Traumatic Heart Block

B. A. SIMS AND J. S. GEDDES

From the Department of Pathology, Queen's University, Belfast, and the Department of Cardiology, Royal Victoria Hospital, Belfast

Trauma to the chest may result in rupture of the interventricular septum (Cary, Hurst, and Arentzen, 1958). Disturbances of conduction, including complete heart block, may follow (Dolara, 1964), or they may arise in the presence of an intact septum (Levine, Roberts, and Morrow, 1962). In the case to be reported, non-penetrating trauma produced structural cardiac damage, associated with the development of complete heart block.

Case Report

A previously healthy 24-year-old man fell 60 feet from a building which was under construction. On arrival in hospital just over half an hour later he was confused. The right pupil was larger than the left. The peripheral circulation was poor. Pulse was 50 a minute, and the blood pressure was 90/60 mm. Hg.

While being examined he collapsed. The major pulses were absent and resuscitative measures were begun immediately. The electrocardiogram showed that ventricular complexes occurred only when external chest compression was applied. Shortly after, a spontaneous cardiac rhythm with palpable arterial pulsations resumed. The cardiac rhythm (Fig. 1) was atrial fibrillation with complete heart block, the ventricular rate being 54 a minute.

Before definitive treatment such as endocardial pacing could be undertaken, the patient developed repeated episodes of asystole, and eventually widening of the QRS complexes and displacement of the S-T segments were associated with absent arterial pulses. Resuscitation was then abandoned.

Necropsy. There were multiple facial abrasions and the anterior chest wall was bruised. The right pubic ramus was fractured, but there were no rib fractures.

Each pleural sac contained 500 ml. blood. There was no haemorrhage in the pericardial sac. The heart weighed 305 g. The pericardial surface was not contused. On the medial wall of the right atrium just anterior to the fossa ovalis there was an irregular laceration

2 cm. in size surrounded by subendocardial haemorrhage which extended to the ostium of the coronary sinus. The laceration communicated with the cavity of the left ventricle immediately below the non-coronary cusp of the aortic valve. Apart from a mild degree of coronary atheroma, the heart was otherwise normal.

There was a 3 cm. laceration on the costal surface of the upper lobe of the right lung. The lung tissue was oedematous and the bronchi contained blood. There was extensive haemorrhage into the left lung. The brain weighed 1350 g. and was intact. There had been haemorrhage into the subarachnoid space over the left parieto-occipital area.

The conducting system of the heart was studied histologically using the method recommended by Hudson (1965). The sinu-atrial node was normal. There was haemorrhage in the region of the atrioventricular node. The atrioventricular bundle was contused and haemorrhagic, and was completely transected at one point (Fig. 2). The bundle-branches were undamaged.

Comment

Heart block has been claimed to be the result of trauma in 23 instances (Dolara and Pozzi, 1966): of these, Dolara and Pozzi (1966) considered that only 3 had sufficient evidence of a traumatic aetiology. In order to exclude cases in which the association between injury and heart block was likely to be fortuitous, these authors defined criteria for the diagnosis of traumatic heart block. These are: youthful age, absence of pre-existing heart disease or conduction defects, great magnitude of injury force, electrocardiographic evidence of myocardial involvement, associated structural cardiac damage (usually septal rupture), and absence of delay in the appearance of block.

In the presence of myocardial damage the ability to maintain the heart rate may be essential to the maintenance of the cardiac output (Sowton, 1964). Since artificial pacing and the surgical repair of septal defects are now commonplace procedures, the

FIG. 1.—Electrocardiogram shows atrial fibrillation with complete heart block.

FIG. 2.—Microscopical section of the contused AV bundle at the point of transection. (H. & E. $\times 100$.)

salvage of a patient with traumatic heart block and septal rupture is theoretically feasible. The requirement that the patient must survive with pacing for some time before operation, and the presence of damage to other organs, may prove to be limiting factors. The patient described by Paulin and Rubin (1956) survived for almost a day without any definitive treatment, and if paced might have become fit for operation.

Summary

A 24-year-old man developed complete atrio-ventricular block in association with rupture of the septum between the right atrium and left ventricle following severe, non-penetrating trauma. There was also pulmonary and intracranial damage. Histological examination confirmed disruption of the conducting tissue at the level of the atrioventricular bundle. When strict criteria are applied,

only 3 cases of proven traumatic atrioventricular block have previously been reported.

References

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