

Case report of a mysterious myocardial mass: an aetiological conundrum

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Introduction

Atypical chest pain is frequently an aetiological conundrum, and missing a diagnosis of underlying cardiac disease can have detrimental consequences. The investigation of this may rule out cardiac disease but often provides no clear answers to the underlying pathology.

Case presentation

An 80-year-old man with a background of bilateral inguinal hernia repairs but no cardiac disease presented to his general practitioner with intermittent chest pain of approximately 15 min duration, felt inside his chest under his right nipple. His episodes of chest discomfort had increased in frequency, occurring both at rest and upon exertion. He was seen by the cardiology team at his local hospital and reassured following normal coronary angiography and outpatient echocardiography. The pain persisted, so cardiac magnetic resonance imaging (MRI) was arranged to exclude the underlying myocardial disease. This demonstrated a mass within the right ventricular free wall, which MRI was unable to characterize. Follow-up cardiac computed tomography showed this to be a metallic object within the right ventricular wall, but despite thorough examination of his medical and social history, there remains no obvious explanation to its aetiology other than potentially due to clip migration from his hernia repair.

Discussion

Metallic foreign bodies within the myocardium are described in case reports but almost entirely in the setting of intentional self-injury. There is no previous case evidence of migration of distal surgical clips to the heart, but there appears to be no other clear aetiology for this gentleman's pathology, thus representing a novel description of iatrogenic injury.

Keywords

Atypical chest pain • Foreign body • Iatrogenic

Learning points

- Atypical chest pain is an umbrella term covering a wide variety of aetiologies. It may require lengthy and thorough investigation to come to a satisfactory diagnosis, which explains the patient's symptomatology.
- It may be possible for significant haematogenous spread of iatrogenic foreign bodies, more than has previously been described in the case report literature.
- Metallic objects are often seen on plain radiography or fluoroscopy and returning to these imaging modalities first may be a sensible first port of call when trying to determine the nature of an abnormality. While echocardiography is evidently of use in many cardiac pathologies, it is unlikely to help pick up abnormalities of a metallic aetiology.

Introduction

Atypical chest pain is frequently a difficult clinical conundrum. Although atypical pain is generally benign,¹ cardiac chest pain could have deleterious consequences, if missed.² With an abundance of imaging techniques available to investigate chest pain, it is important to be aware of limitations and artefacts. There are, however, cases when it is impossible to make correct diagnosis without using a wide range of imaging modalities.

This report describes the case of an atypical chest pain, which, after thorough investigation, demonstrated an unexpected and rare cardiac finding. We still remain unsure of the underlying aetiology, which we feel would benefit from external consideration.

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Timeline

Day/month	Event
18 March 2016	Patient presents to a general practitioner following a 2-month history of chest discomfort
19 March 2016	Seen in Rapid Access Chest Pain Clinic—sent to emergency department with suspicion of unstable angina
19 March 2016 (p.m.)	Seen by a medical team, admitted under cardiology. Undergoes angiography—nil abnormal detected
20 March 2016	Discharged for further outpatient investigations
26 May 2016	Echocardiography performed—nil abnormal detected
19 November 2016	Ongoing symptoms still present
15 March 2017	Cardiac magnetic resonance imaging demonstrates abnormal mass in the right ventricular free wall
9 May 2017	Cardiac computed tomography demonstrates a metallic object of uncertain aetiology encysted within the right ventricular free wall
July 2017	Patient seen in the cardiology clinic—currently symptom free, happy to manage conservatively

Case presentation and diagnostic assessment

An 80-year-old retired veterinary surgeon presented to his general practitioner (GP) in March 2016 following a 2-month history of ‘chest discomfort’ under the nipple on the right hand side of the chest, which he felt on the interior of the chest. He described this pain as 3–4/10, lasting for approximately 15 min each time and increasing in frequency. He noted that at the time of presentation to his GP they were occurring every 2–3 days. These episodes occurred both at rest and upon exercise, though he did note that they were particularly more prominent when on his bicycle or in times of stress.

