

**Case
Report**

Intrathoracic Needle Migration from the Mediastinum into the Thoracic Cavity

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Intrathoracic needles are rarely used in clinical practice. They can migrate within the body, injure large blood vessels and other organs, and cause severe complications. We report an interesting case of intrathoracic needle removal using video-assisted thoracoscopic surgery. The needle was inserted under the left clavicle, penetrated the mediastinum, and migrated into the right thoracic cavity. Although pneumothorax developed during the disease course, no severe complications were observed. This rare case illustrates the course of needle migration from the mediastinum into the thoracic cavity. Prompt imaging and surgical removal of foreign bodies are necessary in cases of intrathoracic foreign bodies.

Keywords: intrathoracic needle, foreign body, thoracoscopic surgery

Introduction

Needles within the body are rare in clinical practice. They can migrate within the body and sometimes cause serious complications, such as large blood vessel damage. In the thoracic region, they can occasionally result in various conditions, such as hemothorax, hemopneumothorax, pneumothorax, diaphragmatic rupture, pulmonary contusion, subcutaneous emphysema, pneumomediastinum, and thoracic wall lacerations.¹⁾ Therefore, early

removal of foreign objects from the chest cavity is desirable before they cause complications.^{2,3)}

Some reports have considered why foreign bodies migrate and which routes they travel to reach the thoracic cavity.^{4,5)} However, the process of needle entry into the thoracic cavity is often unclear. Here, we report a rare case of surgical removal of an intrathoracic needle that migrated from the left anterior chest wall into the right thoracic cavity via the mediastinum without damaging the cardiovascular system.

Case Report

A 24-year-old male had a history of self-insertion of a left clavicle piercing needle into the left anterior chest wall. The piercing needle could not be removed from the skin. He presented to another hospital 2 days later with difficulty in removing the needle and pain over the wound and chest. Upon consultation, he had no respiratory symptoms and did not need oxygen support. Physical examination findings were unremarkable. Chest radiography revealed a right pneumothorax with 20% lung collapse and a needle penetrating the mediastinum into the right thoracic cavity. Chest computed tomography (CT) (**Figs. 1A** and **1B**) revealed that the needle

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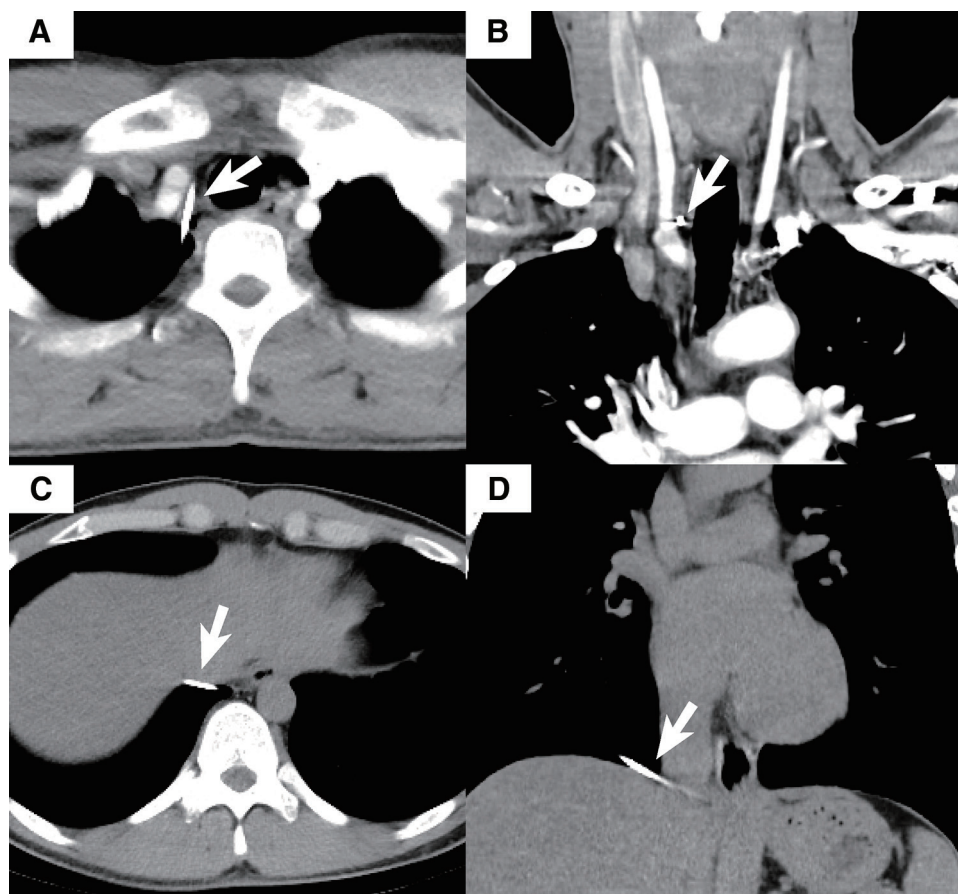


