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## CASE REPORTS

# Endopelvic migration of a sternoclavicular K-wire. Case report and review of literature

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### KEYWORDS

Bone wires;  
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**Summary** We report a unique case, never before published, of sternoclavicular joint fixation K-wire migration to the pelvic region, in a 56 year-old man. Two years previously, sternoclavicular dislocation had been fixed by three wires. A transitory episode of precordial thoracic pain followed by iterative abdominal pain accompanied the migration. Extraction was performed five years later. Scapular K-wire migration is frequent. The proximity of cardiovascular structures may have fatal consequences. This type of internal fixation raises questions, and migration prevention needs to be taken into account. Medical complications and the legal context are major factors leading us to abandon this type of osteosynthesis. Once migration has been diagnosed, the wire should be removed without delay.

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## Introduction

K-wire migration from the scapular girdle is frequent. Lyons and Rockwood [1], in 1990, found 49 migrations in 47 patients in 37 reports. Our own exhaustive literature search found no comparable cases of K-wire migration from the sternoclavicular joint to the pelvic cavity.

## Clinical case

A 56 year-old man suffered posterior dislocation of the left sternoclavicular joint. He was operated on in emergency

by open reduction and fixation using three K-wires. Early postoperative course was favourable. After rehabilitation, he was able to go back to his work as a heavy plant driver. A wire that was jutting out under the skin had to be removed early on. Two years after the osteosynthesis, the patient complained of chest pain. Myocardial infarction (MI) was suspected, but clinical assessment and complementary specialized cardiological examinations failed to confirm this diagnosis. AP chest X-ray found a K-wire projecting vertically in front of the sternum (Fig. 1). The link was not made between this migrated wire and the precordial pain, which spontaneously improved; diagnostic investigation was therefore stopped. This second wire was removed, and the patient resumed his activities. Four years after the original osteosynthesis, radiographic assessment for abdominal pain found a K-wire projecting in the pelvic cavity on AP view (Fig. 2). Laparoscopic removal failed. As there was no aggravation of symptoms, laparotomy was not undertaken. Five years after the osteosynthesis, recurrence of

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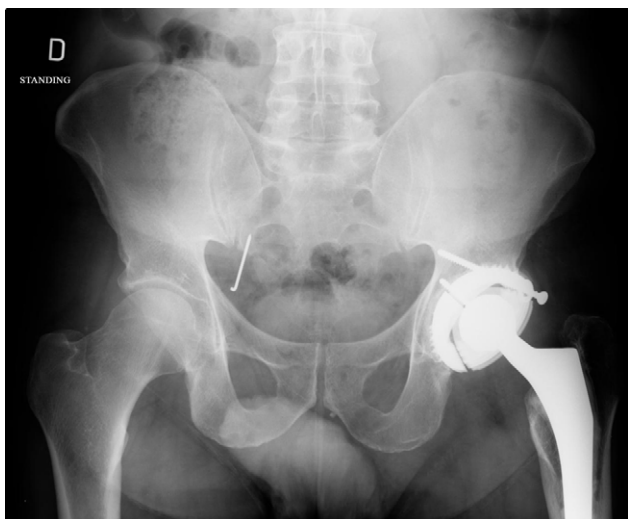


**Figure 1** Chest X-ray, after admission to cardiology for suspected but non-confirmed myocardial infarction, showing a retrosternal K-wire.

abdominal pain led to a renewed attempt to extract the wire, located on CT between the internal iliac vessels and right colon (Fig. 3). Attempted laparoscopic extraction having again failed, a venous haemorrhage led to conversion to sub-umbilical laparotomy. The wire was located under per-operative fluoroscopy and extracted. At last follow-up, the patient was under occupational disability following total hip replacement.

## Discussion

We were able to retrieve 78 articles with 88 separate cases of K-wire migration, following clavicular fracture (27 cases), sternoclavicular joint dislocation (18 cases), acromioclavicular joint dislocation (12 cases), fracture of the proximal extremity of the humerus (nine cases) or surgery for shoulder



**Figure 2** Pelvic X-ray during follow-up of total hip replacement. A K-wire, which had initially been curved, was found in the right pelvic cavity. A. AP pelvic view. B. Strict lateral view. C. Three quarter axillary view.



