

# Migration of Two Broken K-wires into the Cervical Region following Lateral End Clavicle Fixation: A Rare Case Report and Literature Review

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## Learning Point of the Article:

This article highlights the importance of early detection and timely removal of migrated Kirschner wires (K-wires) to prevent complications, especially in mobile joints such as the acromioclavicular joint.

## Abstract

**Introduction:** Kirschner wires (K-wires) are commonly used in orthopedic fixation, but their potential for migration can lead to serious complications.

**Case Report:** We present a rare case of a middle-aged male who reported persistent right-sided neck and shoulder pain 3 years following surgery for a lateral end clavicle fracture. Imaging revealed two broken K-wire fragments – one in the right supraclavicular region and another in the posterior neck musculature. The wires were successfully removed through a posterior neck surgical approach with the help of an otorhinologist, and the patient had complete symptomatic resolution postoperatively.

**Conclusion:** This case underscores the unusual scenario of dual K-wire migration into the cervical region without neurological involvement. It highlights the critical importance of timely hardware removal and cautious use of unthreaded K-wires in mobile joints such as the acromioclavicular joint. Clinicians must be vigilant about potential wire migration, especially in patients with unexplained persistent pain post-surgery. Early detection and multidisciplinary surgical management are key to preventing catastrophic outcomes.

**Keywords:** Kirschner wire, migration, acromioclavicular joint, neck.

## Introduction

Kirschner wires (K-wires) are commonly used in orthopedic surgeries, ranging from provisional fixation to definitive fracture stabilization [1]. With the evolution of more stable and biomechanically superior implants, such as anatomically contoured plates and intramedullary nails for internal fixation, their routine use for definitive fixation has declined [2]. Nonetheless, K-wires are still used in selected indications, particularly in resource-constrained settings, due to their affordability and ease of use. A major concern associated with K-

wire fixation is the potential for delayed removal, which may result in complications [3,4]. Among these, migration of the wire to distant or critical anatomical locations represents the most serious and potentially life-threatening outcome [5,6,7]. Although several cases of K-wire migration have been documented in the literature, migration into the cervical region remains exceedingly rare. We report a unique case of dual K-wire migration into the neck following clavicle fixation, which remained undiagnosed for several years.

## Author's Photo Gallery



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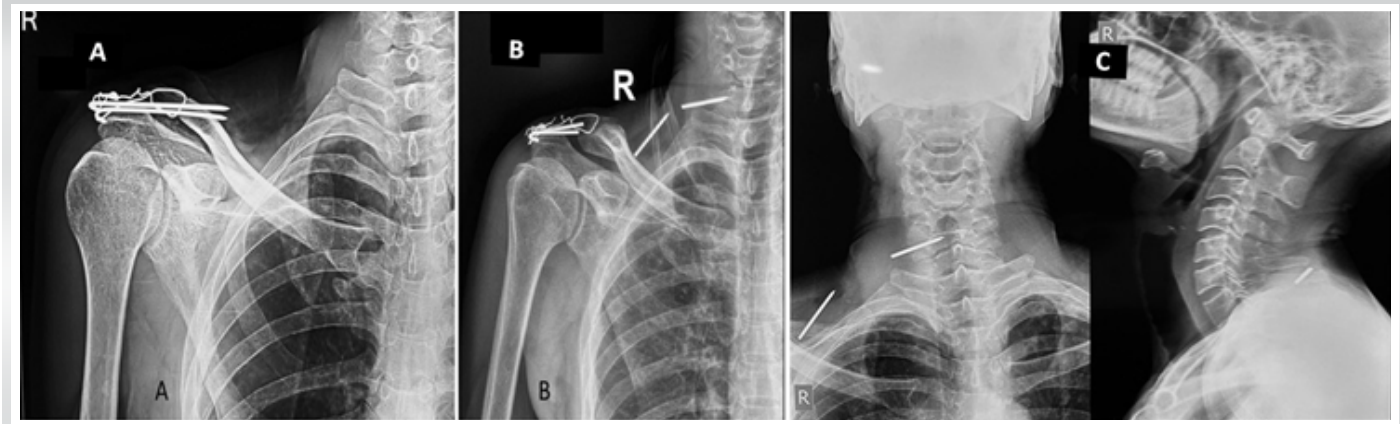
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**Figure 1:** Old radiograph of the right shoulder showing tension band wiring of the acromioclavicular joint and a malunited but healed lateral end clavicle fracture (a); Recent radiograph of the right shoulder (b) and neck demonstrating two broken K-wire fragments migrated to the posterior neck on the right side—one located in the right supraclavicular region and the other at the posterior aspect of the neck (c).

