

## Intrathoracic Kirschner Wire Migration After Management of a Dislocated Shoulder Fracture

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### Abstract

Kirschner wires have been the most widely used devices in orthopedic surgery, given their great versatility, low cost, and availability. Due to their malleable nature, the wires are prone to migration. We present the case of a 69 year old male patient who suffered a falling from a two-meter-high ladder with support from the upper right extremity and was diagnosed with a fracture dislocation of the right shoulder. The shoulder was reduced with the Kocher maneuver. Further imaging showed bony bankart lesion, Hill Sachs lesion and a rotator cuff tear. Two weeks after trauma, the fracture dislocation was surgically treated using three Kirschner wires, a cannulated screw with washer and tree anchors for the rotator cuff repair.

Four months after surgery the patient complained of pain in the right hemithorax associated with deep inspiration. X ray and CT showed intrathoracic Kirschner wire migration. The patient undergo surgery to remove the Kirschner wire, evolving without respiratory problems and with full function of his shoulder.

**Keywords:** Kirschner Wire; Foreign Body Migration; Bone Wires; Shoulder Dislocation; Shoulder Fracture

### Introduction

The use of metal wires is widely used in orthopedics, both for temporary and definitive fixation of a fracture after its reduction. It is an efficient, simple and economical fixation method for the management of dislocated shoulder fractures.

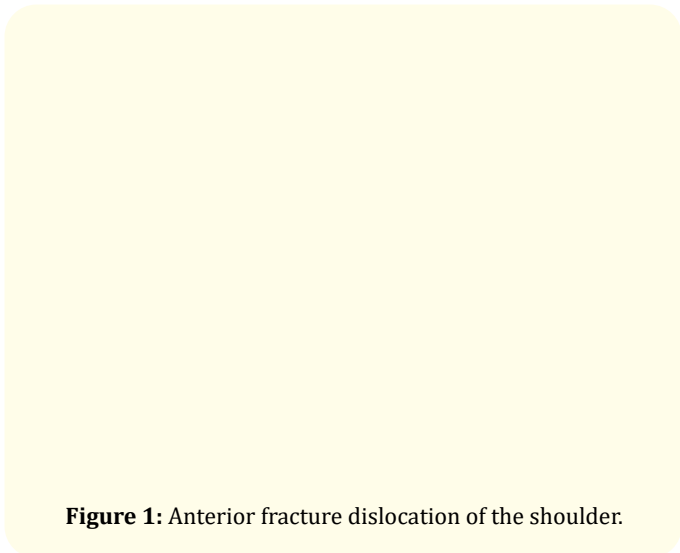
The complications described after the use of Kirschner wires include soft tissue damage, including injuries to tendons, ligaments, nerves, and blood vessels; loss of reduction; infection and migration of osteosynthesis material. Kirschner wire migration can lead to anything from simple loss of reduction to death, if it compromises the airway, large blood vessels, or the heart.

The mechanism is generally unknown, however the striated musculature plays an important role, associating the migration of osteosynthesis material with the ventilatory movements and those of the thoracic region in daily activities.

### Clinical Case

Healthy 69-year-old man who consulted after falling from a two-meter-high ladder with support from the upper right extremity. Asymmetry of the right shoulder is observed, with an epaulette sign, in an antalgic position. An AP shoulder X-ray is requested, where an anterior dislocation of the shoulder is observed (Figure 1). The Kocher reduction maneuver is performed, observing clinical reduction of the shoulder, which is corroborated with a control X-ray (Figure 2) and medical discharge is indicated. The study is complemented with CT and MRI of the shoulder, in which bony bankart lesion and Hill Sachs lesion with rupture of the supraspinatus and subscapularis tendon are observed. After 2 weeks, the patient was admitted to perform open reduction and internal fixation of the glenoid fracture and rotator cuff repair. However, due to the limited space to access the glenoid, an

osteotomy of the coracoid tip was performed. Glenoid fracture not amenable to screw synthesis, therefore reduction and fixation with 3 Kirschner wires, one cannulated screw (3,5 mm)with washer to coracoid osteotomy and repair of supraspinatus and subscapularis with 3 anchors (Figure 3).



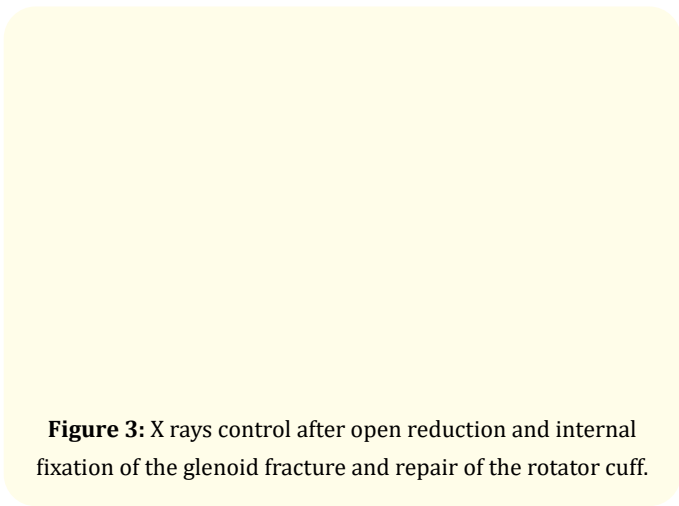
**Figure 1:** Anterior fracture dislocation of the shoulder.