**Figure 3** Horizontal CT slice: right pelvic K-wire location on the anterior side of the piriform muscle.

instability (five cases). Descriptions were in some cases incomplete. Migration was most often pleuropulmonary (17 cases) [2–16], cervical or thoracic tracheobronchial (four cases) [17–20], vascular (ascending aorta (eight cases) [21–26], pulmonary artery (five cases) [21,27–31], or sub-clavian artery (two cases) [32,33]), to the heart cavities (12 cases) [10,22,27,28,34–41], or esophageal (one case) [16]. There was migration towards the spinal nerves and lower cervical or upper thoracic intervertebral foramens (from C5-C6 to T8-T9) (12 cases) [15,42–51] and to the cervical region (three cases) [20,52,53]. Exceptionally, K-wire migration was found in the abdominal cavity: spleen (one case) [54,55] or intrahepatic (two cases) [52,56]. Origins were right-side in 19 cases and left-side in 20.

The present case features six years' radiological tracking of the K-wire's gradual migration from thorax to pelvic cavity. The episode of chest pain led to admission in cardiology for non-confirmed suspicion of myocardial infarction. A control pulmonary X-ray showing sternal projection of the wire failed to attract attention at the time. The migration route was probably via the anterior mediastinum in a retrosternal position simulating MI without vascular or cardiac perforation, passing posteriorly to the xiphoid process and then into the abdominal cavity without visceral lesion. Intra-abdominal migration followed the gravitational axis in the peritoneal cavity forward of the stomach and then of colon. The wire came to fix in the right retroperitoneal space on the anterior side of the piriform muscle. The outcome in this case was fortunate.

The evolution of this kind of migration, however, can sometimes be tragic [10,18,23,42,43,54,57,58], leading us to reconsider indications and osteosynthesis material in functional lesions of the scapular belt. A case was reported of cardiac tamponade on postoperative day 6 [27]. Rajesh [55] reported K-wire migration on day 5 in the right atrium and 12 hours later in the abdominal cavity in contact with the spleen. Another case of migration was reported at a 20-year interval [34] with a cerclage performed to stabilize the sternoclavicular joint and removed from the right ventricular wall by thoracotomy. In unstable osteosynthesis, the large ranges of motion in the shoulder induce K-wire migration, exacerbated by respiratory motion, intrathoracic depression and gravity. The proximity of vessels in contact with the sternoclavicular joint leads to anterograde or

retrograde intravascular migration to the cardiac cavities during the first weeks. Longer term migration seems to be due to muscle movement, inducing migration along the arteriovenous circuit in contact with the muscles and under the effect of gravity, accounting for migration from the muscle compartment into other anatomic regions. Lyons and Rockwood [1] reported eight deaths, out of 47 patients, due to migration from the sternoclavicular joint: six cardiovascular complications with tamponade and two cases in the early course following wire removal; one of the latter involved irreversible ventricular fibrillation following repair of a pseudoaneurysm of the ascending aorta, and the other irreversible cardiovascular collapse. Our literature search found two deaths from K-wire migration with associated cardiovascular lesions, 1 following humeral fracture osteosynthesis [24] and the other following stabilization of chronic shoulder instability [35,38]. K-wires should be extracted as soon as signs of migration appear, to avoid sudden and sometimes fatal acute complications [1,48]. Endoscopic extraction may be recommended if the migration area is accessible and risk-free; otherwise, open surgery should be performed [13,14]. This attitude was formulated for pleuropulmonary migration and applies also in the present case, where laparoscopic extraction failed twice due to the deep location of the wire, finally requiring conversion to sub-umbilical laparotomy for pelvic vein hemostasis.

The risk of migration increases in both frequency and severity after sternoclavicular stabilization, so that certain authors [1] consider K-wire osteosynthesis as contraindicated. Patients managed by scapular belt K-wire should be informed of this risk and followed up regularly before removal. The use and number of K-wires should be specified in the surgical report. These authors [1,48] recommend curving the wire at its extremity and planning for removal as soon as the treatment period is over [1]. Curving the wire tip does not guarantee long-term stability, as the present case shows, nor does using a threaded pin. The legal aspect of the issue is worth mentioning. Should a patient who had not been informed of the question or given an appointment for material ablation after consolidation develop this complication, he or she can demand compensation. The risk should be clearly stated in postoperative, discharge and consolidation reports.

## Conclusion

K-wires are still a common means of fixation in orthopedic reduction stabilization. They can be mandatory when fragments are small and unamenable to other methods. The significant risk of migration has to be taken into account, as do the means of minimizing it in the scapular belt and in the sternoclavicular joint in particular. The risk of severe complications has led certain teams to abandon K-wire osteosynthesis as a treatment option in such cases.

## Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

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