Unusual cause of a pulsatile abdominal mass

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A case of pulsation in the abdomen induced by a maladjusted cardiac pacemaker–CRT (cardiac resynchronisation therapy) with an implantable defibrillator is presented. The CRT stimulated the diaphragm causing a repetitive contraction synchronised with the heart beat, giving the picture of an abdominal aortic aneurysm.

A 77-year-old man with a past medical history of significant ischaemic heart disease, atrioventricular node ablation and implantation of cardiac resynchronisation therapy (CRT) presented to the emergency department with a 5 day history of pulsation over the left upper abdominal area. He denied any pain. On examination, he was comfortable and haemodynamically stable, but anxious. A pulsating mass was felt in the left upper quadrant. This was visible and palpable. A focused assessment sonography in trauma scan showed a 6 cm diameter abdominal aorta.

A provisional diagnosis of abdominal aortic aneurysm was made. However, the patient underwent a computed tomographic scan (fig 1), which showed that the abdominal aorta was of normal calibre. Pacing leads were noted in the right atrium and right ventricle with a defibrillator lead lying

within the coronary sinus. The tip of the right ventricular lead lay within 3–4 mm of the left hemidiaphragm. The timing of the left abdominal pulsation matched the patient pulse and the suggestion was that the permanent pacemaker was pacing the left hemidiaphragm.

The permanent pacemaker was adjusted with the left ventricular output reduced from 5 V to 4 V with 2.5 V threshold to pace. No further stimulation of the hemidiaphragm was noted afterwards.

DISCUSSION

CRT is well established as a treatment for patients with moderate to severe heart failure on optimal medical treatment. Early studies demonstrated improved functional capacity and CRT has been associated with a survival benefit in advanced heart failure, both with and without a defibrillator.¹

It may be difficult to establish the diagnosis of an abdominal aneurysm in the emergency department.²

In this case, the reason for pulsation in the abdomen was blamed on CRT. This could happen because of a temporary increase in pacing amplitude, associated with an automatic daily lead impedance measurement, and may cause stimulation of the phrenic nerve, intercostal nerves, diaphragm, or potentially other non-cardiac tissues. Non-cardiac stimulation may occur more often in patients implanted with CRT devices as these devices utilise a left ventricular (LV) lead, which may be positioned close to the diaphragm and/or phrenic nerve. Reprogramming the LV pace vectors or turning off the daily pace impedance measurement provides a non-invasive means to minimise or eliminate non-cardiac stimulation.³

One study was conducted to determine the frequency and causes of intermittent and permanent loss of CRT in patients who have undergone the successful implantation of a transvenous defibrillator that delivers CRT. Among 512 patients, 2% experienced diaphragmatic stimulation post-implantation.⁴

In conclusion, it should be noted that not all pulsatile abdominal masses are abdominal aortic aneurysms.

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Figure 1 Computed tomographic scan of the abdomen and pelvis. The arrow is pointing to the cardiac pacemaker–CRT lead within the coronary sinus.