Migration of a Broken Cerclage Wire from the Patella into the Heart

A Case Report

By Flavio Biddau, MD, Massimo Fioriti, MD, and Giovanni Benelli, MD

Investigation performed at Ospedale Misericordia e Dolce Prato, Prato, Italy

Fixation wires are used routinely for the treatment of fractures and dislocations. Wire migration is believed to be a rare but potential complication. We describe the case of a patient in whom a broken cerclage wire migrated from the right patella into the right ventricle. The patient was informed that data concerning this case would be submitted for publication. To our knowledge, no similar cases have been reported in the literature.

Case Report

A forty-seven-year-old man underwent a barium swallow to evaluate gastroesophageal reflux due to a hiatal hernia. The radiographs demonstrated a metallic wire in the right ventricle of the heart (Figs. 1-A and 1-B). The clinical history revealed that the patient had undergone surgery with use of circumferential wiring for the treatment of a transverse patellar fracture of the right knee thirteen years previously. The fracture had healed, and the patient had not had any subsequent knee pain or swelling. The hardware had not been removed because there were no clinical symptoms related to the right knee. A radiograph of the right knee showed a broken patellar cerclage wire with absence of the superior part of the wire (Fig. 2). The patient was immediately referred to the cardiothoracic surgery service, where he underwent open heart surgery with removal of the wire. The procedure required a sternotomy and a right atriotomy while the patient was on cardiopulmonary bypass. The surgeons did not note any ventricular damage resulting from the broken wire. Postoperatively, the patient recovered well and walked out of the hospital in stable condition. He was subsequently referred to us for additional care.

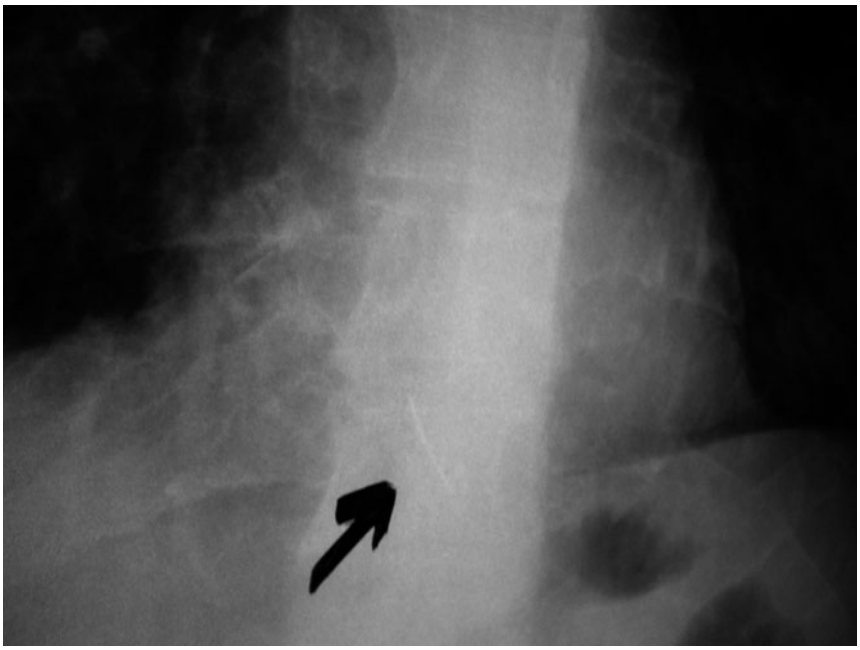

Fig. 1-A

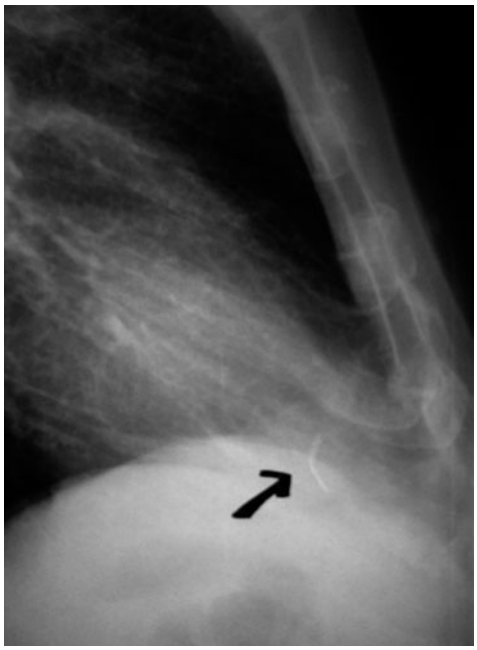

Fig. 1-B

Plain anteroposterior (Fig. 1-A) and lateral (Fig. 1-B) radiographs demonstrating the fragment of cerclage wire in the right ventricle of the heart (black arrow).

Fig. 2
Radiograph of the right knee, showing the absence of the superior portion of the cerclage wire.

We obtained the piece of wire that had been removed from the heart and matched its length with the gap shown on the knee radiograph, at which time we noted that another piece of cerclage wire was missing. Additional radiographic evaluation showed that the missing piece of wire was located in the deep crural fascia of the ipsilateral leg. We then surgically removed all of the residual hardware from the right patella and from the calf region.

