

Right ventricular aneurysm with ventricular premature beats

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Two patients with unusual right ventricular aneurysms, probably congenital in origin, are reported. In both patients, unifocal frequent ventricular ectopic beats were the only symptoms. These aneurysms are thought to act as foci of the ventricular premature beats, and in one of them, aneurysmectomy led to the abolition of the ventricular premature beats.

The majority of left ventricular aneurysms occur as a consequence of ischaemic heart disease and healed myocardial infarction. Arrhythmias happen sometimes as complications of left ventricular aneurysm, and aneurysmectomy for the control of these arrhythmias was recently reported (Hunt, Sloman, and Westlake, 1969). In contrast, aneurysm of the right ventricle is rare (Weglicki, Ruskin, and McIntosh, 1966), and coronary artery disease is not thought to be an important aetiological factor (Stansel, Julian, and Dye, 1963). The relation between right ventricular aneurysm and arrhythmia is not clear and reports on arrhythmias caused by right ventricular aneurysms are extremely rare.

The purpose of this paper is to report 2 cases of right ventricular aneurysms which act as the trigger for ventricular extrasystoles, and in one of these cases, aneurysmectomy led to the termination of the intractable ventricular extrasystoles.

Case reports

Case 1

A 5-year-old girl was admitted to our hospital for the precise identification of arrhythmias. When she suffered from a common cold her home doctor found that she had an arrhythmia and referred her for further examination. She was asymptomatic and had no particular family or past histories.

On admission, the patient was a well-developed and moderately nourished girl, apparently in good health. The only abnormal physical observations were those relating to the heart rhythm. Her pulse rate was 108 a

minute and the rhythm was irregular with frequent extrasystoles. The blood pressure was 90/60 mmHg. No abnormal cardiac pulsations were noted on the chest wall. On auscultation, the second heart sound split normally during inspiration and no significant murmur was heard. The lungs were clear.

Chest x-ray showed a normal cardiac silhouette, vascular pedicle, and lung fields. An electrocardiogram showed sinus rhythm with frequent unifocal ventricular premature beats. The QRS complex was normal in the sinus beats. In the standard leads, the ventricular premature beats showed an \hat{A} QRS at +30 degrees. The QRS interval of the extrasystoles measured 0.12 sec. In the chest leads, there was a left bundle-branch block pattern with rS in V₁ and notched R pattern in V₅₋₆. These findings suggested that the focus of these ventricular premature beats was in the free wall of the right ventricle (Fig. 1).

Cardiac catheterization revealed normal pressures throughout the left and right sides of the heart, and there were no valvar gradients or left-to-right shunts. An angiocardiogram was performed after the injection of contrast medium into the right ventricle. On the anterior wall on the outflow tract of the right ventricle, aneurysmal protrusion of contrast medium was observed (Fig. 2a). The ventricular extrasystoles were considered to arise from this small aneurysm.

Because various combinations of drugs had failed to abolish the recurrent premature ventricular beats, including digitalis, quinidine, and procainamide, recourse was had to open heart surgery. At the anterior wall of the outflow tract of the right ventricle, a small aneurysm measuring approximately 2 cm in diameter was found and excised (Fig. 3). The wall of the aneurysm was thin, but consisted of epicardium, myocardium, and endocardium. No inflammatory signs or fibrosis were observed histologically.

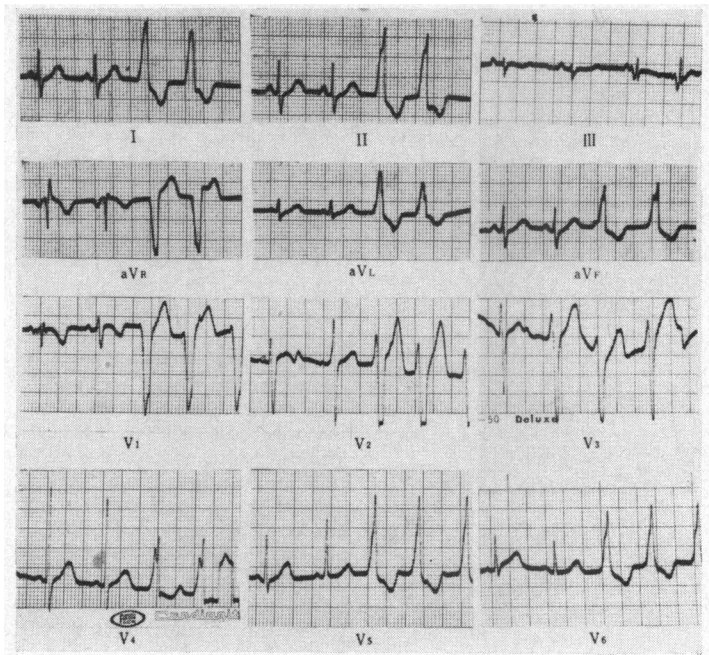


FIG. 1 Case 1. Electrocardiogram reveals frequent unifocal ventricular premature beats.

