

CASE REPORT

A young man with a heavy heart

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Abstract

A 34 year old man presented with acute chest pain. His ECG was very abnormal but stable and he was treated with opiate analgesia. When his condition did not improve, chest radiography and cardiac ultrasound were performed. Both revealed metal dense deposits in the heart. On questioning, the patient revealed that he had self injected with mercury 15 years before. Self injection of elemental mercury is rare but well described and normally used by those who are suicidally depressed or who seek to improve sexual or athletic performance. Intravenous mercury may be deposited in the right heart and can result in ECG abnormalities, which may later be mistaken for changes due to coronary or other cardiac disease and result in inappropriate medication and hospitalisation.

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An accident and emergency department will usually treat a patient presenting with chest pain as an emergency case. An ECG can help to assess acute chest pain, but may also be responsible for misdiagnosis. Furthermore, patients with previously diagnosed stable ECG abnormalities may use their knowledge of their condition inappropriately to obtain medical attention or opiate drugs. We report the case of a young man, with stable ECG abnormalities

due to previous self administration of intravenous mercury, who presented with acute chest pain, and in whom the ECG findings initially confused the situation.

Case report

A 34 year old man presented at our accident and emergency department with severe retrosternal chest discomfort, sweating, hand tingling, and circumoral paraesthesia, which had developed several hours earlier. On arrival, he seemed to be in great distress and his ECG was very abnormal (fig 1); it was decided that his condition warranted immediate intravenous opiate analgesia. He had epilepsy as a child but he denied other significant previous illness or hospital admission within the past two years. He smoked 20 cigarettes a day and physical examination was unremarkable. Serial cardiac enzymes revealed no abnormality, his ECG did not change over the next three days; a chest x ray was taken (fig 2), which was very abnormal. Metal dense deposits could be seen within the cardiac silhouette and small opacities were present throughout both lung fields. Therefore, cardiac ultrasound was performed, which showed metal dense deposits on the posterior aspect of the right ventricle extending into the distal septum, with normal right and left ventricular systolic function and no hypertrophy. On further questioning, the patient admitted to self injection with metallic mercury

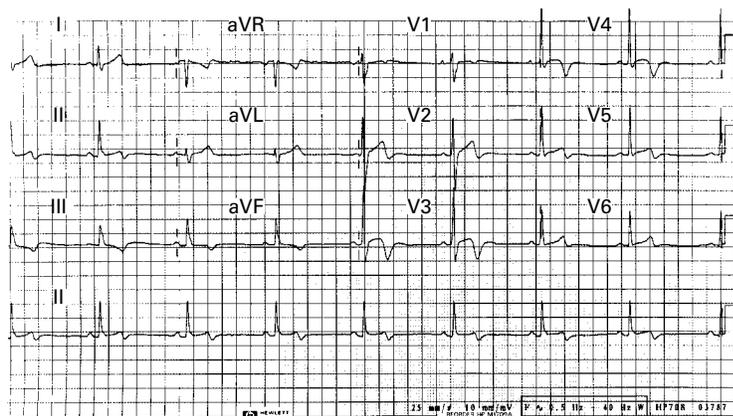


Figure 1 12 lead ECG at presentation showing widespread anterior and inferior T wave changes.



Figure 2 Chest x ray showing metal dense deposits within the cardiac silhouette at the apex of the right ventricle, and multiple small metal dense deposits scattered throughout both lung fields.

(obtained from thermometers) on one occasion 15 years before. He acknowledged toxicological surveillance, but denied any other contact with health services.

It transpired that, in the past six months, this patient had presented to other hospitals with similar symptoms, four or more times. An ECG from one of the previous admissions was similar to the ECG taken on this occasion. A previous ventilation perfusion scintiscan was also normal. During the course of his admission to our hospital the patient received seven doses of intravenous opiate analgesia. Once we had established his full history, analgesia with non-steroidal anti-inflammatory agents was given and the patient was discharged. The final diagnosis was non-cardiac chest pain with an abnormal ECG due to the intracardiac deposition of mercury.

