the 10 cases of this anomaly (9 tabulated by Park et al. [1] and 1 in our study [2], 6 patients were women and 4 were men; these data would not suggest any significant sex predilection.

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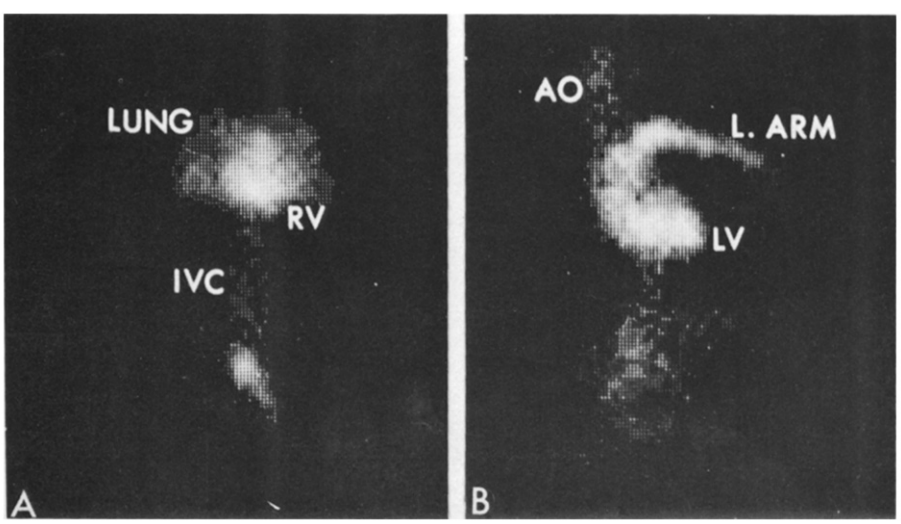

Figure 1. Radionuclide angiography, first pass study. **A**, The inferior vena cava (IVC), right ventricle (RV) and lungs were seen after injection into a vein in the right foot. **B**, After injection into a left arm vein, the left innominate vein, superior vena cava, left atrium (not marked) and left ventricle (LV) were successively visualized. The aorta (AO) was faintly opacified from the left ventricle.

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Reply

We thank Rao for pointing out that our literature search failed to include his case report. Our computer literature search is by no means a perfect one. We certainly agree with him that radionuclide angiocardiography and contrast echocardiography are noninvasive procedures that play an important role in the evaluation of congenital heart disease.

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Transient Neonatal Tricuspid Regurgitation: Possible Relation With Premature Closure of the Ductus Arteriosus

The report of Berry et al. (1) regarding the relation of transient neonatal tricuspid regurgitation and premature closure of the ductus arteriosus is an important case description and review of the literature. However, in their case and in all previously reported occurrences of this syndrome in human beings, the premature closure of the ductus in utero was not documented. Hence, although their explanation that the tricuspid regurgitation is a consequence of premature ductal closure is plausible, a definite cause and effect relation is not established and other etiologies are possible. The ductal closure may have occurred after birth and may have been unrelated.

We wish to note that with improved ultrasonic equipment and technique, it is now possible to reliably image the ductus arteriosus in utero (Fig. 1). Therefore, it should be possible to diagnose ductal constriction or closure. If ductal closure in utero is noted, we suggest that two-dimensional/Doppler echocardiographic studies of the tricuspid valve be performed. Imaging and Doppler studies may make possible definitive characterization of the effects of intrauterine closure of the ductus arteriosus.

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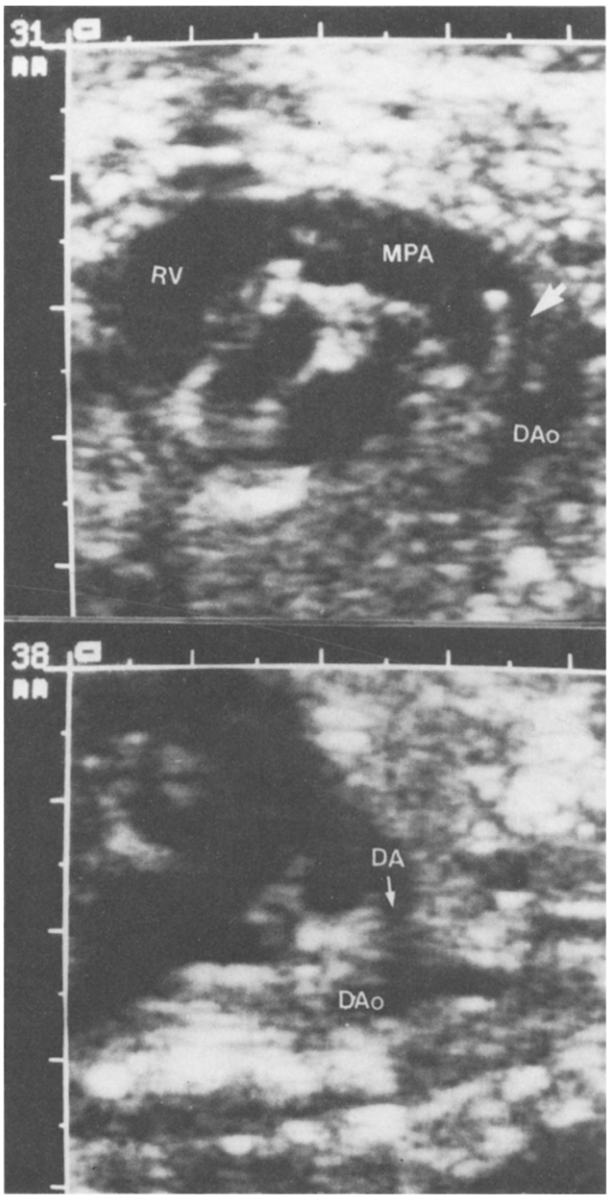

Figure 1. Upper panel, Fetal two-dimensional echocardiograms of the right ventricle (RV), main pulmonary artery (MPA) and descending aorta (DAo). Note the relation to the open ductus arteriosus (**arrow**) in this normal 23 week gestation human fetus. This scan is analogous to a suprasternal or high parasternal approach. **Lower panel**, Similar scan illustrating the foreshortening of the ductus that may occur. This is analogous to a parasternal scan of the ductus arteriosus (DA) (**arrow**). Imaging was performed with the Acuson 128 computed sonographic system.

Inhibition of Reflex Circulatory Control in Open Heart Surgery Potentiated by Combination Beta-Adrenergic and Calcium Channel Blockade

Data such as those reported by Winniford et al. (1), suggesting that beta-adrenergic and calcium channel blockade is an effective