

Following the operation, the patient was transferred to the intensive care unit in good condition. The postoperative course was uneventful.

### DISCUSSION

Though complete atresia at the site of coarctation was not diagnosed from the preoperative angiograms, its anatomic proximity to the left common carotid was apparent. Therefore, it was considered best to test-occlude the left common carotid artery and measure left temporal arterial pressure in an attempt to estimate cerebral perfusion through collateral vessels before proceeding with resection. The fall in blood pressure in the left temporal artery was severe, but blood pressure was easily elevated and maintained by the phenylephrine infusion. No ill effect such as reflex bradycardia or cardiac arrhythmias occurred during the prolonged phenylephrine administration.

If temporal arterial pressure and blood-gas monitoring had indicated the cerebral perfusion was inadequate during occlusion of the left common carotid artery, hypothermia and cardiopulmonary bypass were alternative plans. An additional clinical tool that could

have been utilized in the management of this case was electroencephalographic monitoring.

This case of surgical correction of coarctation of the aorta in close proximity to the left carotid artery with complete interruption of the aorta is presented to illustrate the usefulness of monitoring the left temporal arterial pressure<sup>3</sup> when perfusion to the brain might be compromised by occlusion of the left common carotid artery. Temporal arterial pressure monitoring gives an accurate, reliable index of both the pressure and oxygenation of the blood perfusing the brain.

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## Relationship of Right Bundle-branch Block and Marked Left Axis Deviation to Complete Heart Block during General Anesthesia

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In 1934 Wilson and associates<sup>1</sup> recognized the pattern of right bundle branch block (RBBB) and marked left axis deviation (MLAD) as an abnormality seen in many routine screening electrocardiograms (ECG). Subsequent investigations into this pattern,

including those of Lasser in 1968<sup>2</sup> and Scanlon<sup>3</sup> in 1970, showed that extensive abnormalities of both the right and left bundle branches of the conducting system are responsible for this abnormal pattern. Much work has been done and much has been written about the clinical significance of this pathologic condition. Interest has centered on the incidence of complete heart block (CHB) in these individuals, with a particular view towards prophylactic placement of a demand pacemaker unit to avoid the extreme consequences of an episode of complete

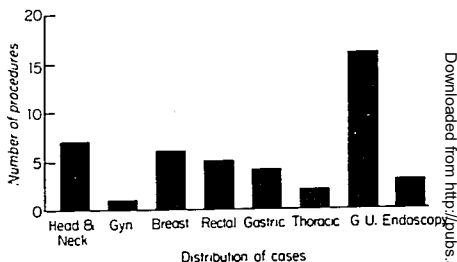
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FIG. 1. Distribution of operative procedures.



heart block. Anesthesiologists may see patients with RBBB and MLAD for preoperative evaluation and thus become involved in the decision whether a prophylactic pacemaker should be implanted prior to anesthesia and surgery. To provide better information on which to base this decision, a prospective study of such patients undergoing general anesthesia and operation was initiated.

METHOD

During a 24-month period, 27 patients who had the pattern of RBBB and MLAD were scheduled for operation. Nineteen male and eight female patients were studied. Patients' ages ranged from 49 to 82 years. Forty-four surgical procedures were performed on the 27 patients. Anatomic distribution of the sites of operation is shown in figure 1. Anesthesia was induced with thopental, followed by succinylcholine (in 36 procedures) for endotracheal intubation. Thereafter anesthetic techniques varied. Lengths of anesthesia ranged from 30 minutes to eight hours. Patients were monitored continuously intraoperatively using an oscilloscope, and were followed by serial electrocardiograms to the fifth postoperative day.

RESULTS

The distribution of patients and procedures according to pre-existing medical illness is shown in table 1.

All patients had the electrocardiographic pattern of RBBB and LAD, with electrical

axes varying from -30 to -90 degrees (fig. 2). Throughout the intraoperative and postoperative periods the only cardiac problems that developed were bradycardia on four occasions intraoperatively and sporadic episodes of ventricular premature contractions (VPC) on seven occasions intraoperatively. Bradycardia was treated with atropine. VPC's, treated by increasing the inspired oxygen concentration, rapidly responded with no further sequel except for one patient with a history of ASHD who required digitalization postoperatively because of frequent VPC's and atrial premature contractions.

DISCUSSION

In 1968, Lasser and associates<sup>2</sup> reported the incidence of RBBB and MLAD to be 1.5 per cent, after reviewing the records of 5,500

TABLE 1. Distribution of Pre-existing Medical Illness\*

	Patients	Procedures
Isolated ECG abnormality†	12	15
HCVD	3	6
ASHD	3	5
HCVD + ASHD	3	4
ASHD + COPD	2	3
HCVD + ASHD + COPD	1	6
HCVD + ASHD + diabetes	1	1
ASHD + COPD + diabetes	1	1
Diabetes	1	1

\* HCVD = hypertensive cardiovascular disease; ASHD = arteriosclerotic heart disease; COPD = chronic obstructive pulmonary disease.

† No known medical illness.

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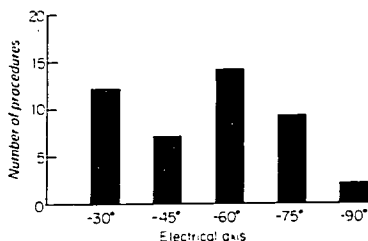


FIG. 2. Distribution of axis deviation.

consecutive hospitalized patients. Obviously with this high an incidence the anesthesiologist may frequently be faced with such a patient. In this situation his concern is whether this history will predispose the patient to the major complication of complete heart block.

Watt and associates,<sup>4</sup> in 1968, produced ECG patterns of RBBB and LAD experimentally in dogs by sectioning the right bundle branch and ligating the anterior fibers of the left bundle branch, thus confirming that indeed this pattern represents bilateral bundle-branch block. Lasser<sup>2</sup> reported in 1968 that 10 per cent of the 55 patients with this bifascicular block followed by his group eventually had complete heart block. In 1970, Scanlon *et al.*<sup>3</sup> reported a 10-year experience following 147 patients with RBBB and LAD. Complete heart block developed in 20 of these patients (13.6 per cent), a figure comparable to that reported by Lasser.

Atkins and associates,<sup>5</sup> in 1973, reported the cases of 30 patients who developed RBBB and LAD during an acute myocardial infarction. They found that 43 per cent of these patients went on to complete heart block. Of interest was the fact that 11 of 13 patients with RBBB and LAD who had transient complete heart block without the placement of permanent pacemakers died suddenly within eight months of discharge,

while eight patients with the same history who had permanent pacemakers implanted were still living.

Our study was undertaken to determine what effect the stress of anesthesia and operation might have on these patients, and to attempt to answer the question whether all patients who have this bifascicular block should have standby pacemakers implanted. We found no instance of complete heart block in our 27 patients associated with 41 general anesthetics. It must be emphasized that these patients were in stable condition with no recent acute cardiac problems and without a history of transient complete heart block as suggested by syncope or ECG. With Atkins' experience in mind, it is imperative that a careful history be obtained by the anesthesiologist, to elicit any prior transient complete heart block.

Based on our findings, we feel that routine placement of demand pacemakers in patients with RBBB and LAD before anesthesia and operation is not necessary in the absence of cardiac symptoms.

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