Bronchial penetration of migrated Temporary Epicardial Pacing Wire with bronchoscopic extraction

Christopher G. Roy *, Nicholas A. Pozessere

Maine Medical Center, Department of Pulmonary Disease and Critical Care Medicine, USA

ARTICLE INFO

Keywords:
Pulmonary medicine
Bronchoscopy
Foreign body

ABSTRACT

Our patient was incidentally discovered to have a filamentous foreign object penetrating his left mainstem bronchus during EBUS, with subsequent successful forceps extraction. Temporary epicardial pacing wires (TEPW) are commonly retained during coronary artery bypass surgery. Significant migration of these wires is extremely rare, and in certain instances of airway penetration they are amenable to extraction by bronchoscopy. The risk factors for significant migration, and potential consequences of such events are not well understood currently. Elucidating these elements should be of great interest to cardiac surgery, thoracic surgery, and pulmonary medicine.

1. Introduction

Migration of retained Temporary Epicardial Pacing Wire (TEPW) with penetration of adjacent organs is a known but seemingly rare phenomenon. Pulmonary involvement presents unique risks compared to other organ systems, and there is potential for extraction by bronchoscopy.

2. Case presentation

A 73-year-old man presented for endobronchial ultrasound (EBUS) guided lymph node sampling after computed tomography (CT) imaging of his chest demonstrated a right apical lung mass (Fig. 1), which was noted to be fluorodeoxyglucose (FDG) avid on subsequent Positron Emission Tomography-Computed Tomography (PET-CT) along with several FDG-avid right hilar and mediastinal lymph nodes. He had previously noted cough, dyspnea, and right upper back pain which ultimately led to these findings. His past medical history was notable for prior tobacco use disorder, coronary artery disease with history of coronary artery bypass graft approximately 13 months prior, and ischemic cardiomyopathy with biventricular pacemaker placed three months prior to the date of his EBUS procedure.

During the initial airway inspection, an orange filamentous body was noted to traverse the lumen of the left mainstem bronchus, appearing to penetrate both the medial and lateral airway walls (Fig. 2). On the lateral wall, there was a small amount of exophytic tissue associated with the insertion point of the object.

Of note, no intraluminal bodies or obstructions were visualized on CT chest from approximately two weeks prior. This most recent CT did show a wire-like structure which was noted to originate in the subcutaneous soft tissue overlying the sternotomy site, subsequently coursing between the left atrium and the right pulmonary artery to terminate with the outer margin of the left mainstem bronchus.

* Corresponding author.
E-mail address: cgroy@mmc.org (C.G. Roy).

https://doi.org/10.1016/j.rmcr.2022.101624
Received 6 December 2021; Received in revised form 17 February 2022; Accepted 7 March 2022
Available online 14 March 2022
2213-0071/© 2022 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
bronchus wall (Figs. 3 and 4). Notably, there was no evidence on this most recent CT chest that the wire had actually penetrated into the airway lumen.

Gentle manipulation of the object suggested that it was embedded to each wall to some degree, and also highly deformable. Using forceps, minimal retractive force was applied and the object was successfully extracted from both insertion sites on the airway wall. There was little to no observed bleeding at these sites. The patient was extubated and recovered from anesthesia in an uncomplicated manner, demonstrating normal vital signs without any new symptoms. A post-procedure chest x-ray did not show any significant changes from prior. He was discharged home feeling well.

Upon further examination following completion of the procedure, the object was measured at approximately 17 cm in length (Fig. 5). Review with cardiac surgery confirmed it was consistent with a temporary epicardial pacing wire. TEPWs are frequently employed for cardiac pacing after CABG, and in some cases post-operative removal is eschewed if they are not able to be extricated.
with gentle traction.

3. Discussion

Previous case series note that the duration of time from placement of TEPW to the development of a complication related to migration ranges from a matter of weeks to several decades [1]. In our patient’s case, the migration occurred over the course of thirteen months. Because the wire is not visualized actually penetrating or traversing the lumen of the airway on the CT chest from two weeks prior to our bronchoscopy, it is presumed that this occurred in the interim period. Representing movement of at least a few centimeters, this emphasizes the speed with which such migration can occur, perhaps especially through an air-filled space.

Notably, there have been only a handful of case reports documenting respiratory system involvement of migrated TEPWs, involving penetration of the pleural space and lung parenchyma [2,3]. We are familiar with only two prior instances of migrated TEPW that have been visualized by bronchoscopy [4], only one of which was amenable to removal by bronchoscopy [5]. In our case, we believe that because both ends of the wire were visualized on recent imaging to be free from attachment to any organ, and given the responsivity of the wire to extraction with only minimal retractive effort, our bronchoscopic extraction maneuver was reasonably safe. If either of these conditions were not met, consideration would have to be given to thoracic surgery involvement and operative extraction.

The frequency of TEPW migration and that of subsequent adverse events is not well-described. These questions, in addition to risk factors for migration, are important areas for future study. Increased understanding of TEPW migration could lead to better...
understanding of patient safety risks posed by these devices and improved management strategies. In particular, the threshold cardiac surgery maintains for leaving epicardial pacer wires in place may need to be reconsidered as the answers to these questions become better defined.

4. Conclusion

- TEPWs rarely present with migration, but do have the capacity to cause adverse events related to the respiratory system.
- The true incidence of pulmonary involvement of migrated TEPW, and the risk factors for related adverse events, are not well understood.
- Bronchoscopic evaluation and extraction of migrated TEPW with pulmonary involvement are feasible under certain circumstances, depending on radiographic evidence of wire attachment to other organs and the degree of force required to achieve extraction.

Prior abstract publication/presentation

None.

Funding disclosures

None.

Declaration of competing interest

None.

References

[1] K. Shaikhrezai, M. Khorsandi, M. Patronis, S. Prasad, Is it safe to cut pacing wires flush with the skin instead of removing them? Interact. Cardiovasc. Thorac. Surg. 15 (2012) 1047–1051.
[2] M. Polomsky, J. Saifi, T. Olutola, D.G. Walled, M.G. Katz, An Unusual Case of Epicardial Lead Migration Presenting with Hemoptyis, vol. 6, 2020, 453-356.
[3] T. Sakellaridis, Argiro Michalis, V. Panagiotakopoulos, C. Charitos, Journal of Cardiothoracic Surgery, vol. 4, 2009, p. 26.
[4] G.S. Horng, E. Ashley, L. Balsam, B. Reitz, R.R.T. Zamanian, Progressive dyspnea after CABG: complication of retained epicardial pacing wires, Ann. Thorac. Surg. 86 (2008) 1352–1354.
[5] W.H. Gentry, A.A. Hassan, Complications of retained epicardial pacing wires: an unusual bronchial foreign body, Ann. Thorac. Surg. 56 (1993) 1391–1393.