Extensive Calcification of the Myocardium
Report of a Case

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An unusual case of extensive calcification of the myocardium in a 25 year old woman is presented. Presumably it was the result of an earlier severe toxic or septic myocarditis.

Pathologic deposits of calcium may occur in valve leaflets and valve rings, in the pericardial scar of chronic constrictive pericarditis, and in the myocardium. In each of these regions, the areas of calcification may be demonstrated by appropriately taken roentgenograms. Their detection often is of considerable diagnostic importance. The most common cause of calcification in the myocardium is myocardial infarction, the calcium being deposited during the process of healing of the infarct. In addition, myocardial calcification may occur as a complication of hyperparathyroidism and as a result of focal toxic or inflammatory myocardial necrosis. Areas of bone formation may also be present. A review of the literature has been presented recently by Finestone and Geschickter.

Report of Case

A white, single woman, aged 25 years, was admitted to the hospital on Nov. 7, 1946 because of progressive dyspnea of two years' duration. At the age of 9 years, she had had scarlet fever of such severity that she was out of school for one year. No cardiac or renal symptoms could be recalled. Four years before admission she had suffered from pneumonia and had been kept in bed for one month. Two years later there had been an acute upper respiratory infection, and since that time she had had noticeable shortness of breath on exertion. In January, 1946, cough and increasing dyspnea necessitated a 4 weeks' period of rest in bed, but the patient was then able to return to work as a clerk until June. From June onward, dyspnea and cough progressively became more severe, and approximately 10 days before admission a sudden further increase in these symptoms was accompanied by the first appearance of cyanosis and swelling of the face, neck, and abdomen.

Physical examination revealed a well developed, well nourished young woman with severe orthopneic, cyanosis of the lips and nail beds, and moderate distention of the jugular veins. The temperature was normal, the heart rate 120 per minute, and the blood pressure 80 mm. systolic, and 60 mm. diastolic. There was slight puffiness of the face. Signs of fluid were present over the lower half of the right thorax posteriorly, and there were numerous moist rales above this level as well as over the lower lobe of the left lung. The heart was greatly enlarged to the left; its rhythm was regular except for an occasional premature beat, and no murmurs were present. All heart sounds were of average intensity. The liver extended 14 cm. below the costal margin in the right midclavicular line and was moderately tender. The edge of the spleen could be felt 4 cm. below the costal margin. There was no peripheral edema.

The urine had a specific gravity of 1.020 and contained 3 plus albumin and an occasional hyaline or granular cast. The red blood cell count was 6,140,000 per cu. mm., and the hemoglobin content was 16.0 Gm. The leukocyte count was 12,000 per cu. mm. The Wassermann reaction of the blood was negative.

An electrocardiogram showed sinus tachycardia with a rate of 116 per minute. The P waves were notched in lead I. The P-R intervals were within normal limits but the duration of the QRS complexes was increased to 0.11 second. There was slurring of QRS in leads I and II, and right axis deviation was present. The T waves were inverted in leads II and III.

Portable anteroposterior roentgenograms of the thorax were of poor quality but revealed opacity of the right thorax with slight displacement of the trachea and mediastinum to the left. Extensive areas of increased density, suggestive of calcium deposits, were present within the area of a much enlarged cardiac shadow.

Digitoxin, mercurial diuretics, a low sodium diet, the administration of oxygen, and right thoracentesis with the removal of 650 cc. of clear, straw colored fluid resulted in only slight and temporary improvement. On the twelfth day in the hospital the patient suddenly developed acute pulmonary edema and died.

Postmortem examination revealed the heart to be...
greatly enlarged and to weigh 950 Gm. There were numerous irregular, white projections of calcification over the epicardial surface of the left auricle and ventricle (fig. 1). The right heart appeared normal externally except for dilatation of the auricle. The left auricle and ventricle were opened only with difficulty, and cut sections of their walls revealed extremely extensive, irregular depictions of calcium (fig. 2). Only a small area on the posterior wall of the ventricle near the septum was not affected. The interventricular septum showed similar massive involvement but the right auricle and right ventricle were affected to a much lesser degree (fig. 3). Multiple calcific excresences were present on the endocardial surface of the left auricle, left ventricle and pulmonary conus, ranging up to 4 mm. in diameter and 5 mm. in elevation. The extent and degree of the calcification in the heart as a whole was well demonstrated by roentgenograms of the fresh, isolated organ (fig. 4). The heart valves were normal. There were two small mural thrombi in the left auricle and a single thrombus of larger size was present near the apex of the left ventricle. The coronary arteries were normal. There were 70 cc. of straw colored fluid in the pericardial sac but the pericardium was normal except for two small, irregular roughened areas in the posterior portion opposite one of the larger calcific protuberances. No adhesions were present. The aorta appeared somewhat small in diameter throughout its entire length but was otherwise normal. Examination of the abdominal viscera and lungs revealed severe chronic passive congestion. Right hydrothorax was present, and the lower lobe of the

Fig. 1. Epicardial surface of the left ventricle and left auricle. Numerous irregular projections of calcium are seen.

Fig. 2. Illustrating the extensive irregular calcification in the wall of the left ventricle and left auricle.

Fig. 3. The right chambers of the heart have been opened to demonstrate the much lesser extent of calcification in the wall of the right ventricle.
EXTENSIVE CALCIFICATION OF MYOCARDIUM

right lung showed compression atelectasis and a large area of recent infarction.

Microscopic examination of the myocardium revealed extensive areas of calcification within broad zones of cicatization (fig. 5, left). Some of the calcific masses included islands of bone formation (fig. 5, right). Muscle fibers marginal to regions of fibrosis were to a considerable extent individually separated by fibrous tissue continuous with the partly calcified cicatrices. In addition, there were focal areas of myocardial scarring without accompanying calcific material. No areas of calcification were present in sections of the lungs and kidneys.

DISCUSSION

It is of interest that the calcium deposits in the cardiac area had been recognized by roentgenologic examination before the patient’s admission to the hospital and the possibility of chronic constrictive pericarditis with pericardial calcification had been suggested. The patient’s general condition after admission precluded additional detailed roentgenologic and fluoroscopic studies, and the significance of the calcium deposits was not correctly assessed prior to the patient’s death. It was believed,
however, that the great enlargement of the heart was sufficient evidence to exclude chronic constrictive pericarditis as the cause of the illness. In chronic constrictive pericarditis the heart is surrounded by a firm, vise-like scar which interferes with diastolic relaxation of the ventricles and prevents hypertrophy and dilatation. Roentgenograms show the heart shadow to be of normal size or at the most only slightly enlarged.

The extensive myocardial calcification in the present case probably resulted from a severe toxic or septic myocarditis but the reason for the predominant involvement of the left auricle and ventricle and the interventricular septum is not known. The patient had experienced at least three illnesses that might have been attended by acute myocarditis. The first of these was severe scarlet fever 16 years before her admission to the hospital, the second was pneumonia 4 years before admission, and the third was an acute upper respiratory infection 2 years before the terminal illness. No decision can be made as to whether any of these actually was an etiologic factor. The most severe infection apparently was the scarlet fever but it would seem most unusual for a patient to live for 16 years after having experienced such severe damage to the myocardium.

SUMMARY
Extensive calcification of the myocardium, involving predominantly the left auricle and ventricle and the interventricular septum, was found in a 25 year old woman who died of congestive heart failure. The etiology of the condition was not determined but it is probable that the deposition of calcium occurred during the healing phase of an earlier severe toxic or septic myocarditis.

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