

# Migration of Kirschner Wire into the Spinal Canal as Complication of Inveterate Shoulder Luxation Treatment. Case Study.

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## SUMMARY

We report a case of intrathoracic migration of a Kirschner wire used for inveterate anterior right shoulder luxation penetrating the spinal canal through the right Th8 nerve root foramen. The migration was asymptomatic. The treatment involved removing the pin via posterolateral thoracotomy. The postoperative course was uneventful. Intrathoracic migration of Kirschner wires should be expected in patients so treated for shoulder problems. This complication can be avoided through using a threaded pin for the shoulder surgery, bending the external end of the pin and choosing a correct diameter of the Kirschner wire.

**Key words:** intrathoracic migration, spinal canal migration, kirschner wire, removal via thoracotomy, inveterate shoulder luxation

## BACKGROUND

Kirschner wires are widely used in the surgical management of fractures and luxations in orthopedic surgery [1]. Kirschner wires (also called K-wires) are thin, rigid wires that can be used to stabilize bone fragments. These wires can be drilled through the bone to hold the fragments in place. They can be placed percutaneously (through the skin), thus avoiding open surgery in some cases. Some of these metallic fixation devices have a tendency to migrate and

serious complications are not rare [2–5]. We wish to report a case of intrathoracic migration of a smooth Kirschner wire, treated successfully in our institution.

## CASE PRESENTATION

A 66-year-old man was admitted to the emergency department of our hospital for inveterate anterior right shoulder luxation with a history of 22 days (Fig. 1). The dislocation was treated by close reduction and percutaneous fixation with a Kirschner wire

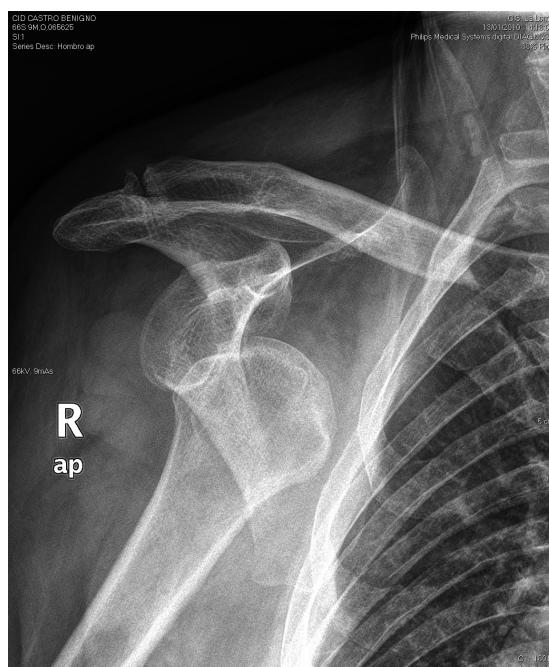


Fig. 1. X-ray of inveterate right shoulder luxation

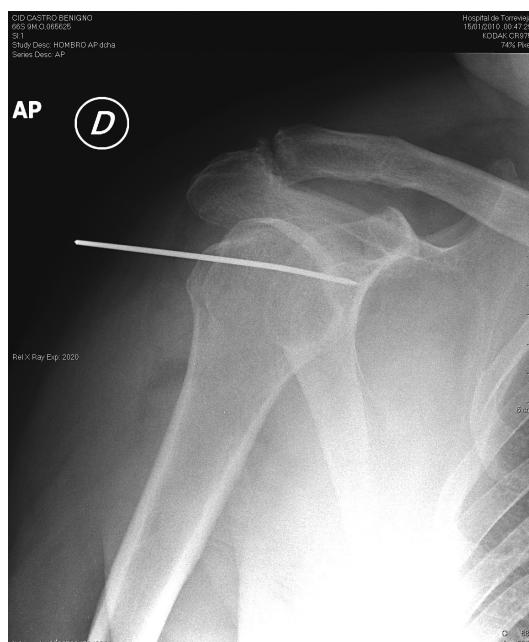


Fig. 2. X-ray – post-operative follow-up

to prevent secondary luxation. The smooth pin was introduced through the humeral head into the scapular glenoid fossa. The K-wire was cut, not bent and covered with the skin and soft tissues. Postoperative radiographs showed that the positions of the K-wire and the shoulder were appropriate (Fig. 2). A sling was used to immobilize the shoulder in the post-operative period. The patient was discharged on the first postoperative day. On day 26 after the operation he was admitted to the outpatient clinic for a routine follow-up examination. A follow-up x-ray showed

intrathoracic migration of the K-wire without secondary luxation of the right shoulder (Fig. 3). He was symptom-free (no spinal cord symptomatology on neurological examination) but chest x-rays and CT scans indicated that the K-wire had migrated to the right thoracic cavity (Fig. 4). A thoracic computed tomography scan showed that the wire was in the right upper lobe and its tip was seen in the spinal canal entering through the right Th8 nerve root foramen (Fig. 5, Fig. 6). There was no evidence of a pneumothorax or hemothorax.