He did not complain of any symptoms associated to his discomfort, specifically no shortness of breath, palpitations, dizziness, or loss of consciousness.

His medical history included neither history of cardiac disease nor any other significant ongoing disease. He does experience nocturia for which he takes solifenacin and has undergone some surgical interventions. He had a transurethral resection of the prostate in 2007 with no complications. He also underwent a laparoscopic bilateral inguinal hernia repair in the same year with no complications. In the 1990s, he had a procedure to remove varicose veins of the right leg and underwent a rigid cystoscopy for haematuria in the 1970s with no underlying abnormality noted.

He was sent by his GP to the Rapid Access Chest Pain Clinic at his local district general hospital on 18 March 2016. Examination was unremarkable with normal observations and heart sounds. He was

advised that due to the nature of his symptoms, he should attend the emergency department with a diagnosis of unstable angina. In the emergency department, he also complained of some right thumb numbness associated with the right-sided chest pain. After the administration of glyceryl trinitrate spray in the emergency department, he felt that the discomfort had slightly diminished.

Upon initial examination by the medical team, the cardiovascular system was entirely unremarkable. Heart rate was 70 b.p.m., while pulse was regular with normal volume, oxygen saturation was 99% in room air, auscultation of the heart demonstrated normal heart sounds with no additional sounds audible, and peripheral pulses were present and of good volume. Peripherally, there were no stigmata of cardiovascular disease and no peripheral oedema. Respiratory and gastrointestinal examinations were similarly unremarkable. Normal observations and body mass index were noted.

Biochemical investigations demonstrated a troponin-I within normal range as well as otherwise entirely unremarkable full blood count and urea and electrolyte panels. A 12-lead electrocardiogram showed no ischaemic changes at rest (*Figure 1*), and his chest X-ray showed no acute abnormalities. His cardiovascular risk profile was limited; he is an ex-smoker with mild hypercholesterolaemia and a family history of late-presentation acute coronary syndrome.

He was referred to the cardiology team who admitted him to undergo coronary angiography. This was performed without complications and demonstrated normal coronary arteries. He was subsequently discharged with plans for further investigations as an outpatient. Outpatient echocardiography demonstrated normal biventricular structure and dimensions and preserved ejection fraction with mild-to-moderate tricuspid regurgitation (*Figure 2*).

A 24-h Holter test displayed no abnormalities. Incidentally, discontinuation of solifenacin for detrusor instability improved his symptoms, but his chest pain did not settle entirely. He was subsequently followed up with stress cardiac MRI. This demonstrated a round-shaped mass in the right ventricular free wall (*Figure 3*), but tissue characteristics were not compatible with known benign or malignant masses. Cardiology multidisciplinary team suggested cardiac computed tomography to assess the mass and mediastinum in full.

Computed tomography demonstrated that the round mass was actually an artefact from a small metallic object incorporated into the right ventricular free wall measuring 2 × 3 mm (*Figure 4*).

In hindsight, it had been visible on fluoroscopic imaging (*Figure 5*) during angiography. Chest radiography performed did not display the object clearly.

In summary, there is a small metallic object within the free wall of the right ventricle, which is likely to have been causing chest discomfort. The patient cannot explain how this could have become imbedded in his myocardium.

