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Case Report

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Navigating challenges: a case report on complications in clavicle fracture management with 'K' wire fixation

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ABSTRACT

Orthopaedic metallic pins and wires are commonly used for the fixation of fractures and dislocations, with the shoulder girdle being one of the common areas for their application. Despite recent precautionary measures, complications related to migration of these devices into the pleural cavity continue to be reported. We present a case of a Kirschner wire (K-wire) migration from a left clavicle fracture to the first rib, highlighting the importance of vigilance and immediate intervention in such cases. A 35-year-old female, previously operated for a left clavicle fracture using K-wire and tension band wiring, presented with left shoulder and chest pain eight years later. Radiological investigations revealed a broken K-wire in the pleural cavity, with one portion near the acromio-clavicular region and the other at the posterior aspect of the first rib. Surgical intervention was performed, involving the removal of the K-wire from the chest cavity and clavicle, with subsequent patient recovery. The migration of orthopaedic pins and wires into the chest cavity is a rare but well-documented complication. Previous reports have demonstrated severe consequences, including cardiovascular complications and fatalities. Theories explaining wire migration include muscle action, shoulder mobility, negative intrathoracic pressure during respiration, regional bone resorption, gravitational forces, and even capillary action. To minimize such complications, subcutaneous K-wire ends should be bent, and restraining devices should be used. Close clinical and radiographic follow-up is essential until the pins and wires are removed after achieving the therapeutic goal. In case of migration, prompt removal is necessary to prevent fatal complications. This case report emphasizes the significance of vigilance and proper precautions when using orthopaedic pins and wires for shoulder girdle fractures. Timely intervention is crucial to mitigate severe complications associated with migration. Sharing experiences and lessons learned can contribute to the safer application of these fixation devices in orthopaedic practice.

Keywords: Broken K-wire, Intrathoracic migration, Clavicle fracture, Shoulder girdle, Orthopaedic pins

INTRODUCTION

One of the implants that is most frequently used to treat fractures or dislocations in the shoulder area is Kirschner wire, or K-wire.

Even with successful outcomes, wire migration is one of the most common problems following K-wire fixation. Wire migration has been linked to a number of fatal consequences, including wire penetrations into the abdominal cavity, great artery, lungs, heart, and spinal cord.[1-6]

CASE REPORT

In this case report, a 35-year-old female, previously treated for a left clavicle fracture using Kirschner wire (K-wire) fixation with tension band wiring (TBW), presented eight years later with left shoulder and chest pain. Radiological examinations revealed a broken K-wire, with one part in the left acromio-clavicular region and the other in the

posterior aspect of the first rib (Figure 1). Figure 1 revealed a broken Kirschner wire positioned below the first rib, confirming the presence and location of the migrated wire, aiding in surgical planning and decision-making. Surgical intervention involved the removal of the migrated K-wire from the chest cavity and the left clavicle, with subsequent patient recovery. The discussion highlights the rarity of orthopaedic pin and wire migration into the chest cavity, the associated complications, and the importance of timely removal when migration is detected. Precautionary measures, including appropriate bending and restraining of K-wires, close clinical and radiographic follow-up, and immediate removal of migrated wires, are recommended to prevent severe and potentially fatal complications. Post operatively patient was comfortable. Pain was reduced and able to move left upper limb freely. Patient discharged after two weeks. Figure 2 provided detailed imaging of the chest, highlighting accurately depicting the positions of the Kirschner wire segments, with one located in the left acromio-clavicular region and the other in the posterior aspect of the first rib.

Figure 3 shows that the intraoperative C-arm picture, was instrumental in guiding the surgical procedure and confirming the precise location of the migrated Kirschner wire during the intervention.

Figure 1: Pre-op X-ray.

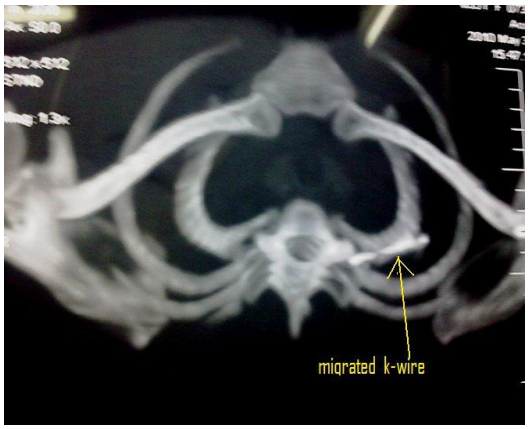

Figure 2: Pre op CT scan.