Fig. 3. X-ray – follow-up at 26 days after the surgery

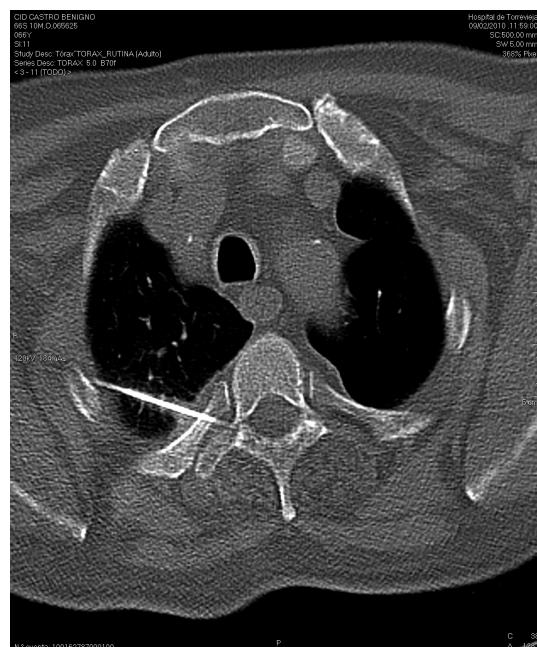


Fig. 4. CT scan – migration to the right thoracic cavity

The patient was taken to the operating room and a right posterolateral exploratory thoracotomy was performed. There was no active bleeding and no air leakage. The wire was found to be penetrating the right lung parenchyma and the pleura adjacent to the eighth costovertebral joint and entering the vertebral canal. The wire was carefully cut and removed in two pieces along its axis (Fig. 7, Fig. 8). The patient was discharged on the sixth postoperative day. The outcome was favourable.

## DISCUSSION

Use of Kirschner wires for bone and joint fixation is potentially complicated by migration of the wire from the fixation site over time. When this occurs, it can be dangerous. The literature contains some case reports concerning remarkable migration of wires from the shoulder region into the lung and to the subclavian artery, into the mediastinum and large vessels, spinal canal, trachea, etc. [2-5].