Interventions, follow-up, and outcomes

No follow-up is currently planned as his symptoms are not troubling him significantly at the current time as it appears that the object remains encysted within the myocardial wall. In line with the patient’s

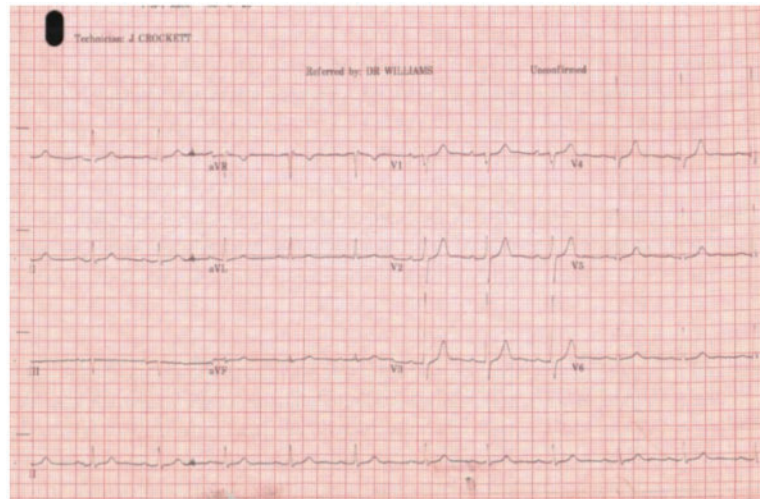


Figure 1 A 12-lead electrocardiogram on admission demonstrating no evidence of ischaemia.

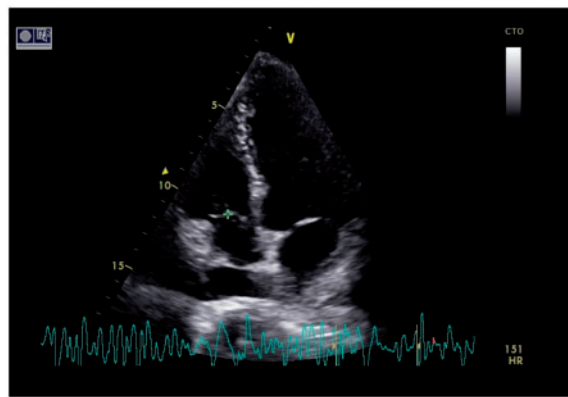


Figure 2 Four-chamber echocardiography demonstrating no evidence of structural abnormality.

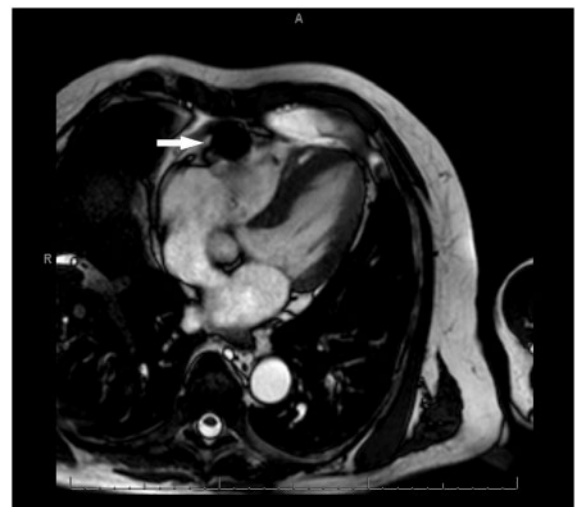


Figure 3 Cardiac magnetic resonance imaging demonstrating a round mass within the right ventricular free wall.

preferences, a conservative management strategy is being followed unless there is a change in his symptoms.

Discussion

In terms of possible aetiologies, the patient used to work as a veterinary surgeon and now continues with DIY at home. He notes that he is not particularly vigilant with wearing a protective mask when using an axle grinder and other tools, and he occasionally holds nails and similar objects in his mouth when building or repairing objects.

He and his elder brother, whom he consulted, could recall neither any traumatic chest injury nor about potential childhood injuries. As a child, he did spend a lot of time outdoors and would accompany others on shooting expeditions, though he maintains he never sustained any injuries. He would regularly eat game that had been killed on these hunts.

