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## Clavicle Kirschner Wire Migration into Left Lung: A Case Report

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Statistical Analysis C  
Data Interpretation D  
Manuscript Preparation E  
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**Conflict of interest:** None declared

**Patient:** Female, 65  
**Final Diagnosis:** Clavicle Kirschner wire migration into left lung  
**Symptoms:** No symptoms  
**Medication:** —  
**Clinical Procedure:** Thoracotomy  
**Specialty:** Surgery

**Objective:** Diagnostic/therapeutic accidents  
**Background:** Kirschner wires are often used to perform osteosynthesis. Migration through tissue of these wires is a rare but well-known occurrence.  
**Case Report:** A 65-year-old female presented with light intensity pain complaints in the upper left chest area; personal history included left clavicle fracture 20 years ago that was treated surgically with fixation using a K-wire. Chest radiography showed the presence of metallic foreign body in the left pulmonary apex. An exploratory axillary thoracotomy was performed, and the foreign body was extracted by a pneumotomy.  
**Conclusions:** To obtain satisfactory results with a K-wire, some peculiarities in their application should be respected. The time from orthopedic surgery of the collarbone to migration into the chest of the metal rod used can vary from one day to nearly 20 years. Although the migration mechanism remains unclear, it is likely that it involves shoulder movements, breathing movements, negative intrathoracic pressure, gravitational force, or local bone resorption. Caution should be exercised when orthopedic pins and wires are used for the fixation of fractures and dislocations of the shoulder girdle. If there is migration of the wire, it should be removed immediately to avoid sudden and fatal complications.

**MeSH Keywords:** Clavicle • Device Removal • Lung • Risk Management • Thoracic Surgery

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## Background

Clavicle fractures and sternum-clavicular dislocations are common after traumatic chest injuries. In some cases, orthopedic surgeons need to use metal rods to fix and stabilize these fractures [1].

Kirschner wire (K-wire) was developed at the beginning of the nineteenth century [2]; now it is commonly used for stabilization of complex fractures [3] to perform osteosynthesis.

Migration through tissue of these wires is a rare but well-known occurrence [1,3,4]. Several significant complications of clavicle fixation have been previously reported such as migration of K-wires into the chest cavity that could cause spinal cord, esophagus, lung, trachea, heart, pericardium, or great vessels drilling [1,4–8].

