

Kirschner Wire Migration from the Right Sternoclavicular Joint to the Heart: A Case Report

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ABSTRACT

Presented here is a rare case in which Kirschner wires migrated from the right sternoclavicular joint to the heart. A 29-year-old man suffering from sternoclavicular instability due to a motorcycle accident received surgical fixation with Kirschner wires. Six months after the surgery, the chest x-ray showed migration of the 3 broken wires to the anterior mediastinum and to the right hemithorax. The patient was asymptomatic and was scheduled for elective surgical extraction of the migrating wires because of the potential danger of injuring the mediastinal organs. During the surgery, the intracardiac location of all wires was discovered, and the wires were successfully extracted from the extracorporeal circulation. This rare and potentially lethal complication is discussed.

INTRODUCTION

Kirschner-wire fixation is one of the options for managing sternoclavicular instability. The migration of these implants toward solid organs or body cavities has been reported [Lyons 1990]. Large-vessel penetration can occur and cause several complications [Haapaniemi 1997; Goodset 1999; Siepel 2001]. In our report, we describe a cause of embolization of the 3 broken Kirschner-wires to the heart and to the pulmonary arteries.

CASE REPORT

A 29-year-old patient had a motorcycle accident in 2004. Subsequent right sternoclavicular joint instability was successfully treated with Kirschner-wire fixation. The postoperative course was uneventful and the patient denied any cardiovascular symptoms. The motion of his sternoclavicular joint was

almost unlimited. The patient was scheduled for elective extraction of the Kirschner wires 6 month after surgery. He underwent a series of routine preoperative tests including a chest x-ray. The radiograph showed the migration of 3 medial fragments of broken Kirschner-wires to the anterior mediastinum and to the right hemithorax (Figure 1). Computed tomography (CT) scans proved that the diagnosis based on the chest x-ray was correct (Figure 2).

Surgical extraction of the wires was performed in a regional department of thoracic surgery. Two of the wires were expected to be located in the anterior mediastinum extrapericardially or intrapericardially lying on the surface of the right ventricle or the right atrium. The third wire was supposed to be in the region of the right pulmonary hilus. The surgical approach was median sternotomy. Unfortunately, the surgeons could not locate any wires in the anterior mediastinum either intrapericardially or extrapericardially. The pericardial sac was thick and there were diffuse adhesions with the heart. A perioperative skiascopy was then performed and the wires were found in the expected location, and they had a cardiac cycle comovement. After this discovery, the operation was terminated and the patient was transported to the Department of Cardiac Surgery at the University Hospital in Prague.

Re-exploration was performed using the same approach 3 days after the first operation. The heart was completely dissected out from the adhesion but wires were not found. The right pleura were then opened and the right hemithorax was explored. One of the wires was found in the right pulmonary hilus. Surprisingly, the location of the wire was in the lumen of the right pulmonary artery going from the hilus to the right lower pulmonary artery. Perioperative transesophageal echocardiography (TEE) was performed and confirmed the intracardiac location of the 2 other wires (1, inside the right ventricle; 2, in the pulmonary artery trunk and left pulmonary artery; 3, in the right pulmonary artery) (Figure 3). With respect to the intracardiac location of the wires, we decided to remove the wires from the extracorporeal circulation. A cardiopulmonary bypass was established and the right atrium was opened on the beating heart. All wires were found in the same location as shown on the TEE. Wires No. 1 and 2 were removed from the right atriotomy. Wire No. 3 was extracted from the right lung in a

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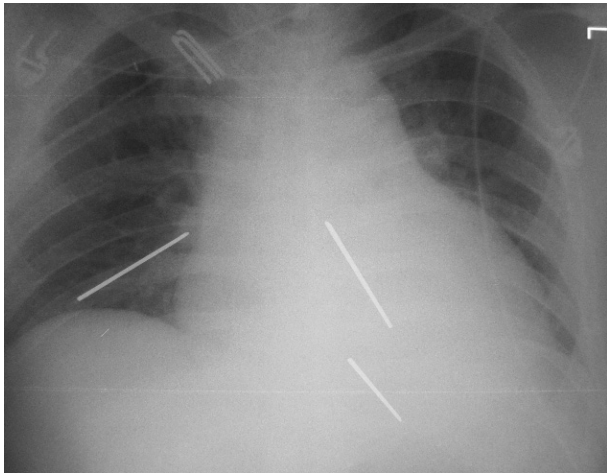