Fig. 1 Chest computed tomography findings. The axial (A) and coronal views (B) show the needle (arrow) penetrating the mediastinum beside the brachiocephalic artery on initial imaging (C and D). The axial (C) and coronal (D) views showing the needle (arrow) on the diaphragm on follow-up imaging.

directly penetrated beside the brachiocephalic artery. Surgery for the removal of the needle from the mediastinum was recommended as soon as possible at the previous hospital. However, the patient refused admission because of his work. He was followed up 4 days later, and on repeat chest radiography, the needle was observed to have fallen onto the diaphragm beside the mediastinum without worsening the pneumothorax. Surgery was again recommended, but the patient refused. As further treatment was considered difficult at the previous hospital, he was referred to our department 2 weeks after his first visit.

Physical examination revealed no abnormality, except for a scar under the sternal end of the left clavicle from the self-insertion of the needle (Fig. 2A). Routine laboratory test results were within normal ranges. Chest radiography showed that the pneumothorax had improved, and the needle was on the diaphragm without a change in its position. Chest CT (Figs. 1C and 1D) revealed that the needle was in front of the vertebral body, with the posterior end near the inferior vena cava and esophagus.

The tip appeared to pierce the base of the right lower lobe. No other traumatic changes were observed on chest CT.

Unilateral video-assisted thoracoscopic surgery (VATS) was performed to remove the needle from the seventh intercostal space along the midaxillary line. Intraoperatively, we observed that the needle was inserted 8 mm into the right lower lobe. The needle was located directly below the visceral pleura, and there was no injury to the other organs (Fig. 2B). We removed the needle (Fig. 2C) from the lower lobe using forceps and performed a wedge resection of the injured lung. The patient's postoperative course was uneventful, and he was discharged on the third postoperative day.

Discussion

Intrathoracic needles are rarely encountered in clinical practice. The causes include trauma, self-inflicted injuries, and iatrogenic diseases, but are sometimes unknown.⁴⁾

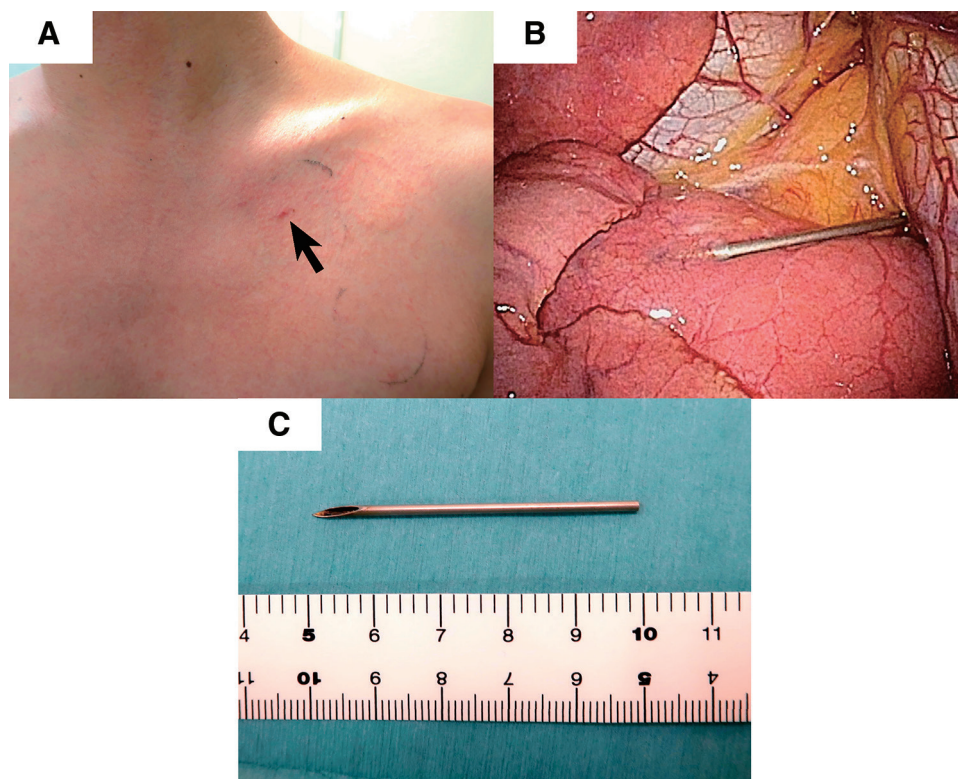


Fig. 2 Insertion site of the needle and intraoperative findings. (A) Insertion site of the needle on the skin (arrow). (B) The needle was inserted into the right lower lobe with the tip just below the visceral pleura. (C) The needle was completely removed.

