CASE REPORT

Treatment of a malpositioned transcutaneous ventricular pacing lead in the left ventricle via direct aortic puncture

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An 81-year-old woman with progressive cough was hospitalized 2 weeks following transcutaneous pacemaker implantation. Imaging revealed an absent brachiocephalic vein and aberrant course of a ventricular lead into the aorta with implantation into the left ventricle. We describe the unusual anatomic course, diagnosis, and surgical extraction of a malpositioned pacer lead.

Case report

An 81-year-old woman received a single-chamber pacemaker with screw-in lead for symptomatic 2:1 aortic valve (AV) node conduction block. Post-procedure chest X-ray (anterioposterior) revealed normal lead placement (Figure 1A). Two weeks later, she developed a non-productive cough that failed to resolve with antibiotics. A chest computed tomography revealed bilateral infiltrates, a persistent left superior vena cava with an absent brachiocephalic vein, and the pacemaker lead directly entering the aortic arch, crossing the AV, and implanting within the left ventricle (LV) (Figure 1B). With evidence of thrombus on the lead, we believed that the LV lead warranted removal.

A multidisciplinary approach utilized an electrophysiologist implanting a new right-sided dual-chamber pacemaker in the operating room. Next, the left-sided pacemaker was exposed, and the lead followed. It was noted to pass through-and-through the subclavian vein, tracked along the subclavian artery, and directly entered the aorta just distal to the subclavian artery take-off. The lead was removed under fluoroscopy, and direct surgical closure of the aorta, without cardiopulmonary bypass, was required due to significant calcifications of the aortic arch preventing suture-mediated closure systems from being successful. The patient was discharged home on post-operative day 11 with a functioning dual-chamber pacemaker.

Discussion

We describe a previously unreported and unusual case of direct transaortic implantation of a ventricular pacemaker lead. We believe that knowledge of this complication and an understanding of the limitations of routine plain X-ray may be of assistance in future cases of malpositioned leads.

Complications following transvenous pacemaker placement, including ventricular lead malposition, infection, venous thrombosis, and pulmonary emboli have become uncommon and occur in <3% of cases.¹ In this case, proper ventricular lead position was challenging due to the patient’s unrecognized absent brachiocephalic vein. Furthermore, only an anterioposterior plain film was performed making early recognition of the LV lead placement difficult.

There are several different techniques for transvenous lead removal including direct traction, use of locking stylets, laser-assisted extraction, and electrosurgical sheaths but their safety for leads implanted in the arterial system are unknown.² Moreover, leads

Figure 1 (A) Pre-operative anterior–posterior chest X-ray demonstrating tortuous but potentially normal appearing pacemaker lead position, intravascular course, and ventricular implantation. (B) Pre-operative non-contrast thoracic computed tomography scan demonstrating a malpositioned pacemaker lead (white arrow) adjacent to the left subclavian artery (a), entering aortic arch (b), traversing aortic valve (c), with implantation in the left ventricle (d).

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placed in the aorta likely need surgical removal or endovascular repair since there is no way to hold pressure on the aorta. This case highlights the unusual anatomic course, diagnosis, and treatment options.

Previous reports of malpositioned pacemaker leads have described both surgical intervention and anticoagulation therapy. One case was reported 4 years after pacemaker implantation and was managed with anticoagulation therapy since the patient was asymptomatic. We chose to surgically remove the lead as the implantation was recent, her cough appeared to be a symptom of left recurrent laryngeal nerve irritation from the malpositioned lead, and because the patient was a poor candidate for long-term anticoagulation due to her age and fall risk.

We describe an unusual case of surgical lead extraction for transaortic left ventricular pacemaker lead. This report highlights a common anatomic anomaly as a complicating feature during transvenous lead placement as well as the importance of lateral X-ray. Further, we believe that an understanding of the anatomy and potential treatment options are important.

**Conflict of interest:** none declared.

**Funding**
American Association for Thoracic Surgery’s Summer Intern Scholarship (J.I.), National Heart, Lung and Blood Institute (5R25HL088724-03) (J.I.), NIH/NHLBI T32 Training Grant HL007849 (D.L.), and TSFRE Research Grant (G.A.).

**References**