well as in a similar investigation performed by Reichek et al at the University of Pennsylvania. Other studies in angina and congestive heart failure attest to the protracted duration of effect of this drug. Of major importance (not evaluated in the present protocol design) is the rapid onset of anginal protection, with a speed of action identical to that of sublingual nitroglycerin. Thus, a patient can use buccal nitroglycerin for acute therapy for an anginal attack as well as for chronic prophylaxis. Greengart et al demonstrate that the effectiveness of buccal nitroglycerin parallels the duration that the tablet remains intact in the mouth.

This investigation would have been enhanced if the patients had been off beta-blocking therapy and if all had demonstrated clear-cut electrocardiographic evidence of ischemia in response to exercise. Nevertheless, the double-blinded protocol, necessary for the evaluation of any antianginal therapy, and the multiplicity of exercise tests, make the data valid and meaningful. The problems in carrying out such studies are revealed by careful inspection of individual patient data: four of 16 patients (nos 3, 5, 7, 9) had little or no antianginal response in spite of a fall in systolic blood pressure during the dosing phase, and four others on placebo (nos 2, 4, 6, 13) had isolated individual treadmill tests demonstrating considerably improved exercise tolerance. The vagaries of the anginal threshold and the difficulty in stopping a patient at precisely the same degree of ischemia (or level of anginal discomfort) are obvious to those who have conducted similar research.

What of the new transdermal nitroglycerin systems, an idea whose commercial response suggests Americans have rediscovered “discomania”? These also represent an innovative approach to therapy, producing a continuous release of nitroglycerin into the circulation over 24 hours following a single applied dose. As of this writing, there are virtually no published data demonstrating clinical efficacy with the transdermal nitrates. Nitroglycerin plasma levels, according to the manufacturers’ own data, are relatively low. It will clearly be necessary to see similarly designed double-blind protocols in angina patients using the nitroglycerin discs before making a final judgment as to their efficacy. Nevertheless, for those physicians who employ long-acting nitrates in their clinical practice, buccal nitroglycerin and hopefully the transdermal delivery system open the door to greater therapeutic help for thousands of patients with angina.

Jonathan Abrams, M.D.
Albuquerque

REFERENCES


Safe Closure of Aortopulmonary Window

In this issue (see page 581) Berry and Jayasinghe present a single case report of aortopulmonary window which was diagnosed at the time of left thoracotomy for patent ductus arteriosus when the latter diagnosis was found to be in error. The authors present the technique of minimal dissection of the aortopulmonary window and ligating it with metal clips. They postulate that minimal dissection and the safety of the hemoclips would allow safe ligation of the aortopulmonary window in selected cases where an error in diagnosis is made, thereby avoiding the usual anterior approach using cardiopulmonary bypass as a second operation. This case report has merit in providing an option in an unusual situation, but the potential hazards of this approach should be clearly recognized before choosing it in the setting of missed diagnosis.

Abnormalities of septation of the aortopulmonary trunk result in a spectrum of defects between the ascending aorta and the pulmonary artery. The most common type of defect (54 percent) and the type described by the authors is a defect between the posteromedial wall of the ascending aorta, just above the sinus of Valsalva, and the main pulmonary artery. The left coronary artery is within 1 mm or on the edge of the defect, or it may have anomalous origin in the

Jonathan Abrams, M.D.
Albuquerque

Chief, Division of Cardiology, University of New Mexico School of Medicine.
Reprint requests: Dr. Abrams, Chief, Division of Cardiology, University of New Mexico School of Medicine, Albuquerque 87131
pulmonary artery. The other types of defects of aortopulmonary septation are more distal on the ascending aorta and involve the origin of the right pulmonary artery. In a series of 25 patients with aortopulmonary septal defects, it was possible to ligate the aortopulmonary connection only when the defect was smaller than 1.2 cm in diameter. Accurate visualization of the left coronary artery is impossible while dissecting around the aortopulmonary connection through an anterior approach and may also be difficult through a lateral approach. Hemorrhage is a constant threat and was massive in one of eight patients undergoing attempted ligation of the connection. For defects located more distal on the ascending aorta, ligation techniques may result in incomplete closure of the aortopulmonary defect while stenosing or actually closing the right pulmonary artery.

In most patients with aortopulmonary septal defect, the repair can be accomplished accurately and safely by prosthetic patch closure through transaortic exposure. This exposure allows accurate location of the defect and of its relationship to the left coronary artery or right pulmonary artery. Prosthetic patch closure not only provides precision, safety, and freedom from distortion of the aorta, aortic valve, or pulmonary artery, but also may allow enlargement of the right pulmonary artery when this is required. This open approach appears to be the best method to elect for treatment of most aortopulmonary septal defects which are optimally diagnosed by aortic root and pulmonary angiography prior to operation.

The authors have suggested an alternate approach for treatment of aortopulmonary window when the situation is not optimal in order to correct a defect found at surgery following an error in diagnosis. The surgeon must be cautioned of the potential hazards of compounding a mistake in diagnosis by exposing the patient to the risk of ligation of the left coronary artery, exsanguinating hemorrhage, and distortion of the right pulmonary artery or aortic valve. While hemoclip ligation may suffice in selected cases where patent ductus arteriosus is mistakenly diagnosed and aortopulmonary window encountered at surgery, it would be recommended for most cases that the incision be closed, proper angiographic diagnosis be established at later cardiac catheterization, and the defect repaired by a procedure planned to give optimal exposure and precise anatomic reconstruction.

Donald B. Doty, M.D., F.C.C.P.
Iowa City

Professor of Thoracic Surgery, Division of Thoracic and Cardiovascular Surgery, The University of Iowa Hospitals and Clinics.

References

Conservative Infundibulectomy, Pulmonary Valvotomy and Residual Right Ventricular Hypertension after Repair of Tetralogy of Fallot

Until recently, there was general agreement about the surgical management of complete repair of tetralogy of Fallot. This included Lillehei's basic repair (ie, closure of the VSD and when necessary, outflow tract patching), supplemented by radical infundibulectomy. It was also agreed that residual right ventricular hypertension (RVHT) is associated with increased incidence of perioperative mortality. This observation provided constant legitimization for radical infundibulectomy. Over the years, however, a number of reports were published describing late right ventricular-borne complications such as significant ventricular dysrhythmias, progressive right ventricular dysfunction and sudden death. It became clear, therefore, that in about 5 to 10 percent of all surgical survivors, initial excellent operative results turned out to be late disasters. It is now time, after two and a half decades of utilization of the conventional techniques, to have a second look at some aspects of this operation.

First, the radical infundibulectomy. This routinely-used procedure, consisting of a generous right ventriculotomy incision and extensive resection of infundibular musculature, totally defunctionalizes the right ventricular outflow tract.

With the intention to minimize damage to the right ventricle, repair of tetralogy recently has been attempted via a very short subpulmonary conal incision with only minimal parietal muscle bundle excision. This minimal procedure, termed conservative infundibulectomy, appeared to carry the same perioperative mortality as the lowest reported in the conventional method. The perioperative hemodynamics recorded in this type of operation differed from the usual. Characteristically, the immediate post-pump right ventricular pressures were quite high, ranging between 62 to 145 mm Hg, with an average of 84 mm Hg. However, these high RV pressures were short-lived, and within 24 hours dropped to 55 mm Hg (range 35-72). The rapid drop of the right ventricular pressures indicated that in this group of patients the obstruction to the pulmonary flow was of dynamic nature and it was due to transitory hypercontractility of the remaining contractile conal musculature. On the