They have four entrance routes into the thoracic cavity: transesophageal, transbronchial, transcutaneous, or hematogenous.⁵⁾ The migration mechanism remains unclear; however, some reports suggest that it involves muscular activity, shoulder movements, breathing movements, negative intrathoracic pressure, gravitational force, and capillary action.⁶⁾ In this patient, the point of needle entry was in the left anterior thoracic region, and the needle penetrated the mediastinum into the right thoracic cavity. The fact that the needle penetrated the contralateral thoracic cavity from the entry point is perplexing. The needle penetrated the upper part of the right thoracic cavity on chest CT (**Fig. 1**). The entry point was under the clavicle; therefore, the needle must have migrated in the mediastinum up to the clavicle and then downward to the right thoracic cavity (**Fig. 3**). Considering these factors, muscular activity, breathing movements, and capillary action were the probable mechanisms involved in the mediastinal migration in this case. Thereafter, negative intrathoracic pressure and gravitational force facilitated the needle into the right thoracic cavity and its subsequent fall onto the diaphragm.

Various complications caused by intrathoracic foreign bodies have been reported, such as pneumothorax, hemothorax, hemopneumothorax, and empyema.¹⁾

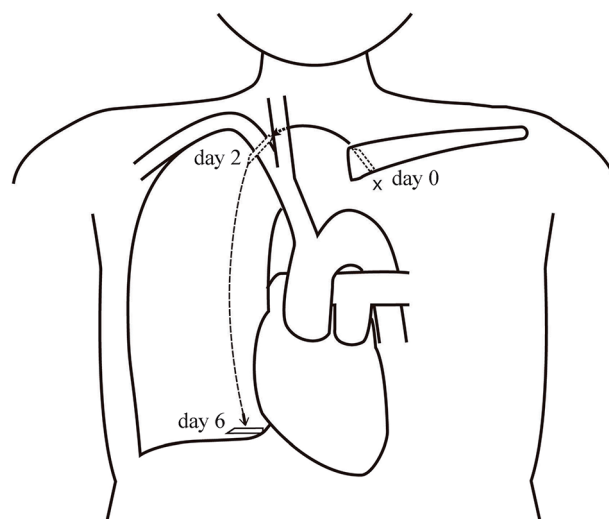


Fig. 3 Migration route of the needle.

Among these, some complications may potentially become life-threatening, including pericardial tamponade, arrhythmias, pericarditis, false aneurysm, aortopulmonary fistula, pneumothorax, and hemoptysis.^{2,3)} Surprisingly, the needle reached the right thoracic cavity in our case without injuring large blood vessels, passing through fat tissue alone. Thus, the only

complication this patient experienced before surgery was pneumothorax.

We performed VATS to remove the needle from the right thoracic cavity and repair the lung via wedge resection. Currently, VATS is a common technique for patients with chest trauma. VATS is a less painful and minimally invasive technique, yields better cosmetic results, allows faster recovery, and leads to earlier discharge.⁷⁾ Furthermore, it enables the evaluation of complications, such as hemothorax or empyema, and injury to peripheral organs.⁸⁾ In our patient, there were no complications other than pneumothorax, which enabled us to perform surgery without thoracotomy and led to faster discharge with a less painful postoperative course.

Conclusion

Herein, we present a rare case of an intrathoracic needle penetrating the mediastinum into the contralateral thoracic cavity. Intrathoracic needles can injure large blood vessels and cause severe complications. Early surgical removal of foreign bodies is essential.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

The patient provided consent for the publication of this case report.

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Data availability statement

Not applicable.

Author contributions

Tomo Sato: Conception or design of the work, or acquisition, analysis, or interpretation of data, manuscript drafting or revision

Yasufumi Kato: Approving the final version of the manuscript for publication

Hiroaki Kataba: Agreeing to be held accountable for all aspects of the work

Koichi Yoshida: Agreeing to be held accountable for all aspects of the work

Hiroki Hayashi: Agreeing to be held accountable for all aspects of the work

Masatoshi Kakihana: Agreeing to be held accountable for all aspects of the work

Norihiko Ikeda: Agreeing to be held accountable for all aspects of the work.

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Disclosure statement

The authors declare no conflicts of interest.

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