Figure 1. Chest x-ray showing 3 metal fragments of the Kirschner wires.

manner in which the collapsed lung was compressed and the wire was pulled out on the surface peripherally. The small hole in the lung was then sutured. The cardiopulmonary bypass was discontinued and the postoperative course was uneventful.

DISCUSSION

Kirschner wires are regularly used in the treatment of fractures and dislocations. There are multiple reports regarding migration of Kirschner wires, but the migration to a large vascular structure is very rare [Pafko 1988; Hegemann 2005; Prihan 2005; Wada 2005]. There are only a few reports referring to wire embolization to the heart, often associated with pericardial tamponade or arrhythmias [Haapaniemi 1997; Goodsett 1999]. In our case, the patient was surprisingly asymptomatic. We believe

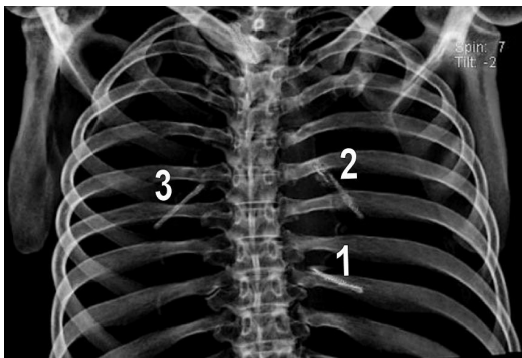


Figure 2. Three-dimensional reconstruction obtained from computed tomography scans of the thorax showing 3 migrating metal fragments of the Kirschner wires. No. 1 was inside the right ventricle lying on the inferior wall; No. 2, in the pulmonary artery trunk and left pulmonary artery; No. 3, in the right pulmonary artery.

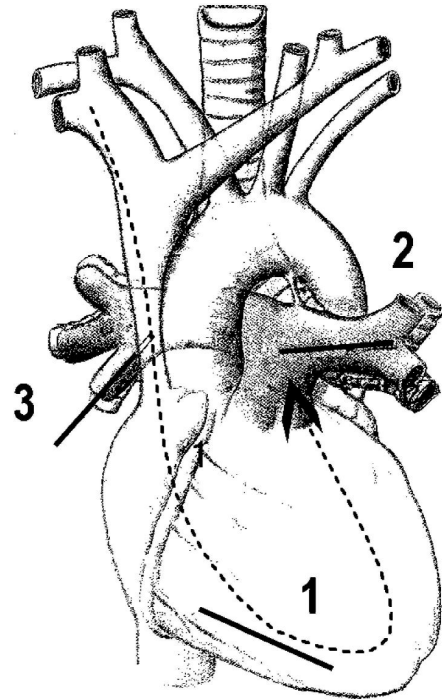


Figure 3. The scheme of the location of the Kirschner wires inside the heart and their route from the right sternoclavicular joint. No. 1 was inside the right ventricle lying on the inferior wall; No. 2, in the pulmonary artery trunk and left pulmonary artery; No. 3, in the right pulmonary artery.

that in cases like this an extraction of the wires is necessary even in asymptomatic patients because of the potential threat of heart injury. The CT scans and chest x-ray were misinterpreted and the correct location of the wires was finally obtained by TEE perioperatively. In cases of suspected intracardiac localization of a foreign mass, TEE has a higher sensitivity than CT and chest x-rays and is therefore highly recommended.

The treatment strategy of the sternoclavicular joint dislocation is generally conservative. If sternoclavicular joint instability persists and is associated with pain, temporary surgical fixation of the joint may be recommended. Placement of Kirschner wires across the sternoclavicular joint is one treatment option. The complication described above is very rare and potentially lethal. Extraction of the wires during extracorporeal circulation is therefore the treatment of choice.

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