### Case Report

A middle-aged male in his fifties presented to our institution with a 3-year history of persistent right-sided neck and shoulder pain. The pain, localized to the posterior neck and right supraclavicular region, had been managed symptomatically at multiple local healthcare facilities without definitive relief. There was no radiation of pain or paraesthesia in either upper limb. The patient had previously been treated for cervical spondylosis, with partial symptom relief following analgesics; however, the symptoms persisted. On detailed history, the patient reported having undergone surgical fixation for a right shoulder fracture 6 years prior (Fig. 1a).

Clinical examination revealed no signs of radiculopathy, motor weakness, or restriction in neck mobility. However, a palpable small swelling (3 × 2 cm) was noted in the right supraclavicular region. The carotid artery was well palpated, and the swelling was lateral to the vascular bundle. Radiographs of the shoulder and neck revealed two broken K-wire fragments – one located in the right supraclavicular region and another posteriorly near the cervical spine (Fig. 1b and c). The shoulder radiograph showed

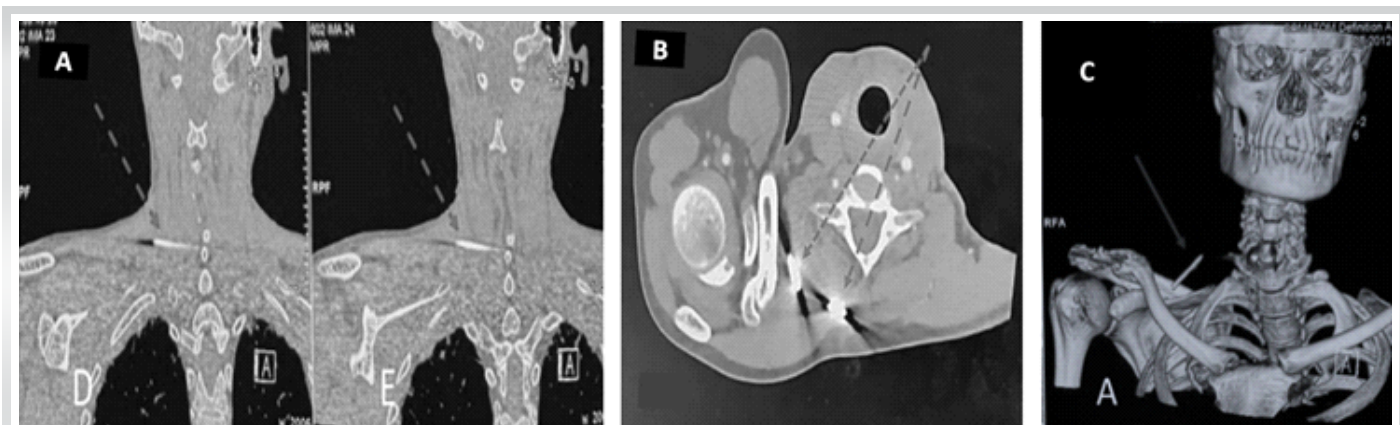
a malunited lateral end clavicle fracture fixed with tension band wiring over two K-wires, both of which were broken distally.

A non-contrast computed tomography (CT) scan of the neck was performed to delineate the exact position of the migrated wires (Fig. 2). The case was reviewed in a multidisciplinary team setting with input from an otorhinolaryngology expert. Routine pre-operative laboratory investigations were within normal limits, and the patient was planned for elective hardware removal.

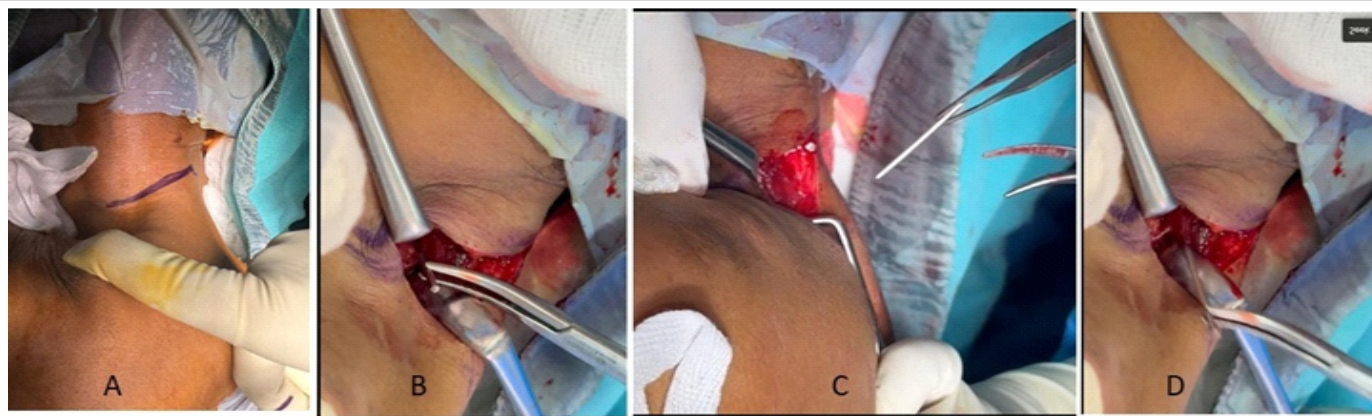
### Surgical technique

Under general anesthesia, the patient was positioned in the lateral decubitus position. Intraoperative localization of the K-wire fragments was achieved using fluoroscopic guidance, correlating with pre-operative CT findings. A single curvilinear incision was made over the posterior cervical region and extended anteriorly toward the supraclavicular fossa (Fig. 3a).

