ANGINA PECTORIS WITH PAIN OF ATYPICAL DISTRIBUTION

Report of a Case Illustrating the Diagnostic Value of Electro-Cardiographic Changes During an Induced Attack of Pain

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An occasional patient with angina pectoris caused by coronary artery disease suffers from pain of such atypical distribution that, in order to establish the diagnosis beyond doubt, it becomes important to obtain objective evidence of organic heart disease. The electrocardiogram taken at rest furnishes the desired information in some of these patients, but in a considerable number no significant electrocardiographic changes are present. In the latter group, an electrocardiogram taken during an induced attack of pain usually shows changes in the S-T segment or the T wave of greater degree than occur in the tracings of normal individuals after the same amount of exercise. The value of these changes as a corroborative diagnostic measure is demonstrated in the following case report.

REPORT OF CASE

A businessman, 56 years of age, came to the Clinic because of attacks of stiffness in the neck and "congestion" in the substernal region. The symptoms had appeared first eighteen months earlier, and during the last seven weeks had become much worse. Both the stiffness in the neck and the sense of congestion in the chest were induced by exertion. The patient was unable to walk more than half a city block at a moderate pace without experiencing such distress that he would find it necessary to stop. With rest the symptoms would subside in about ten minutes. Exposure to cold air appeared to be an important predisposing factor in the development of the attacks and, at times, the symptoms were brought on by smoking. The relief afforded by rest seemed to be hastened by the inhalation of spirits of ammonia, by taking nitroglycerine, or by drinking a small amount of whiskey. Digitalis had been taken for short periods during the seven weeks before his admission, without benefit.

The attacks began with a choking sensation in the throat, followed immediately by a sensation of aching and stiffness in the back of the neck. The aching radiated into the occipital region and sometimes into the shoulders and outer aspect of both arms as far as the elbows. The discomfort in the neck was followed shortly by the development of a sense of fulness in the substernal region, which was accompanied by moderate dyspnea.

Physical examination revealed a well developed and well nourished middle-aged man. The pulse rate was 63 per minute and the blood pressure, 100 mm. systolic and 68 mm. diastolic. There was slight tenderness over the lower cervical spine. The lungs were clear throughout. The heart was not enlarged, its rhythm was regular, but the sounds were of poor quality. No murmurs were heard. There was moderate sclerosis of the peripheral arteries.

A clinical diagnosis of coronary heart disease with angina pectoris was made. It was thought that degenerative arthritis of the cervical spine may have been a factor in determining the atypical distribution of the anginal pain.

The blood count and urinalysis gave findings within the limits of normal. The Wassermann reaction of the blood was negative. Roentgenologic examination of the chest showed the heart to be normal in size, shape, and position, and the lung fields to be clear. Examination of the cervical spine revealed ankylosis of the fifth and sixth cervical vertebrae, apparently a congenital defect. The electrocardiogram showed sinus rhythm with a rate of 62, slight sagging of the S-T segments in Leads II and III, diphasic T waves in Lead II and inverted T waves in Lead III.

An exercise tolerance test was done by having the patient mount and descend a two-step staircase. An electrocardiogram was taken before beginning the exercise, and the electrodes were kept in place throughout the test. Fifty trips over the steps failed to induce distress in the neck or chest. Immediately after cessation of the exercise, Lead IV_F of the electrocardiogram was recorded. The patient then was given several ice cubes to hold in his left hand while exercising on the steps once more[1]. After ten trips he began to experience a choking sensation in the throat but no aching in the neck or substernal oppression. In spite of about fifteen additional trips over the steps, no further sensations developed, and at that time the exercise was terminated. Lead IV_F was recorded immediately. About three minutes after the cessation of the test, the patient began to complain of severe substernal oppression and was in obvious distress. Lead IV_F was recorded again, and the patient was given a tablet of nitroglycerine, grains 1/100, which promptly gave relief from all symptoms. The patient had noted only a little aching in the back of the neck when he had the substernal distress. A 4-lead electrocardiogram was taken about three hours later.

Figure 1 shows the electrocardiogram taken at rest. Since the patient had had an unknown amount of digitalis during the previous seven weeks, the changes in the S-T segments and T waves are of doubtful significance. Figure 2 shows the effect of exercise on Lead IV_F. Tracing A is the normal control. It shows 0.8 mm. depression of the S-T segment and a T wave 4 mm. in height. Tracing B, taken after fifty trips over the steps, shows 1.0 mm. depression of the S-T segment and a T wave 5 mm. in height. Tracing C, taken after twenty-five additional trips over the steps while ice was being held in the left hand, shows 1.0 mm. depression of the S-T segment and a T wave 5 mm. in height. Tracing D, taken after the onset of the pain in the chest, shows the S-T segment to be depressed 4.5 mm. and the T wave to be 10 mm. in height. Bradycardia appeared with the onset of the substernal pain. The electrocardiogram taken three hours after the exercise tolerance test was identical with the control tracing.