## Case Report

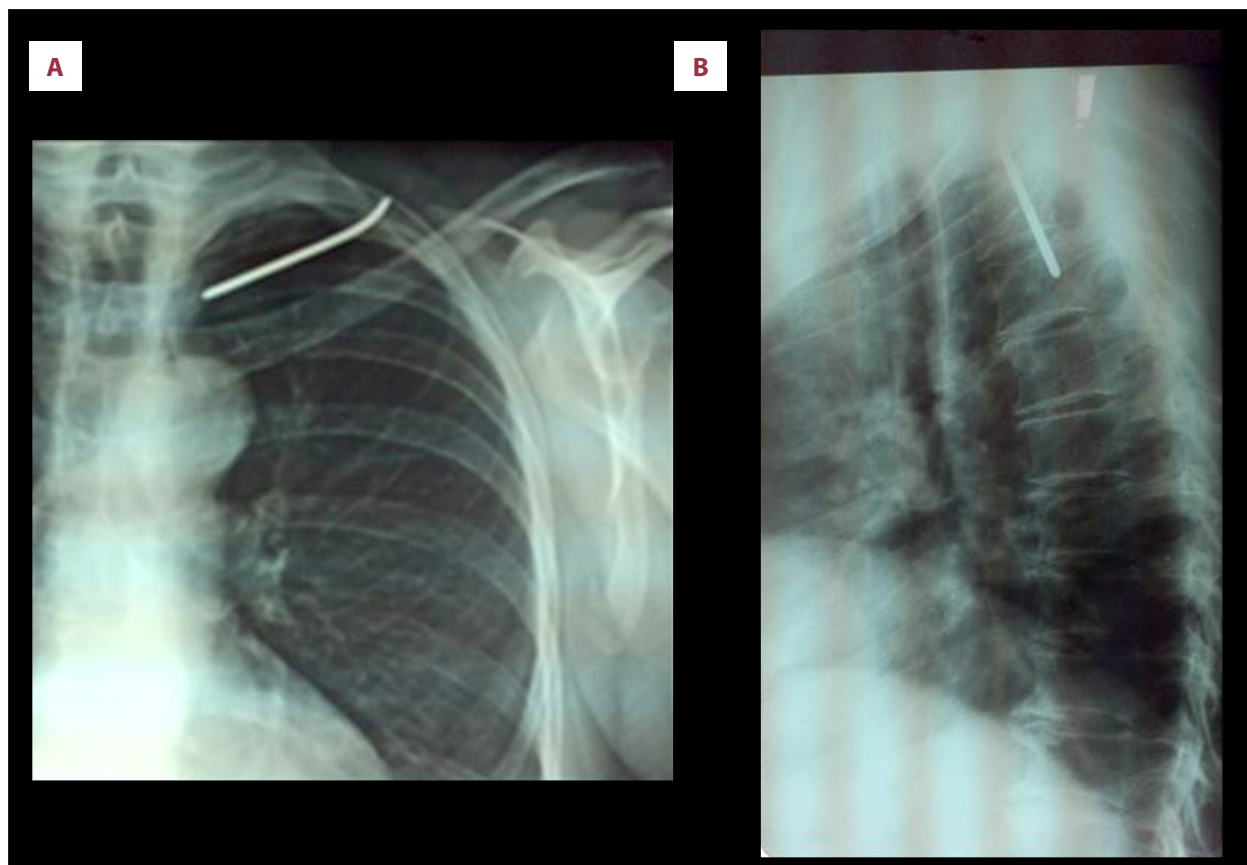
Twenty years ago, a healthy 45-year-old female suffered a traumatic left mid-shaft clavicle fracture when she had an accident with a motorcycle. At that time, she was treated in a rural

hospital then referred to an institution with orthopedic services. The treatment of the clavicle fracture was surgical with fixation using a K-wire. The correct position of the wire was documented by a postoperative chest radiograph. After surgery, the patient continued with her normal activities and did not require a follow-up appointment as she had no complaints.

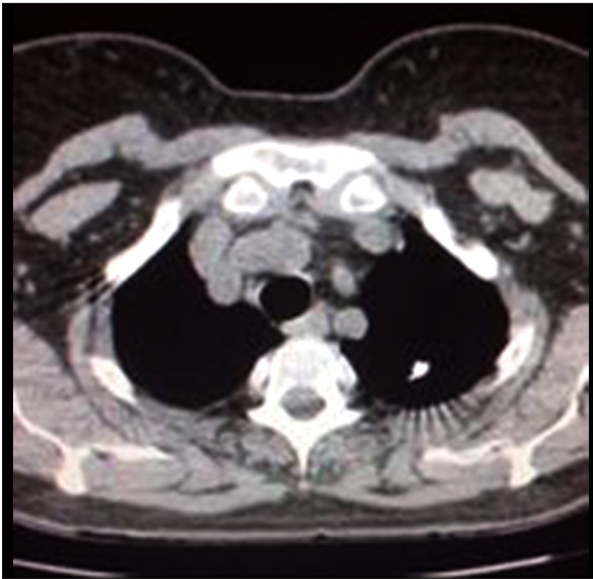
In May 2013, she started complaining of light intensity pain in the upper left chest area that was mainly associated with movements of the upper ipsilateral limb in the last 6 months with worsening in the last month. She had no other symptoms and no limitation of movement or impairment of daily activities.

Chest radiography showed the presence of a metallic foreign body in the left pulmonary apex (Figure 1). Radiography was thus requested, and completion of the imaging study with computed tomography revealed the presence of a metallic linear radiodense artifact tangential to the apex of the left upper lobe, measuring about 6.6 cm along its largest longitudinal axis (Figure 2).

