There have been many reports concerning difficulties with pacemaker (PM) leads. We have recorded brachiocephalic vein (BCV) or innominate vein perforation by a PM lead in a 78-year-old man using three-dimensional computed tomography (3DCT). The patient received a dual chamber PM system implantation in another hospital because of atrioventricular conduction block with mild sinus node dysfunction. His post-operative general condition was quite good and he did not have any complaints. Measured data showed that the amplitude of spontaneous P-waves was 2 mV. However, atrial pacing showed no capture. Chest X-ray revealed that the atrial PM lead tip was at the level of the high right atrium (RA) as shown in Figure 1A (black arrowhead). In contrast, the ventricular PM lead tip was positioned in the right ventricular apex.

Three-dimensional computed tomography to investigate this abnormality showed that the atrial PM lead was outside the BCV and its tip was positioned just above RA in the anterior mediastinum as shown in Figure 1B and C. Judging from these 3DCT findings, the left BCV was perforated by the atrial PM lead in the anterior mediastinum, in the space between the mediastinal pleura and the parietal pericardium.

From the anatomical point of view, the left BCV generally descends forwards from the left and turns backwards in the middle of the anterior mediastinum. This tortuosity of the BCV tends to increase with age. There was an extremely large bend in the left BCV in this case. In fact, the BCV perforation by the PM lead occurred at this bend (white arrowhead). It is very important to take these anatomical characteristics of the left BCV into consideration to avoid complications, especially in old patients. To our knowledge, this 3DCT image of BCV perforation has not previously been reported.
Figure 1  (A) Chest X-ray after PM implantation. The atrial lead tip was positioned at the level of the high RA (black arrowheads). (B) Anteroposterior view of the 3DCT. The atrial lead was outside the left brachiocephalic vein and its tip was located just above RA in the anterior mediastinum (black arrowheads). (C) Lateral view of the 3DCT.