Electrocardiographic abnormalities in an elderly woman

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An elderly woman was admitted as an emergency from home. Figure 1 shows an electrocardiogram (ECG) taken at the time of admission.

Figure 1 Admission ECG

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Questions

- 1 What electrocardiographic abnormalities are seen in figure 1?
- 2 What is the diagnosis?

Answers

QUESTION 1

Junctional (J) waves, prolongation of the QT interval, bradycardia, atrial fibrillation, and shivering artefact.

QUESTION 2

Hypothermia.

Discussion

Junctional waves, hump-like deflections at the junction of the QRS complex and ST segment are seen best in the unipolar chest leads (V2-V6).¹ These deflections (also known as Osborn waves) may appear in hypercalcaemia and in patients predisposed to early repolarisation.² Possible mechanisms include altered myocardial repolarisation and depolarisation rates during cooling¹⁻³ or altered epicardial action potential morphology resulting in a voltage gradient across the ventricular wall.² The amplitude of J waves increases with the severity of hypothermia and they are consistently seen below 25°C. Their prognostic significance is uncertain.

Prolongation of the QT interval may persist beyond rewarming, as repolarisation recovers more slowly than depolarisation. Bradycardia is common below 33°C. Prior to reaching this temperature the patient is often tachycardic due to homeostatic mechanisms including shivering and sympathetic activation. At lower temperatures tremor may not be obvious but electrocardiographic shivering artefact is usual, as seen here. Other electrocardiographic abnormalities include QRS widening, ST segment depression, T wave abnormalities, atrio-ventricular block, and arrhythmias, of which atrial fibrillation is the commonest.³

Figure 2 Illustration of the J wave

These electrocardiographic abnormalities disappear with rewarming (figure 2). In this patient atrial fibrillation was longstanding and she was on no anti-arrhythmic medication. On rewarming her ventricular rate rose to 80–100 beats/min.

Final diagnosis

Hypothermia.

Keywords: hypothermia; electrocardiogram; junctional waves; QT prolongation

1 Schamroth L. Hypothermia. In: Schamroth L, ed, *An introduction to electrocardiography*. Oxford: Blackwell Scientific Publications, 1990; pp 254–6.

2 Gan-Xin Y, Antzelevitch C. Cellular basis for the electrocardiographic J wave. *Circulation* 1996;**93**:372–9.

3 Clements SD Jr, Hurst JW. Diagnostic value of electrocardiographic abnormalities observed in subjects accidentally exposed to cold. *Am J Cardiol* 1972;**92**:729–34.

A yellow patient with hepatomegaly

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A 17-year-old woman, born to non-consanguineous parents, presented with 5-year history of persistent yellow discolouration of eyes and urine without any history of nausea, vomiting, pruritus, white faeces, features of hepatocellular failure and blood transfusion. On examination, she had jaundice and hepatomegaly (2 cm), soft in consistency, non-tender with smooth surface. Examination of other systems were non-contributory. At the age of 16 years, she had had an episode of acute cholecystitis and ultrasonography of the hepatobiliary system revealed cholelithiasis (figure 1) with normal hepatic echotexture, biliary system, and hepatic and common bile ducts (CBD). Other investigations revealed haemoglobin 12 g/dl, total leucocyte count $7.6 \times 10^9/l$, neutrophils 64%, lymphocytes 31%, eosinophils 5%, platelets $250 \times 10^9/l$, conjugated hyperbilirubinaemia and normal levels of serum proteins, transaminases, alkaline phosphatase and prothrombin time (table). Oral cholecystography and BSP excretion tests were not performed. The patient was managed conservatively but jaundice persisted and after 3 months she had another attack of cholecystitis. Repeat ultrasonograph showed persistence of gall stones with dilatation of upper part of the CBD. Cholecystectomy with exploration of CBD was performed. Per-operative findings demonstrated that the gall bladder was full of multiple stones but no stones were found in the CBD. Histopathology showed chronic cholecystitis with lithiasis. Liver biopsy revealed gross blackish discolouration of tissue. Microscopically, lobular architecture was preserved and hepatocytes in the pericanalicular regions were studded with blackish-brown pigment in the cytoplasm (figure 2). Some of the Kupffer cells showed similar pigment deposition. The T-tube cholangiogram done on the tenth post-operative day was normal and she made an uneventful recovery. Liver function tests 4 weeks after surgery were similar to those performed pre-operatively.

The younger sister of the patient, aged 12 years, was also found to have jaundice, hepatomegaly (2 cm), soft in consistency, non-tender with smooth surface. Her liver function tests were similar to those of the patient. Ultrasonography of her hepatobiliary system was normal, and liver biopsy was not performed. There was no jaundice in the parents and liver function tests were normal.

Figure 1 Ultrasonograph demonstrating stones in the gallbladder

Figure 2 Microphotograph showing black pigment deposition in liver parenchymal cells, concentrated in centrilobular area (H&E stain $\times 500$)

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Table Laboratory findings

Tests	Patient	Sister
Total bilirubin ($\mu\text{mol/l}$)	95.7	94.0
Conjugated bilirubin ($\mu\text{mol/l}$)	78.6	71.8
Serum protein (g/dl)	7.4	6.5
Albumin:globulin ratio	4.2:3.2	4.0:2.5
Alanine transaminase (IU/l)	40	29
Aspartate transaminase (IU/l)	35	19
Alkaline phosphatase (IU/l), normal range 37–147 IU/l	93	103
Prothrombin time (s), control value 16 s	18	17
Australia antigen (HbsAg)	negative	negative

Questions

- 1 What is the diagnosis and what disorders are associated with this syndrome?
- 2 What is the cause of cholelithiasis in this disease?

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