An exploratory axillary thoracotomy was performed. After selective left bronchial intubation, the patient was placed in the right lateral decubitus position. One incision was made, in the



**Figure 1.** Anteroposterior (A) and lateral (B) chest radiograph revealing the presence of the foreign body in the left lung apex region.



**Figure 2.** Computed tomography of the chest, revealing metallic artifact in the left upper lobe apex.

5th intercostal space at the anterior axillary line intersection. With the aid of a ring clamp, the foreign body was extracted by a pneumotomy (Figure 3). Hemostasis and an air leak test were performed. A chest drain was connected to a pleural drainage system. The patient had no complications after surgery and was discharged on the 4th day after surgery. She remained in outpatient follow-up for 2 years.

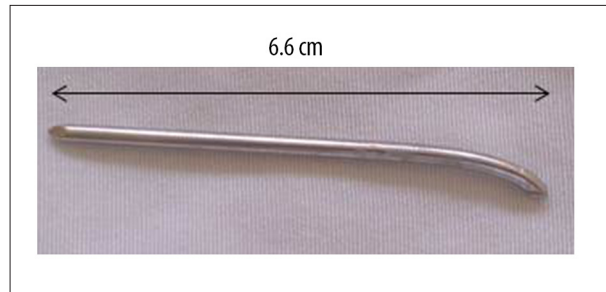
## Discussion

Late migration of K-wire after surgeries has been reported in the literature [3,9–13] and the time from orthopedic surgery of the collarbone to migration into the chest of the metal rod used can vary from one day to nearly 30 years [1,3,4].

The migration mechanism remains unclear [14]. The possible reasons include muscular activity, movement of the shoulder, breathing movements, negative intrathoracic pressure with respiratory excursion, gravitational force, local bone resorption, [4] capillary action, [1] and even peripheral intravascular embolization to the heart [3].

The successful removal of intrathoracic K-wires using different approaches has been reported. [3,15]. The location of the K-wire and the clinical condition of the patient are the criteria used to choose the most appropriate technique; thoracoscopy is the preferred approach [3].

To obtain satisfactory results with a K-wire, some peculiarities in their application should be respected. The surgeon should accommodate local anatomy, and as a precaution, the insert



**Figure 3.** The K-wire removed from the upper left lobe.

should be made from the anatomical site of greatest risk and in the opposite direction [16]. When these locations cannot be avoided, it is essential to palpate the artery and insert the wire at a minimum distance of 2 cm from it. Note also that extreme care must be taken to avoid sliding the thread on the bone and to avoid damage to the surrounding structures [16,17].

Therefore, caution should be exercised when orthopedic pins and wires are used for the fixation of fractures and dislocations of the shoulder girdle. Care should also be taken to perform a fold at the end of the wire or use a restraint system.

The most important step in the prevention of this potentially lethal complication is to double the exposed portion of the wire or pin after fixation through use of holding devices, to perform rigorous clinical and radiography follow-up every 2–4 weeks [18], K-wire removal as soon as bone healing is achieved, and bending the external tip of each implanted wire [14]. Regardless, once the migration has been diagnosed, the wire should be removed immediately [4].

Nevertheless, according to Tsai et al. [12], physicians should be aware of the possibility of late migration of threaded wires and carefully instruct patients about the risks and the importance of returning for follow-up evaluations, even years later. Risk management allows early detection of incidents and contributes for patient safety.

## Conclusions

Exploratory axillary thoracotomy is an effective treatment to remove a K-wire which migrated into left lung when the clinical condition of the patient is stable. Although the mechanism of late and silent migration is unclear, physicians should advise the patient about the risk and the need of clinical and radiographic follow-up, even years later after the insertion of the device, in order to allow for early detection of possible harms. If there is migration of the wire, it should be removed immediately to avoid sudden and fatal complications.

## Conflict of interest

None.

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