We are still unsure of the direct provenance of the metallic object and how it ended up in the right ventricle. Given the chronology, one possibility is that a surgical clip from his laparoscopic inguinal hernia repair became dislodged and migrated via the external iliac vein to the inferior vena cava and subsequently to the right side of the heart. This being said, although there are several case reports regarding local migration,^{3,4} we have found sparing cases of device or clip migration to the heart,⁵ and no cases found in which foreign bodies had been implanted elsewhere and migrated through the tissue and subsequently the vascular system to the heart. It is, therefore, of interest that an object may have been introduced iatrogenically and migrated to the right side of the heart without causing significant damage or more significant symptoms.

Given that the existence of an intracardiac metallic object was not known prior to the magnetic resonance imaging (MRI), it is lucky that



Figure 4 Cardiac computed tomography showing metallic object within the right ventricular free wall.

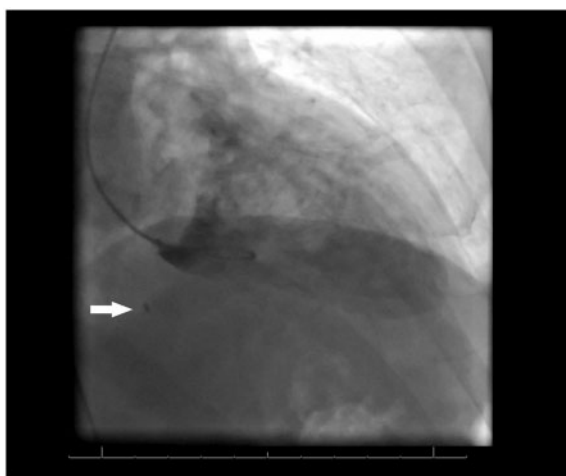


Figure 5 Angiographic fluoroscopy demonstrating radio opaque object consistent with small metallic object in the right ventricle.

no significant damage was caused by the investigation itself. It is also possible that the movement of the object could have been induced by the MRI itself, though its significant encasement within the myocardium would seem to contradict this.

Generally, within the literature, cases of intracardiac foreign bodies are rare, but isolated case reports do exist regarding similar presentations. These cases, however, occur in a more acute clinical setting with a more clearly delineated mechanism of injury. Almost universally these appear due to intentional self-injury^{6–8} in the setting of mental health disease, although Nishida *et al.*⁹ do describe cardiac injury secondary to a sewing needle leading to tamponade in which the patient did not remember the mechanism of injury.

While the patient's symptoms are not convincingly related to the foreign body within the right ventricle, its very existence is perplexing. Given the potential for damage to cardiac, as well as pre-and

post-cardiac structures in transit of the foreign body, it would be worthwhile discovering the nature of the object and discussing possible provenance, but the patient's symptoms are currently unobtrusive and the invasive nature of any attempt to remove the object means we are limited in terms of reaching a definitive answer.

Patient perspective

Most metals and alloys are not biologically inert, so in the body, electrochemical reactions often take place causing non-septic abscess. Everyday items used in DIY are not sterile so some reactions would be expected. While many metals are not magnetic, many household fittings and fastenings are plated steels (magnetic) and only some stainless steels are non-magnetic.

As a veterinary surgeon in general practice (I retired 15 years ago), I frequently encountered migrating foreign bodies, such as a seed from barley grass entering between the toes of a dog, usually presenting as lame with a septic swelling between the toes. Lancing the lesion, the seed would be removed leading to prompt resolution, but if the patient was presented later (or if not completely removed in the first instance), the seed could migrate deeper and cranially and become extremely difficult to locate, with the pus tending to drain towards the original point of entry via a narrow tract. The migration was facilitated by the arrangement of the spiny hairs along the seed leading to a ratchet effect. They could also be found in ear canals (acute pain and head shaking) and eyes (acute blepharospasm sepsis and corneal trauma).

The one thing that does not hold still while the patient holds breath and lays still is the heart, making visualization much more difficult!

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Consent: The author/s confirm that written consent for submission and publication of this case report including image(s) and associated text has been obtained from the patient in line with COPE guidance.

Conflict of interest: none declared.

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