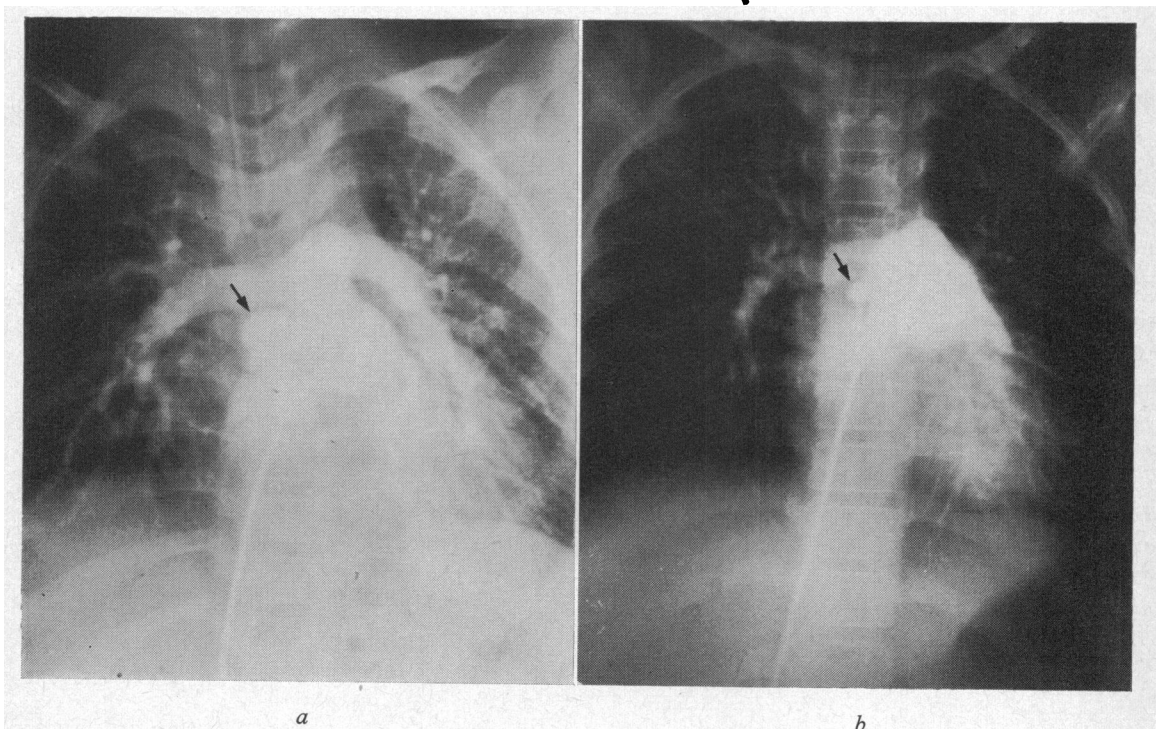


FIG. 2 Right ventricular angiogram with aneurysmal protrusion of contrast medium in the outflow tract. a) Case 1. b) Case 2.

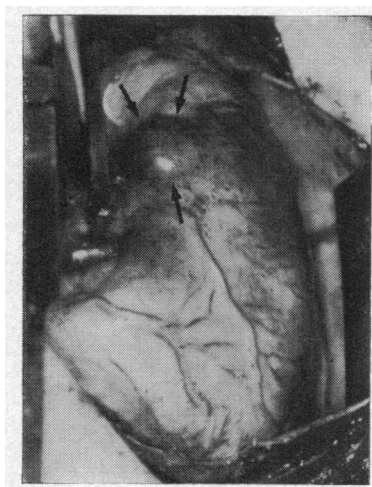


FIG. 3 Case 1. Aneurysm at the anterior wall of the right ventricular outflow tract.

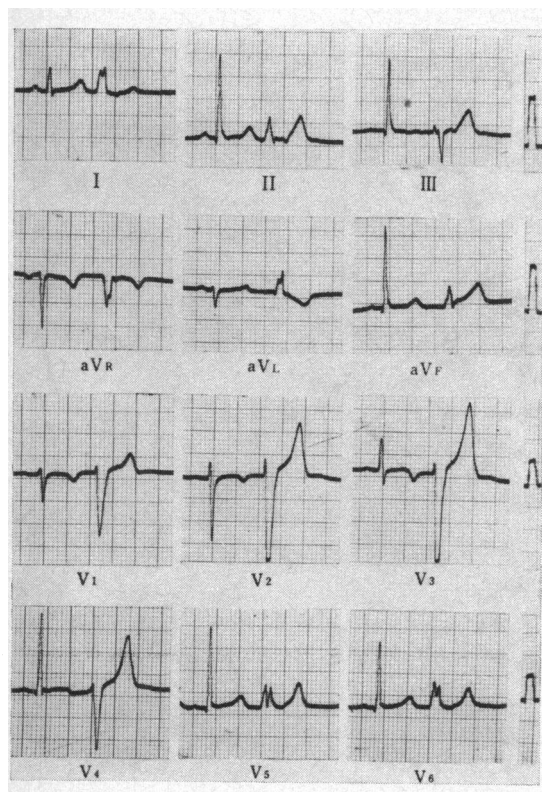


FIG. 4 Case 2. Electrocardiogram showing ventricular extrasystole with left bundle-branch block pattern.