Dissection was carefully performed in two anatomical planes around the trapezius muscle. The first K-wire fragment was



**Figure 2:** Coronal computed tomography (CT) sections localizing the exact position of the migrated wires (a); Axial CT image (b), and 3D-reconstructed images from CT scan showing the position of the migrated K-wires (c).



**Figure 3:** Intraoperative photographs showing the skin incision (a) and retrieval of the two K-wire fragments (b-d).

identified anterior to the trapezius within the supraclavicular region. After blunt and sharp dissection through the platysma and fascia, the wire (8 cm length) was successfully retrieved (Fig. 3b). Dissection then continued posterior to the trapezius, where the second K-wire fragment (7 cm length) was located in the paraspinal musculature and removed without difficulty (Fig. 3c and d).

In the same operative session, a separate incision was made over the acromion process to remove the tension band wiring from the acromioclavicular joint. The lateral clavicle fracture was found to be malunited, but as the patient was asymptomatic, no further intervention was performed.

Both surgical sites were irrigated thoroughly and closed in layers. Post-operative radiographs confirmed complete removal of hardware (Fig. 4). The patient recovered uneventfully, with complete resolution of symptoms by the 1-month follow-up. At 3 months, he remained pain-free with a full, pain-free range of motion at the shoulder and cervical spine.

### Discussion

This report is unique in that it documents the migration of two distinct broken segments of K-wires into the cervical region – an exceptionally rare phenomenon. While K-wire migration is a recognized complication, it typically involves either a complete wire or a single fragment. In our case, two sizable fragments migrated independently to different anatomical planes in the neck and were successfully removed before causing life-threatening consequences.

K-wire migration can lead to serious complications, particularly when wires penetrate critical structures such as the spinal canal, thoracic cavity, or neurovascular bundles [5,6,7,8,9,10,11,12]. A comprehensive search of the PubMed database using the keywords “K-wire,” “migration,” and “neck” yielded 42 articles related to K-wire migration into the cervical region. In addition, relevant references were

manually reviewed, resulting in the retrieval of 19 articles specifically reporting K-wire migration into the neck originating from the clavicle or proximal humerus (Table 1). The majority of these cases described migration from the shoulder region to the cervical spine, often associated with neurological symptoms or deficits. There have also been reports of wires migrating into the thoracic cavity and mediastinum. However, migration into the neck without neurological involvement is exceedingly rare. We identified only four such cases in the literature, including those described by Leppilahti and Jalovaara [13], Batin et al. [14], and Ko and Lee. [15].

The mechanisms underlying K-wire migration are multifactorial. Repeated or oscillatory drilling – especially with reused wires – can induce localized thermal necrosis and osteolysis, impairing bone anchorage [16, 17, 18]. Unthreaded wires, commonly used due to ease of insertion, have less



**Figure 4:** Post-operative radiograph confirming complete removal of the migrated K-wire fragments and the previously placed tension band wiring from the acromioclavicular joint.

**Table 1: Cases of K-wire migration from the clavicle/AC joint/proximal humerus fixation site to neck, thoracic regions, and other distant sites**

