

- Alpert BS, Rao PS, Moore HV, et al. Surgical correction of anomalous right superior vena cava to the left atrium. *J Thorac Cardiovasc Surg* 1981;82:301-5.
- Braudo M, Beanlands DS, Trusler G. Anomalous drainage of the right superior vena cava into the left atrium. *Can Med Assoc J* 1968;99:715-9.
- Kirsch WM, Carlsson E, Hartman AF Jr. A case of anomalous drainage of superior vena cava into the left atrium. *J Thorac Cardiovasc Surg* 1961;41:550-6.
- Park HM, Smith ET, Siberstein EB. Isolated right superior vena cava draining into left atrium diagnosed by radionuclide angiography. *J Nucl Med* 1974;14:240-2.

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 angiography 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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Reference

- Berry TE, Muster AJ, Paul MH. Transient neonatal tricuspid regurgitation: possible relation with premature closure of the ductus arteriosus. *J Am Coll Cardiol* 1983;2:1178-82.

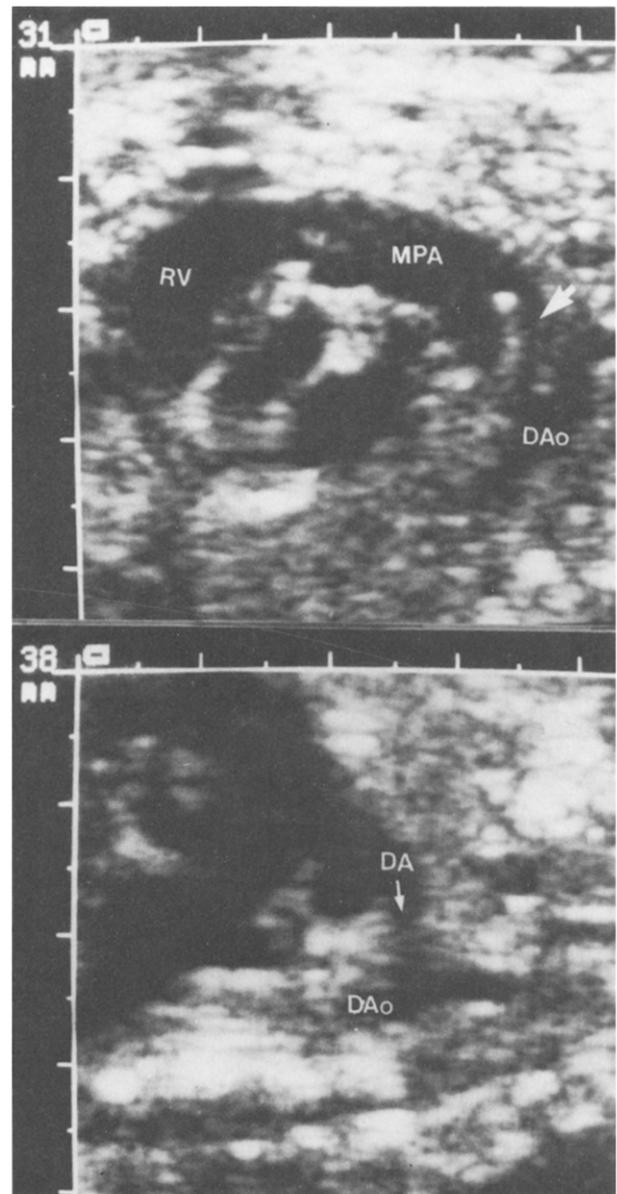


Figure 1. Upper panel, Fetal two-dimensional echocardiograms of the right ventricle (RV), main pulmonary artery (MPA) and descending aorta (DAo). Note the relation to the open ductus arteriosus (arrow) in this normal 23 week gestation human fetus. This scan is analogous to a suprasternal or high parasternal 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

combination in the management of patients with stable angina have been convincing. However, others (2,3) have expressed concern over the potential deleterious effects of this particular pharmacologic combination in patients with even moderately compromised left ventricular function. We believe that there is another patient group, those undergoing cardiopulmonary bypass for myocardial revascularization, that may be particularly vulnerable to the negative inotropic and chronotropic effects of this drug combination.