DISCUSSION

The changes in the electrocardiogram during and after attacks of angina pectoris induced by exercise have been studied by a number of observers and were recently investigated under standardized conditions by Riseman, Waller and Brown[2]. Riseman and his associates observed a deviation, usually a depression, in the level of the S-T segment of Lead IV in all of twenty patients during an induced attack of pain. They also demonstrated that similar changes occur in normal individuals after a measured amount of exertion but, in general, the deviation in normal persons is of less magnitude than in patients who have angina pectoris. Changes in the level of the S-T segment of 1.5 mm. or more were encountered commonly during attacks of angina pectoris, but deviations of this degree were not recorded in any of the normal individuals. When, however, the electrocardiographic changes in patients with angina pectoris, after an amount of exercise which seldom caused pain, were compared with the changes in normal individuals after the

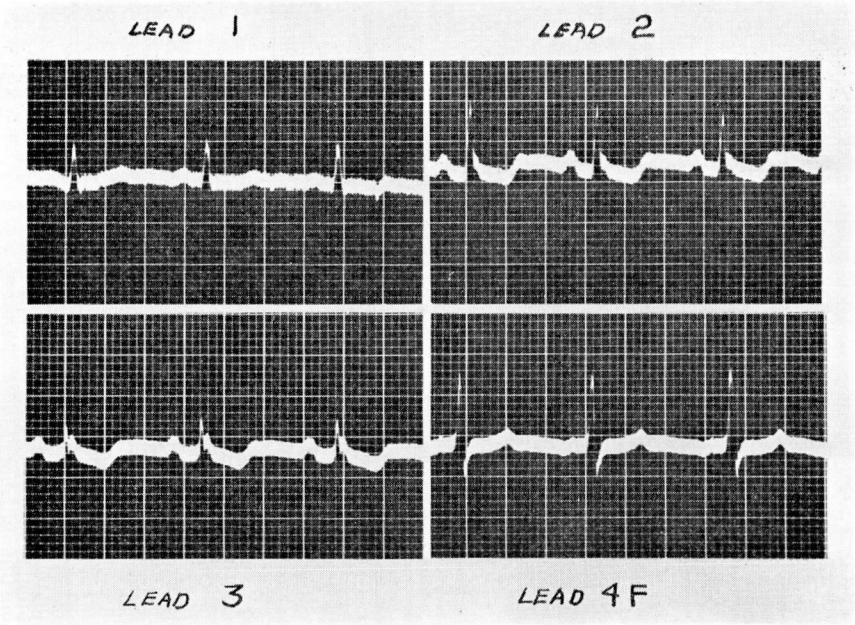

Figure 1. Electrocardiogram taken at rest.

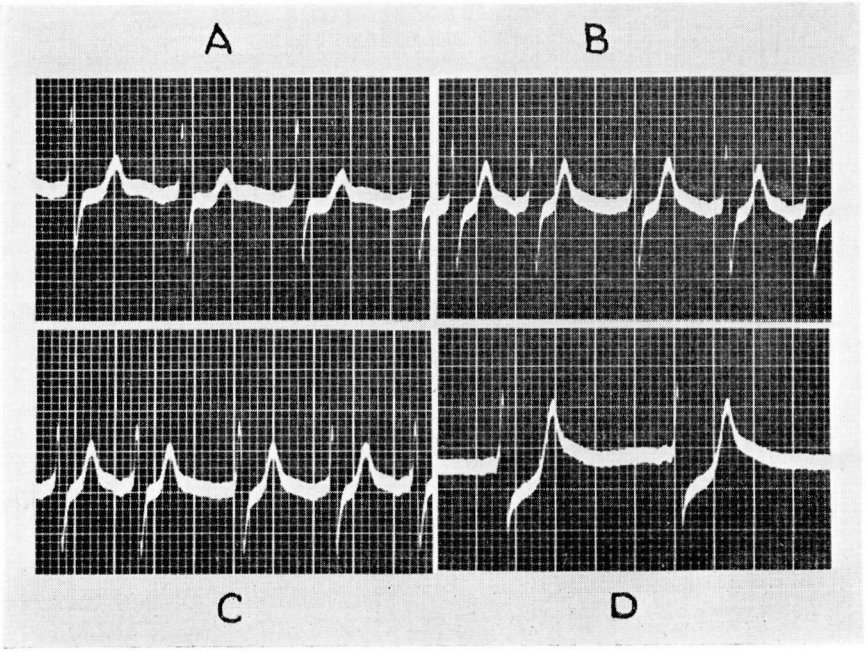

Figure 2. The effect of exercise on Lead IVf of the electrocardiogram. A., at rest; B., after 50 trips over two-step staircase; C., after 25 additional trips with ice in left hand; D., 3 minutes after C.

same amount of exertion, the differences between the two groups were not sufficient to be of diagnostic value. It is our opinion, however, that when the patient's pain is reproduced by exercise and the electrocardiogram taken during the attack shows a striking change in the level of the S-T segment, this combination is a valuable aid in diagnosis. Of course, this procedure is not necessary in patients who have typical angina pectoris, but it may be of great diagnostic help in individuals who have anginal pain of atypical distribution. In the case reported in the present communication, the patient's pain was induced by exercise, and the magnitude of the depression of the S-T segment in Lead IV of the electrocardiogram furnished important additional evidence of the cardiac origin of the distress.

Riseman, Waller and Brown[2] observed that changes in voltage of the T wave, either an increase or a decrease in amplitude, commonly occur during or after attacks of angina pectoris. A decrease in the voltage of the T wave also was induced by exercise in normal individuals, but an increase in amplitude was not recorded in any of fifteen normal persons. In the case reported above there was an increase of 6 mm. in the amplitude of T_4 during the attack.

Roentgenologic examination of the cervical spine revealed fusion of the bodies of the fifth and sixth cervical vertebrae, and this may have been an important factor in determining the location of the initial symptoms of the patient's attacks. Boas and Levy[3] are of the opinion that extracardiac disease often determines the location and radiation of anginal pain.

SUMMARY

A case of angina pectoris is reported in which the attacks began with a choking sensation in the throat followed immediately by a sensation of aching and stiffness in the back of the neck. It is believed that the presence of ankylosis of the fifth and sixth cervical vertebrae was an important factor in determining the location of the initial symptoms of the attacks. Electrocardiograms taken during an attack induced by exercise showed marked depression of the S-T segment and an increase of 6 mm. in the amplitude of the T wave in Lead IV_F. The electrocardiographic changes were of value in corroborating the clinical diagnosis of angina pectoris.

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