Serial No.	Author (Year)	Age/sex	Site of fixation	Migration site	Duration until migration	Symptoms	Treatment/ outcome
1	Leppilahti and Jalovaara (1999)	56/M	Right clavicle fracture	Anterior cervical spine	11 days	Asymptomatic	Removal
2	Kumar <i>et al.</i> (2002)	36/M	Right clavicle dislocation	Anterior mediastinum	<4 weeks	Asymptomatic	Removal
3	Fransen <i>et al.</i> (2007)	30/M	Clavicle fracture	Spinal canal at T2	1 year	Paraparesis	Laminectomy
4	Nakayama <i>et al.</i> (2009)	70/M	Right clavicle fracture	Lung and intrathoracic trachea	8 months	Cough, hemoptum	Surgical removal
5	Ballas <i>et al.</i> (2012)	56/M	Sternoclavicular dislocation	Endopelvic region	2 years	Chest pain	Removal
6	Julia <i>et al.</i> (2012)	83/F	Left proximal humerus fracture	Abdomen	1 month	Abdominal pain, hemothorax	Thoracotomy/laparotomy
7	Tan <i>et al.</i> (2016)	5/M	Right midshaft clavicle fracture	Ascending aorta	7 days	Syncope, chest pain, hemopericardium, tamponade	Fatal/emergency management attempted
8	Batin <i>et al.</i> (2016)	52/M	Right AC dislocation	Back of neck	5 years	Neck swelling	Surgical removal
9	Mankowski <i>et al.</i> (2016)	34/M	AC joint	Cervical vertebral foramen	7 years	Clavicle and neck pain	Radiologic evaluation
10	Rhegine <i>et al.</i> (2018)	65/F	Left clavicle fracture	Left pulmonary apex	20 years	Mild upper chest pain	Removal (details not specified)
11	Irianto <i>et al.</i> (2018)	34/F	Left clavicle fracture	Right lung	3 years	Chronic cough, chest pain, hemoptysis	Surgical removal
12	Palauro <i>et al.</i> (2019)	48/M	Right AC dislocation	Left shoulder (contralateral)	9 months	Shoulder pain, ecchymosis, limited movement	Surgical removal
13	Ko and Lee (2019)	34/M	Right AC joint	Left neck	Not specified	Asymptomatic	Neck dissection
14	Sananta <i>et al.</i> (2020)	40/M	Left AC dislocation	Left cavum pleura	2 years	Chest pain, pneumothorax	VATS-assisted removal
15	Tamrakar and Chapagain (2020)	60/M	Right lateral clavicle fracture	Cervical spine	4 years	Neck pain	Surgical removal
16	Gallego <i>et al.</i> (2022)	Not specified	Right clavicle+AC joint	Lower brachial plexus	15 years	Pain, dysesthesia	Surgical removal
17	Al Rhaazi <i>et al.</i> (2023)	51/M	Left AC joint repair	Cervical vertebrae C6–C7	3 years	Neck and shoulder pain	Surgical removal
18	Bhattarai <i>et al.</i> (2024)	46/M	AC joint	C5–C6 foramen	3 months	Neck pain, tingling	Surgical removal
19	Venkataramana <i>et al.</i> (2024)	60/F	Clavicle	Cervical spinal canal	Not specified	Neck pain	Surgical removal

purchase and are more prone to dislodgement. In addition, mechanical forces generated by muscle contractions, joint mobility, and thoracic movements can contribute to wire migration. In this case, the use of tension band wiring for a lateral end clavicle fracture, passing through the acromion, subjected the wires to cyclical biomechanical stress across the mobile acromioclavicular joint. Both wires fractured at the

clavicular entry site and migrated – one anteriorly into the supraclavicular region and the other posteriorly into the paraspinous musculature – likely along paths of least resistance.

Fortunately, neither fragment impinged on adjacent major neurovascular structures such as the brachial plexus, spinal cord, carotid artery, or jugular veins. The delayed presentation in this case emphasizes the lack of awareness among the patients

and the primary care providers regarding the potential for K-wire migration. Early evaluation at the onset of neck pain could have led to the timely detection of the migrated wires, potentially preventing prolonged symptoms and associated risks. As noted by Wichlas et al. [19], off-label use of K-wires persists in many low-/middle-income countries due to constrained implant availability. The majority of reported migrations originate from procedures around the shoulder girdle, particularly the acromioclavicular joint, owing to its high mobility and muscle traction [6,7,8,14,15,16].

Biomechanically sound fixation is essential to mitigate such risks. Pre-contoured lateral clavicle plates or hook plates offer more rigid constructs for lateral end clavicle fractures [20]. Supplementation with lag screws may enhance stability further. Flexible fixation devices such as TightRope systems have shown promise, although current evidence remains limited [21,22,23]. Importantly, to prevent heat-induced osteonecrosis, intermittent drilling with adequate saline irrigation should be employed during K-wire insertion [18].

Definitive prevention of wire-related complications lies in the timely removal of the implant. While conservative management

has been attempted in select cases [24], it mandates serial imaging and close surveillance. Surgical retrieval remains the safest and most reliable option, particularly when the migrated fragment is mobile or encroaching on vital structures.

### Conclusion

K-wire migration is a potentially serious complication of acromioclavicular fixation. Prompt removal of wires following fracture union is critical to prevent adverse outcomes. When migration occurs, early diagnosis and multidisciplinary surgical management can avert catastrophic consequences. This case reinforces the importance of adhering to safe fixation principles and vigilant post-operative follow-up.

### Clinical Message

Clinicians should be vigilant for potential K-wire migration in patients with unexplained post-surgical pain, particularly in mobile joints, and prioritize early detection and timely removal to prevent serious complications.

**Declaration of patient consent:** The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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