CASE REPORT

A tale of comet tail: multiple pellets in the heart

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SUMMARY

A 66-year-old man who presented with chest pain was assessed with a CT coronary angiogram that showed multiple hyperdense bodies. Echocardiography documented a comet tail artefact, an uncommon ultrasonic finding but no other abnormality.

BACKGROUND

A cardiac injury due to firearm bullets or pellets usually has catastrophic consequences with poor survival rate. The patient is taken to an emergency department for urgent surgical assessment and treatment, particularly if arrhythmias, heart failure, ventricular septal defect or cardiac tamponade are evident.^{1 2} In survivors of such injury, chest X-ray (CXR) and chest CT can easily demonstrate the bullets or pellets in the thoracic cavity.³ Echocardiography is the only non-invasive tool to demonstrate the real-time physiological consequence of the metal foreign bodies in a moving heart. However significant artefact can occur and make image acquisition and interpretation difficult.

CASE PRESENTATION

A 66-year-old Turkish man was assessed in the Rapid Access Chest Pain Clinic for left-sided chest pain associated with left arm numbness. The chest pain was described as a substernal chest discomfort provoked by exertion and emotional stress, lasted for 2–4 h and relieved either gradually on its own or with painkillers. No history of chest wall injuries, cervical spondylosis or drug abuse was reported. The patient's risk factors for coronary artery disease (CAD) were dyslipidaemia and family history of ischaemic heart disease.

On clinical examination, no obvious scars were seen, his heart sounds were normal, pulse 84 bpm, blood pressure 98/65 mm Hg and his chest was clear on auscultation. The 12-lead ECG was unremarkable.

The patient's likelihood of having a CAD was estimated at 86% as per National Institute for Health and Care Excellence (NICE) 2010 guidelines⁴ and a CT coronary angiogram and echocardiogram were organised.

The coronary calcium score on electron-beam CT was zero suggesting that CAD was unlikely. On the CT images, there were multiple hyperdense foreign bodies scattered in the inferiobasal region and the anterior wall of the left ventricle. There were others embedded in the chest wall and in the upper abdomen (figure 1A, B). Subsequent CXR identified five metal pieces in the cardiac contour (figure 2).

An echocardiogram was performed to evaluate if these foreign bodies had an effect on the overall left ventricle function or if any regional wall motion abnormalities were caused. The wall motion and overall function of the left ventricle were not affected though there were multiple echo intensive areas suggestive of metal pieces embedded in the heart.

A long piece (11×2 mm) was in the mid-ventricular septum and two small pieces of metal in the left ventricular apex. One of them produced a bright and long funnel-shaped echo artefact extending across the left ventricle and left atrium (figure 3). This is most likely to be a comet tail artefact, an uncommon ultrasonic finding.

Figure 1 CT showing hyperdense foreign bodies in (A) the myocardium and chest wall and (B) the abdomen.

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Figure 2 Chest X-ray with multiple hyperdense foreign bodies.

INVESTIGATIONS

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DIFFERENTIAL DIAGNOSIS

Based on the hyperdense foreign bodies on the CT scan, a differential diagnosis of a permanent pacemaker or gunshot wounds must be considered.

OUTCOME AND FOLLOW-UP

The case was discussed in the joint cardiology and cardiothoracic surgery meeting and it was concluded that no surgical intervention was indicated. The patient was discharged from cardiology as there had been no problems for 30 years but some chest pain which was possibly due to metal pieces embedded in chest wall.

Figure 3 Apical four-chamber view with comet tail artefact.

DISCUSSION

In the absence of detailed relevant medical history, the hyperdense foreign bodies on CT images suggested a differential diagnosis of pacemaker leads or gunshot wounds.

The patient did not have a pacemaker or any implantable device, but on subsequent direct questioning to previous possible gunshot wound he admitted to having been shot in the chest over 30 years ago. The largest metal fragment had been removed from his sternum and no further surgery required. Though there were no obvious scars on the chest wall, fine ones could have been missed due to chest hair.

The echo recorded a comet tail artefact extending across the left ventricle and left atrium.

Comet tail artefact is a form of merged reverberations of high frequency. It is seen as multiple, equally spaced echoes by the bouncing of the sound waves between two strong reflectors in parallel to the ultrasound beam when the reflecting surfaces are located in a medium with a very high propagation speed, for instance metal.

A comet tail can be mistaken as a ring-down artefact. Ring-down artefact is produced in a gas medium, particularly multiple gas bubbles. When the ultrasound beam reaches the gas bubbles, it excites the liquid between the bubbles causing the liquid to resonate. As a result, continuous sound waves generated and transmitted back to the receiver as a line or series of parallel bands, resulting in ring-down artefact.⁵

Although patient's symptoms were very unlikely to be cardiac, we are not certain about the underlying cause for associated left arm numbness. It is unlikely to be related to his gun wound as no bullet fragments are identified around left shoulder on CXR.

Learning points

- ▶ Gunshot injuries to the heart are potentially life-threatening and must be treated urgently.
- ▶ Echocardiography is the only non-invasive tool to demonstrate the real-time physiological consequence of the metal foreign bodies in a moving heart.
- ▶ There is significant difference between comet tail and ring-down artefacts.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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