Discussion

Since the 1930s, metallic fixation pins and wires have been used routinely for the treatment of fractures and dislocations[1]. Transverse patellar fractures are commonly treated with cerclage wiring[2]. In our review of reports on circumferential wiring of patellar fractures, we did not find any cases similar to the one described here. Several cases of migration of metallic hardware into the heart have been reported[3-7], but most have involved migration of a Kirschner wire from the upper limb or the shoulder girdle after an orthopaedic procedure. We found no reports of this kind of complication in association with fracture fixation hardware in the lower limb.

The actual prevalence of wire migration is unknown, although in case reports it has been a well-documented complication with potentially devastating consequences. Lyons and Rockwood[8], in an extensive review of case reports of wire migration from the shoulder region, referenced forty-nine cases of migration, including seventeen cases in which a pin had migrated to a major vascular structure such as the heart (four cases), the subclavian artery (two), the ascending aorta (six), and the pulmonary artery (five). They also referenced eight deaths that were attributable to pin migration, six of which were associated with pericardial tamponade.

We suggest that surgeons consider some factors that may help them to decide when to remove asymptomatic broken hardware in order to prevent a cardiovascular complication. First, the age and activity level of the patient may be important factors when assessing the risk of migration of broken hardware from the lower limb. Our patient was forty-seven years old and was an active participant in sports. Second, when a radiograph shows breakage of hardware around a major joint, periodic follow-up radiographs may be useful for identifying any initial movement of the broken wire.

The relationship between the broken hardware and the large vessels in the region is another important factor to consider. In the case of our patient, we believe that the piece of cerclage wire entered the venous circulation around the knee and then migrated through the caval system to reach the right ventricle. If there is any radiographic evidence of local migration of the broken wire, a Doppler investigation to determine the distance of the fragment from the larger vessels in the region may be helpful. All of these elements may help the surgeon to assess the risk of migration and may influence the decision to remove the broken hardware.

Fortunately, the potential of migration of a broken wire from the lower extremity is rare, as our review of the literature revealed no evidence of any previous case similar to ours. However, a potentially devastating cardiovascular complication resulting from the migration of a broken wire[5,6,9-11], while also rare, could be prevented by performing hardware removal. ■

Flavio Biddau, MD
Via Cento Stelle 3, 50137 Florence, Italy. E-mail address: flbidda@tin.it

Massimo Fioriti, MD
Via Respigli 4, 50127 Florence, Italy. E-mail address: maxfioriti@libero.it

Giovanni Benelli, MD
Piazza Ospedale 5, 59100 Prato, Italy. E-mail address: ortoprato@usl4.toscana.it

The authors did not receive grants or outside funding in support of their research for or preparation of this manuscript. They did not receive payments or other benefits or a commitment or agreement to provide such benefits from a commercial entity. No commercial entity paid or directed, or agreed to pay or direct, any benefits to any research fund, foundation, educational institution, or other charitable or nonprofit organization with which the authors are affiliated or associated.

doi:10.2106/JBJS.E.00968

References

1. Mooney V. Fracture of the shaft of the femur. In: Rockwood CA Jr, Green D, editors. Fractures. Philadelphia: JB Lippincott; 1975. p 1075-129.

2. Weber MJ, Janecki CJ, McLeod P, Nelson CL, Thompson JA. Efficacy of various forms of fixation of transverse fractures of the patella. J Bone Joint Surg Am. 1980;62:215-20.

3. Daus GP, Drez D Jr, Newton BB Jr, Kober R. Migration of a Kirschner wire from the sternum to the right ventricle. A case report. Am J Sports Med. 1993;21:321-2.

4. Wirth MA, Lakoski SG, Rockwood CA Jr. Migration of a broken cerclage wire from the shoulder girdle into the heart: a case report. J Shoulder Elbow Surg. 2000;9:543-4. Erratum in: J Shoulder Elbow Surg. 2001;10:384.

5. Goodsett JR, Pahl AC, Glaspy JN, Schapira MM. Kirschner wire embolization to the heart: an unusual cause of pericardial tamponade. Chest. 1999;115:291-3.

6. Haapaniemi TA, Hermansson US. Cardiac arrhythmia caused by a Kirschner wire inside the heart. An unusual complication of finger osteosynthesis. J Hand Surg [Br]. 1997;22:402-4.

7. Anic D, Brida V, Jelic I, Orlic D. The cardiac migration of a Kirschner wire. A case report. Tex Heart Inst J. 1997;24:359-61.

8. Lyons FA, Rockwood CA Jr. Migration of pins used in operations on the shoulder. J Bone Joint Surg Am. 1990;72:1262-7.

9. Foster GT, Chetty KG, Mahutte K, Kim JB, Sasse SA. Hemoptysis due to migration of a fractured Kirschner wire. Chest. 2001;119:1285-6.

10. Fueter-Tondury M. [Migration of the wire after osteosynthesis]. Schweiz Med Wochenschr. 1976;106:1890-6. German.

11. Dayantas J, Lazarides M, Arwanitis D. Delayed femoral artery trauma from migration of a broken wire after total hip replacement. Eur J Vasc Surg. 1991;5:597-9.