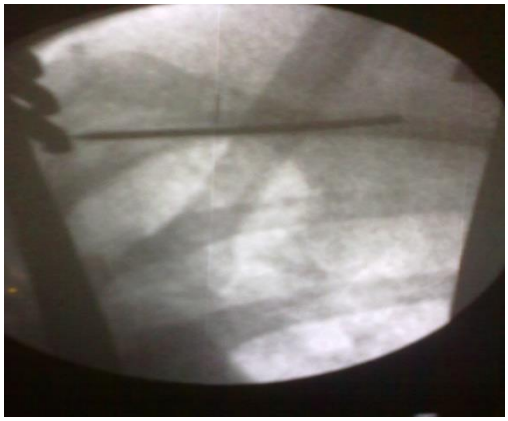

Figure 3: Intra op C-arm picture.

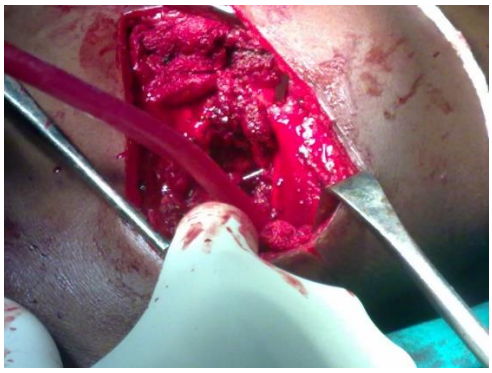

Figure 4: Intra-operative image vividly captures the placement of the K-wire.

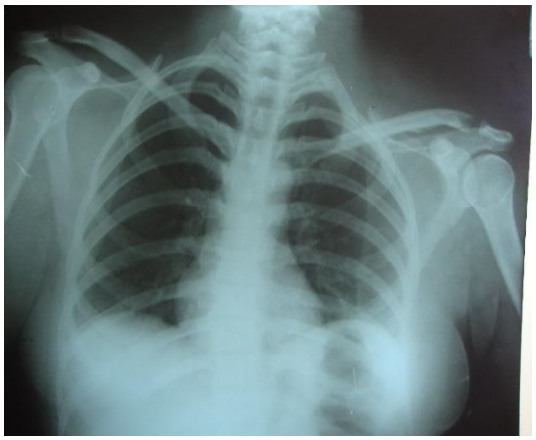

Figure 5: Post-operative chest X-ray reveals the successful outcome following the removal of the K-wire.

DISCUSSION

Though several theories have been proposed, the exact mechanics behind K-wire migration are still unknown.[5,7-9] These theories include aspects of upper limb motion, gravitational forces, respiratory dynamics, and muscle activity. Classification of wire migrations can be based on their orientation along an axis relative to the spine, differentiating them as transversal, ascending, or

descendant migrations.[10] In this particular case study, a female, who had previously undergone K-wire fixation with tension band wiring (TBW), for a left clavicle fracture eight years' prior, presented with symptoms of left shoulder and chest pain. Radiological examinations confirmed the presence of broken K-wire, with segments observed in the posterior aspect of the first rib and the left acromioclavicular area (Figure 1). This case is noteworthy for being one of the few documented instances of K-wire migration that did not jeopardize vital structures or major vessels in the neck. In the context of K-wire fixations, several experts strongly recommend regular follow-up intervals, typically at four-week intervals, and advocate for wire removal once the desired therapeutic objectives have been achieved.[8,11,12] In cases where there are indications of migration or loosening, the removal of the wire should be executed promptly. Nevertheless, it's worth noting that intraoperatively pinpointing the precise location of the migrated implant can sometimes pose challenges.[5] Additionally, changes in patient posture, such as head movement during surgery, can lead to further migration of the implant. To address these challenges, real-time imaging techniques such as intraoperative C-arm fluoroscopy or ultrasonography are invaluable in accurately locating the migrating foreign body.[13]

CONCLUSION

This case underscores the importance of vigilance and timely intervention in cases of wire migration, emphasizing the rarity of orthopaedic pin and wire migration into the chest cavity and its potential for severe complications. Various theories have been proposed to explain wire migration, including muscle action, shoulder mobility, negative intrathoracic pressure during respiration, regional bone resorption, gravitational forces, and capillary action. To prevent such complications, precautions such as adequate bending of subcutaneous wire ends and the use of restraining devices are essential, with close clinical and radiographic follow-up until wire removal upon achieving therapeutic goals. Prompt removal is crucial in cases of migration to prevent potentially fatal complications. Sharing experiences and lessons learned from such cases contributes to safer orthopaedic fixation device applications and underscores the significance of these precautions in ensuring positive patient outcomes while minimizing associated risks.

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