DIVERTICULUM OF THE LEFT VENTRICLE

REPORT OF A CASE

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Congenital diverticulum of the left ventricle of the heart is considered to be a rare malformation. Up to 1958, Keith, Rowe, and Vlad could only collect 13 cases from the published reports. Successful operations had been recorded by Roessler (1944), Skapinker (1951), Potts, DeBoer, and Johnson (1953), and Mustard, Duckworth, Rowe, and Dolan (1958).

The purpose of this paper is to present the clinical angiocardiographic, surgical, and pathological data in an infant with congenital diverticulum of the left ventricle of the heart.

Case Report

A boy aged 4 days was admitted to the hospital on February 2, 1964, presenting with a pulsating mass inside a huge ventral hernia. He had been born at full term, the product of a normal gestation and spontaneous delivery. Parents were first cousins.

Physical examination revealed a non-cyanotic infant, in no distress, weighing 3,700 g. There was no clubbing of the fingers or toes. The respiratory rate was 40 a minute, and the pulse rate was 130 a minute. The radial and femoral pulsations were normal. The blood pressure in the right arm was 75/50 mm.Hg.

Clinical examination of the heart revealed no praecordial bulge. The apex was in the 5th left intercostal space, one finger's breadth inside the nipple line. There were no other pulsations over the praecordium and there were no thrills. Auscultation revealed a soft systolic murmur, grade 2/6, heard maximally over the lower part of the sternum and down over the pulsating mass.

Abdominal examination revealed a huge ventral hernia extending from the xiphoid process to the umbilicus (Fig. 1). The skin covering it was thin and deeply pigmented. The hernia was bulging through a huge defect in the anterior abdominal wall, and at the upper part of the hernia a pulsating tubular mass (3×1.5 cm.) was seen protruding out just below the xiphisternum.

Its pulsations were synchronous with those of the heart, and firm pressure on it provoked extrasystoles.

The liver was not enlarged and the spleen was not palpable.

Radiography revealed that the soft tissue shadow of the pulsating mass was continuous with the cardiac shadow (Fig. 2).

Electrocardiogram revealed right axis deviation, and vertical heart, the praecordial leads showing evidence of right and left ventricular hypertrophy.

Operation was postponed for about three weeks because of mild umbilical sepsis. During this time there was an increase in the size both of the ventral hernia and of the pulsating mass. The infant was operated on at the age of 1 month, the operation being done under general anaesthesia with fluothane, nitrous oxide, and oxygen. Exploration was performed through a hockey-stick thoraco-abdominal incision extending from the left nipple through the 5th intercostal space down to the xiphoid process and extending in the middle line to the umbilicus. Dissection of the upper part of the hernia revealed the presence of a diverticulum of the heart which was covered by pericardium only on its anterior surface. The diverticulum was bulging through a defect between the two slips of the diaphragm arising from the xiphoid process. The ventral hernia was covered with a peritoneal sac independent from the diverticulum.

Operative angiography revealed the continuity of the diverticular cavity with that of the left ventricle. It also demonstrated the simultaneous opacification of the aorta and the pulmonary artery. The pericardial covering was dissected from the diverticulum, and a Potts clamp was applied to its base at its junction with the left ventricle. During the application of the clamp the electrocardiogram revealed a temporary bradycardia with evident S-T change which returned to normal after removal of the clamp. The diverticulum was excised and the base was stitched by interrupted mattress suture; the endocardium was closed; the muscle coat was sutured in another layer; the clamp was released and the sutures were made watertight. The defect in the diaphragm was easily closed by interrupted silk sutures. The chest was closed leaving a drain. The electrocardiogram showed changes in the S-T segment when the diverticulum was cut, and these

FIG. 1.—A huge ventral hernia with a pulsating tubular mass in its upper part.

FIG. 2.—Lateral radiograph showing the soft tissue shadow of the diverticulum (arrow) to be continuous with the cardiac shadow.

persisted throughout the rest of the operation. Apart from these changes the beats were regular and the voltage was normal. Reduction of the contents of the ventral hernia as a test for distress did not produce any further change in the cardiogram, and this encouraged us to proceed with hernial repair at the same time. The sac was excised and abdominal exploration did not reveal any gastro-intestinal anomaly. The contents were reduced and the defect in the anterior abdominal wall was closed.

Half an hour after the end of the operation, which passed smoothly, sudden ventricular fibrillation developed and the child died soon afterwards.

Necropsy. Apart from the diverticulum the heart revealed a huge ventricular septal defect in the membranous part measuring about 12 mm. in diameter.

Histological examination of the diverticulum revealed that the main bulk of the diverticular wall was made up of cardiac muscle fibres arranged in all directions in which neither Purkinje fibres nor nodal tissue was seen. The framework was made up of connective tissue rich in elastic fibres, and the diverticulum was lined with endothelium. The outside covering was a serous membrane with subpericardial connective tissue rich in fat cells and containing numerous blood vessels.

Comment

In this case, apart from the presence of a true congenital cardiac diverticulum, there were other

congenital abnormalities, namely, defects in the basilar pericardium, and in the ventral portion of the diaphragm, and a huge defect in the anterior abdominal wall. The association of these congenital anomalies confirms the suggestion of Potts *et al.* (1953) that the condition is primarily due to some abnormality of the septum transversum. This latter normally gives rise to the basilar portion of the pericardium, the ventral leaf of the diaphragm, and the ventral cephalic part of the abdominal wall (Politzer and Sternberg, 1930; Margulies, 1945). During development the epicardium of the cardiac loop fuses to the ventral leaf of the septum transversum, and as the latter descends the attached epimyocardium is pulled ventrally and caudally and a true congenital diverticulum results.

The high mortality in the reported infants who were not corrected by surgery warranted early operation. Although this was completed successfully, ventricular fibrillation set in soon afterwards and the child died.

It seems advisable to manage this type of case in two stages, first to excise the diverticulum and later to deal with the ventral hernia. The correction of the latter in the same stage may put too much strain on the heart, especially in the presence of intracardiac defects.

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