After excision of the aneurysm, ventricular extrasystoles completely disappeared and the patient remains well without any cardiac drugs.

Case 2

A 12-year-old girl was admitted to our hospital for treatment and evaluation of arrhythmias. She had been in good health until approximately 6 months before admission, when she developed acute appendicitis. It was noticed then that she had frequent ventricular premature beats. Recently, she had begun to complain of palpitation and general fatigue.

On physical examination, she was moderately nourished and well developed for a 12-year-old. Her jugular venous pressure was normal. Her pulse was irregular with frequent extrasystoles at 90 a minute. Blood pressure was 100/60 mmHg. The apex beat was found at the fifth intercostal space in the midclavicular line. On auscultation, the heart sounds were normal and a grade 2/6 musical systolic murmur was audible at the left sternal border. The lungs were clear. There was no hepatomegaly, peripheral oedema, or cyanosis.

Chest x-ray showed normal cardiac silhouette and pulmonary vascular markings. Electrocardiogram revealed sinus rhythm with frequent ventricular premature beats. These were unifocal and showed complete left bundle-branch block pattern with rS in V1 and a notched R pattern in V5-6. These findings indicated that the focus of these ventricular extrasystoles was in the right ventricular wall (Fig. 4). The QRS patterns of the premature beats are quite similar to those in Case 1.

Cardiac catheterization showed normal pressures and no intracardiac shunt was detected. Selective right ventricular angiography revealed a smooth-walled small aneurysm arising from the cavity of the right ventricular outflow tract (Fig. 2b). The size and the site of this aneurysm were similar to that in Case 1. Judging from the QRS pattern of the ventricular premature beats, this aneurysm was also thought to be the focus of the ventricular extrasystoles. Pindolol (Visken, Sandoz) reduced the frequency of the extrasystoles but did not abolish them. She is now asymptomatic with some ventricular extrasystoles and antiarrhythmic therapy is being continued.

Discussion

Left ventricular aneurysm is estimated to occur in from 10 to 38 per cent of survivors of acute myocardial infarction (Cooley and Hallman, 1968). In contrast, aneurysm of the right ventricle is rare and the majority of right ventricular aneurysms are secondary to trauma or surgical procedures (Rosenthal, Gross, and Pasternac, 1972). They may be congenital (Miller *et al.*, 1953) but coronary artery disease is not thought to be an important factor. The aetiology of our cases is obscure. Neither case has a relevant past history and the wall of the aneurysm in the first case showed normal cardiac structure in histology without any inflammatory

processes or fibrosis. These facts suggested the possibility of a congenital origin of these aneurysms.

Our two cases resemble each other. Both aneurysmal protrusions of the contrast media are in the outflow tract of the right ventricle and both patients show no abnormalities in clinical symptoms, physical examinations, chest x-rays, and electrocardiograms, except for premature beats. The frequent intractable arrhythmias are well-known complications of left ventricular aneurysm. It is not known whether they are a feature of right ventricular aneurysms because such aneurysms are so uncommon. Theoretically a right ventricular aneurysm might be the focus of ventricular ectopic beats since the aneurysmal tissue is both stretched and hypoxic, two qualities known to enhance automaticity in His-Purkinje cells (Kaufmann and Theophile, 1967; Han, 1969). On these grounds, we felt that ventricular premature beats in our otherwise symptom-free patients might have originated in the right ventricular aneurysms demonstrated angiographically.

Surgical removal of a left ventricular aneurysm for the cure of intractable ventricular arrhythmias has been reported (Magidson, 1969; Ritter, 1969; Hunt *et al.*, 1969; Maloy *et al.*, 1971). While resection of a right ventricular aneurysm has been previously reported, we believe that our case may be the first in which surgical removal of a right ventricular aneurysm was carried out for the cure of intractable ventricular ectopic beats.

In these cases frequent ventricular unifocal extrasystoles are the only abnormal signs. The QRS patterns of these extrasystoles are similar in both cases with wide QRS intervals, rS pattern in V₁, and notched R in V₅₋₆ resembling left bundle-branch block, pointing to the free wall of the right ventricle as the site of the ectopic foci. In both instances, aneurysms of the right ventricular wall were noted angiographically. The fact that the aneurysmectomy in Case 1 led to the termination of the ventricular ectopic beats supports the suggestion that the aneurysm was the ectopic focus.

These cases emphasize that patients with frequent

ventricular extrasystoles of uncertain aetiology should be carefully investigated since some of them may have a small right ventricular aneurysm.

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