Recent cases. Two patients with mild to moderate left ventricular dysfunction whose angina was controlled by combination beta-adrenergic and calcium channel blockade underwent coronary artery bypass surgery for severe triple vessel coronary artery disease. Revascularization was complete and accomplished with short ischemic times while the heart was protected with cardioplegic and topical hypothermia. Initially, both patients were easily weaned from cardiopulmonary bypass in normal sinus rhythm. However, each developed progressive hypotension and myocardial failure before leaving the operating room. Severe bradyarrhythmias and varying degrees of intermittent atrioventricular (AV) block also complicated their management. Resuscitation attempts were unsuccessful despite aggressive pharmacologic support, cardiac pacing, reinstitution of cardiopulmonary bypass and intraaortic balloon counterpulsation.

Interaction of beta-adrenergic and calcium channel antagonists in surgical setting. Independently, the negative inotropic and chronotropic effects of beta-adrenergic blocking agents and calcium channel antagonists have been well documented. When used in combination, these effects may be potentiated. Propranolol doses as small as 0.5 mg/kg have been shown to block the beneficial "indirect" reflex effects of the calcium channel blockers (4). In the clinical setting surrounding open heart surgery, the negative effects of this pharmacologic combination may be magnified. Anesthetic agents as well as physiologic alterations induced by the initiation of cardiopulmonary bypass may diminish the ability of the cardiovascular system to respond appropriately to physiologic demands or pharmacologic manipulations. Autonomic reflex tachycardia, a positive "indirect" effect of the calcium channel antagonist, may be abolished by atropine experimentally in doses as low as 0.1 to 0.2 $\mu\text{g}/\text{kg}$ (4). A variety of anesthetic and therapeutic agents used in open heart surgery have the potential to alter autonomic reflex mechanisms and may potentiate the negative inotropic and chronotropic effects observed with this drug combination. This

is particularly undesirable in patients with preexisting ventricular dysfunction who are being weaned from cardiopulmonary bypass. At the recent Fifth Annual Meeting of the Society of Cardiovascular Anesthesiologists, Kapur and co-workers at Stanford University described the interactions of calcium channel blockers with anesthetic agents and other drugs; their report supported our concerns.

Patient management. Although limited, this experience has altered our approach to preoperative management of patients taking combination beta-adrenergic and calcium channel blockade. We advise discontinuation of calcium channel blocking at least 2 days before operation. An effort is also made to reduce the degree of beta-adrenergic blockade. If withdrawal of calcium channel blockade is not well tolerated and ischemia results during this period, the patient is hospitalized. The addition of intravenous nitroglycerin may be necessary to control symptoms until the time of surgery. This method has proven effective in the management of three additional patients. One patient in whom the opposite approach was taken (continuation of the calcium antagonist and discontinuation of the beta-adrenergic blocking agent) did not respond as well to weaning from cardiopulmonary bypass as did the patients on beta-adrenergic blocking agents alone. Further studies on the effects of this drug combination in patients undergoing cardiopulmonary bypass and general anesthesia are needed to provide more specific guidelines in the management of this subset of patients.

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References

1. Winniford MD, Huxley RL, Hillis LD. Randomized double-blind comparison of propranolol alone and a propranolol-verapamil combination in patients with severe angina of effort. *J Am Coll Cardiol* 1983;1:492-8.
2. Oesterle SN, Schroeder JS. Calcium-entry blockade, beta-adrenergic blockade and the reflex control of circulation. *Circulation* 1982;65:669-70.
3. Wayne VS, Harper RW, Laufer E, Federman J, Anderson ST, Pitt A. Adverse interaction between beta-adrenergic blocking drugs and verapamil: report of three cases. *Aust NZ J Med* 1982;12:285-9.
4. Millard RW, Grupp G, Grupp IL, DiSalvo J, DePover A, Schwartz A. Chronotropic, inotropic, and vasodilator actions of diltiazem, nifedipine, and verapamil. A comparative study of physiologic responses and membrane receptor activity. *Circ Res* 1983;52:1-29-39.