After 8 weeks of evolution, two Kirschner wires were removed, with no other discomfort. The patient did not show up for his 3-month visit.

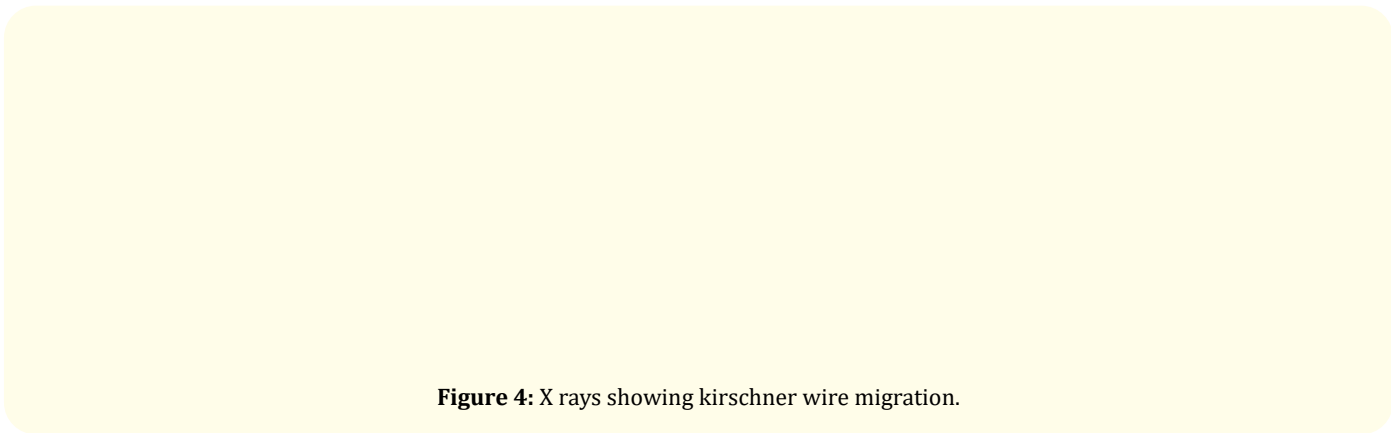
Four months after surgery, the patient consulted in the emergency department due to pain in the right hemithorax associated with deep inspiration. An AP and lateral chest and abdomen X-ray is requested (Figure 4), where a radiopaque object is observed in the right hemithorax compatible with osteosynthesis material. The study is complemented with CT of the chest, where a K needle is observed in the intercostal muscles, with intact pleura, preserving normal lung parenchyma, ruling out penetration into the airway (Figure 5).



**Figure 2:** Restored glenohumeral congruence after Kocher maneuver.



**Figure 3:** X rays control after open reduction and internal fixation of the glenoid fracture and repair of the rotator cuff.



**Figure 4:** X rays showing kirschner wire migration.

**Figure 5:** Axial CT showing intrathoracic migration.

The patient was hospitalized to remove the Kirschner wire, after demarcation with fluoroscopy in two planes (Figure 6).

**Figure 6:** Kirschner wire removing.

## Discussion

The use of metallic wires was introduced by Martin Kirschner at the beginning of the 20<sup>th</sup> century when he used them for the first time for skeletal traction. Since then they have been the most widely used devices in orthopedic surgery, given their great versatility, low cost, and availability. Due to their malleable nature, the needles are prone to migration, as described by Mazet in 1943, after observing the migration of this implant to the lung [1]. Considering the extensive use of Kirschner wires in orthopedic procedures, the incidence of symptomatic migration is rare.

Most cases of migration originate around the shoulder, including the proximal humerus, clavicle, acromioclavicular joint, and sternoclavicular joints [2-5]. However, migration has also been reported in fingers, hip and pelvis [6-8]. Despite these reports, most symptomatic migrations occur in the upper extremity.

The time period for the detection of the migration of the osteosynthesis material varied widely. Intraoperative detection has been reported [9] and after several years after primary surgery [10], the average detection is 3 months [11].

The causes of migration are not fully established, they influence muscle activity, gravitational force, bone resorption, thoracic negative pressure, inadequate surgical technique, respiratory movement and joint range, which in the case of the shoulder girdle it is wide [12].

Migration can lead to fatal consequences if it migrates to the cardiovascular system [11].

There are some recommendations for the use of Kirschner wires in orthopedic surgery, there are: The distal end of the needle, closest to the skin, should be bent at an angle of approximately 90°; After the procedure, radiographs should be obtained to ensure the position of the implant; the patient must maintain a clinical and radiological follow-up until the removal of the implant: finally, the Kirschner wires must be removed at the end of the treatment or if migration of the implant is observed, regardless of the clinical symptoms [12].

In the clinical case presented, the patient returned to consultation due to pain in the right hemithorax associated with respiratory movements. In the x-rays, migration of the Kirschner needle was observed and admission to the ward for removal. The surgery was performed without problems, with complete removal of the osteosynthesis material. The patient evolved favorably from the respiratory and from the osteomuscular point of view, with full function of the shoulder.

## Conclusion

The use of Kirschner wires in orthopedics is widely extended, due to its versatility, low cost and its simplicity. It is important to use them in a technically correct way to avoid their migration, which must be ruled out clinically and imaging with X-rays until the end of treatment. At the moment of detecting the migration of the osteosynthesis material, it must be removed as soon as possible, without waiting for the appearance of symptoms.

## Conflict of Interest

The authors declare that they have no conflict of interest.

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