Discussion

There is a long history of inadvertent mercury poisoning. Indeed, it is possible that the unusual behaviour of Sir Isaac Newton in 1693 was due to mercury poisoning (among various bizarre letters to his friends, he accused one of “endeavouring to embroil me with women”).¹ Mercury poisoning is usually caused by inorganic mercuric chloride or the highly toxic organic compound—for example, as in Minamata disease.² Though rare, self injection of elemental mercury is well described and is often part of a suicide attempt, or may be used by drug misusers as a novel way of becoming intoxicated.³ Other unusual incidences of self injection of mercury include a 14 year old boxer who received a 20 ml injection of metallic mercury in the belief that it would strengthen his punches, and subjects who believe that mercury injections will improve sexual prowess.⁴ Furthermore, an individual may self inject with mercury repeatedly^{5,6}; health service workers are somewhat overrepresented in such cases.^{7–10}

An acute toxic illness which is usually mild, but may be lethal, can develop after an intravenous injection of mercury. Follow up can be difficult, although the chronic phase seems to be remarkably benign, with a low risk of developing long term neurological or pulmonary sequelae. Additionally, intravenous self injection with mercury may result in local extravasation, sterile abscesses, and lung embolisation. In some cases, the mercury is deposited in the right heart, commonly at the apex, where it may be detected radiographically with chest *x* rays, computed tomography, or by ultrasound examination of the heart.^{11–13} Over time, intracardiac mercury may become endothelialised and may also diffuse locally induced cardiac granuloma formation.³ An abnormal ECG may thus arise from either the electrical effects of metal in the heart or from local fibrosis; it is possible that, in the long term, cardiac disturbance may be caused by chronically high levels of mercury in the blood, as experimental mercury poisoning by inhalation also results in an abnormal ECG.^{2,3,14} Mercury deposits have also been seen in the pericardium after intravenous injection; these

may be a consequence of mercury droplets passing through the lung either directly or through precapillary shunts, and possibly the degree of systemic toxicity of elemental mercury depends on the degree to which mercury passes through the pulmonary circulation and into the systemic circulation.^{5,6} Although pericardial mercury deposits may cause abnormalities in the ECG, this was unlikely to be the cause in our patient, as both the chest *x* ray and the cardiac ultrasound failed to show mercury in the pericardium. The prognosis of cardiac mercury deposits is unknown. Interestingly, despite chronically raised levels of mercury in the blood of such patients, late onset cardiomyopathy has not been reported. Our patient had cardiac mercury deposits for 15 years without significant cardiac dysfunction; this therefore suggests that the outlook may be good, and that mercury in the heart does not justify aggressive intervention.

Self administration of mercury usually occurs in people with a psychiatric illness or a personality disorder. The case presented here is unusual because it seems to be the first reported case where the patient has used the resulting ECG abnormality to justify multiple episodes of acute hospital admission. He was not a local resident and this led us to suspect that the final diagnosis would be of a non-cardiac condition; suspicion was heightened when we were presented with evidence that conflicted with his verbal history. It was unclear as to whether this was part of a Munchausen pattern of illness behaviour, an unusually dramatic response to chest wall pain, or whether this behaviour was designed to obtain opiate drugs. There was no evidence that the patient had any other form of structural heart disease, and it seemed very unlikely that he had coronary disease.

Metal chelation treatment is used to treat both acute and chronic elemental mercury poisoning; however, given that the long term risk of toxicity from metallic mercury seems low, the long term benefit from chelation therapy is thus equally low and its use could be restricted to those with symptoms of mercury poisoning.^{9,13,15} These symptoms may be subtle and require complex neuropsychological testing for accurate detection.^{10,16} If the majority of the mercury is accessible—for example, subcutaneous, the best approach may be local excision, which can result in a rapid fall in blood and urine mercury levels.^{9,17} Ultimately, in the absence of symptoms it is difficult to know if aggressive treatment is justified, as long term studies do not clearly illustrate the benefit of such treatment.¹⁸

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