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Multiple unusual abnormalities in the electrocardiogram in myxoedema

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DESCRIPTIONS of the electrocardiographic abnormalities in myxoedema have usually been confined to those of a sinus bradycardia, low-voltage QRS complexes, and T wave changes. Indeed, Wood (1968) described this combination as 'pathognomonic'. Additional changes, however, have been reported by other authors, including a prolonged Q-T interval (Hansen (1961), who also mentioned first degree heart-block), right bundle-branch block (Korth & Schmidt, 1955), complete heart-block (Ibrahim, 1957) and supraventricular and ventricular paroxysmal tachycardia. A sinus tachycardia, slowing after specific treatment, and unexplained on any other grounds than myxoedema, does not appear to have been cited previously; while inverted U waves also have not been described before in this disease.

Case report

A married woman of 53 was seen at out-patients with a 3-month history of fatigue, hoarseness, swollen hands, dry skin, puffy face, cramp in the feet, constipation, gain of a stone in weight, and recent cold intolerance. She had six children and had then been sterilized, but otherwise had an uneventful past history. Her menarche was at the age of 14½ and there was normal menstruation until the menopause at the age of 51. Particular questions were asked about possible anginal symptoms or other cardiac features, and none were elicited. There was no family history of any form of thyroid disease, diabetes mellitus, or pernicious anaemia, and no drugs had been taken in the remote or immediate past.

On examination her weight was 63 kg, height 1.5 m, temperature 35.5° C, pulse-rate 88, and blood-

pressure 130/80 mmHg. She appeared normally alert, but had slightly puffy eyelids, a rough and dry skin over her arms, and there was no palpable thyroid tissue. The relaxation phase of her ankle-jerks was clearly prolonged. The clinical diagnostic index score was + 41 (Billewicz *et al.*, 1969).

Investigations included: serum electrolytes: Na 138, K 4.0, Cl 101, total CO₂ 25 mEq/l; plasma calcium 10.6, 10.6 and 10.5 mg/100 ml; blood urea 45 mg/100 ml; protein-bound iodine (PBI) 1.4 and 1.6 µg/100 ml; serum cholesterol 428 mg/100 ml; Hb 14.2 g/100 ml; leucocytes 6,700/mm³ with normal differential count; urinalysis n.a.d.; negative autprecipitin test for thyroid autoantibodies. X-ray of chest showed no pulmonary or cardiac abnormality.

The electrocardiogram (Fig. 1) showed a sinus tachycardia (rate 120 in lead I), left axis, semi-horizontal position, normal voltage, widespread broadly-inverted U waves, and a prolonged Q-T interval (0.36 sec, the average for the rate being 0.28 sec corrected).

After 6 weeks treatment with thyroxine the electrocardiogram (Fig. 2) showed reduction of the sinus tachycardia to a rate of 100, a more horizontal position, increased voltage of all complexes generally, absence of U waves, and a normal Q-T interval. Normality of the ankle-jerks reflected a general clinical improvement in all respects, at the time of the repeat electrocardiogram.

Discussion

The clinical diagnosis of myxoedema appears certain in this case, but the pre-treatment electrocardiogram would suggest that this diagnosis was

FIG. 1. Electrocardiogram before treatment, showing sinus tachycardia, normal voltage, prolonged Q-T interval, and general widely inverted U waves, best seen in lead I, VL and V5.

FIG. 2. Electrocardiogram after 6 weeks treatment with thyroxine, showing 'paradoxical' reduction in heart rate, increased voltage, normal Q-T interval and absence of U waves.

most unlikely. While Williams (1968) mentions that patients with myxoedema may complain of nervousness and palpitation implying a possibility of thyrotoxicosis, it must be extremely rare to record a sinus tachycardia of 120 in an otherwise classical case of myxoedema, as here; further, the slowing of this tachycardia with treatment is surely 'paradoxical' as a response. In an analysis of electrocardiographic patterns in hypothyroid heart disease Douglas & Samuel (1960) studied the heart rates in forty-four cases before treatment, and found a maximum rate of 90 beats/min, rising after treatment to a maximum of 120. In the standard leads of their cases 38% showed low voltage, and in the precordial leads only 30% pre-treatment, and this does suggest that low voltage complexes occur considerably less frequently than is generally supposed. While they found a prolonged (corrected) Q-T interval in 46% of cases, they concluded that if this finding was due to hypothyroidism, it was irreversible within the time period covered by their study, but it was reversed in the present case. Regarding the U wave, they found it present (without further comment) in 26% of ninety-two cases, and in 17% after treatment. Apart from isolated normal findings, negative U waves have previously only been described in primary myocardial disorders such as angina, left ventricular

hypertrophy, and cardiac infarction. Recently (de Swiet, 1969) a case of subarachnoid haemorrhage was described in which negative U waves appeared, and the further finding of this abnormality in the present case (together with its disappearance on treatment) suggests that its occurrence is probably wider in range than hitherto supposed.

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