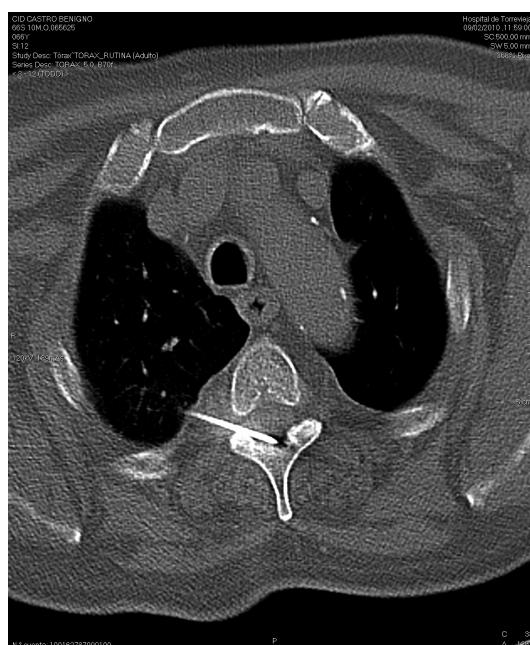


Fig. 5. CT scan – spinal canal entering through the right Th8 nerve root foramen



Fig. 6. CT scan – spinal canal entering through the right Th8 nerve root foramen

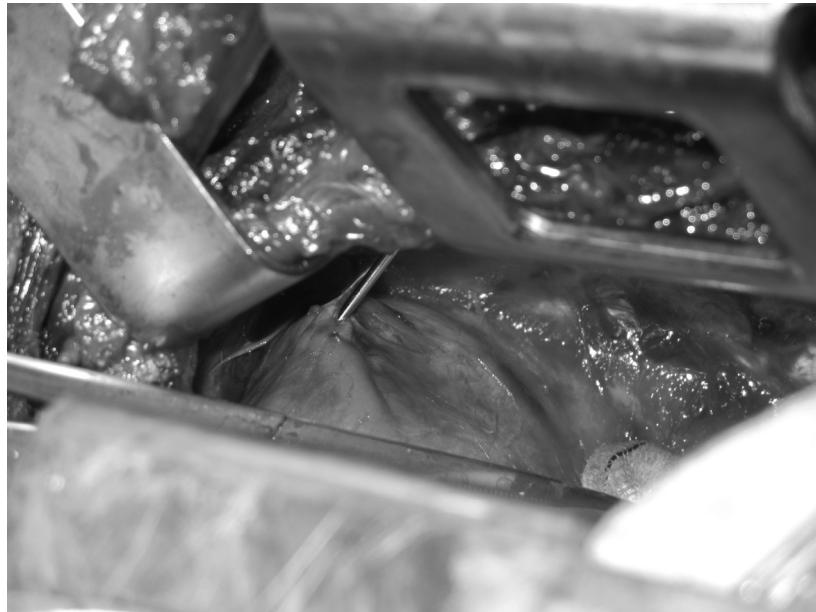


Fig. 7. Intraoperative photograph

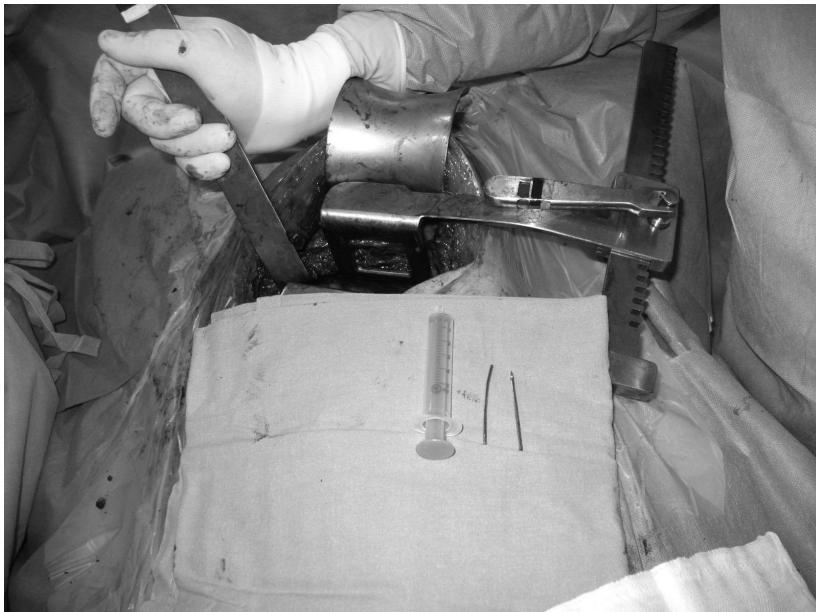


Fig. 8. Surgically removed K-wire

The migration may be asymptomatic and only discovered on follow-up radiographs, as in our case. Sarwal et al. reported that Kirschner wire migration caused a subarachnoid-pleural fistula [6]. Damage to almost all cervical or thoracic organs with serious complications is possible; several fatal complications have been reported.

Various theories have been proposed to explain this migration, including muscular activity, as in our patient, regional resorption of bone and the great freedom of motion of the shoulder. This last possibility might also be responsible for breakage of the wires. Migration to the thorax seems to be favored by

respiratory excursions, negative intrathoracic pressure, gravitational forces and even capillary action [7]. Migration of K-wires has been reported as early as one day after fixation and as late as 21 years after. Usually the process causes no symptoms, as in our case. The type of wire: diameter, smooth or threaded, and surgical technique: bent or no-bent, seem to be factors influencing incidence.

The reports reviewed by us confirm that smooth Kirschner wires should be considered very hazardous. If wires absolutely need to be used, terminally threaded pins have to be used. The patients should be followed up both clinically and radiographically

until all wires have been removed. The most important step in preventing this potentially lethal complication is to bend the external (exposed) part of the K-wire after fixation. However, this does not guarantee safety as wires sometimes migrate after breakage. To prevent breakage, use of an adequate diameter corresponding with mechanical stress is recommended. Close clinical follow-up with frequent postoperative radiographs has been recommended.

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When spinal migration occurs, precise radiologic work-up is necessary for surgical removal and to avoid unwanted complications. Using the same path and axis of penetration during removal is necessary to prevent spinal cord damage and subsequent neurological deficits.

Once migration of a pin is recognized, immediate surgical removal should be carried out to prevent neurological damage.

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