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Migration of trochanteric cerclage cable debris to the knee joint

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Migrating orthopedic hardware has widely been reported in the literature. Most reported cases of migrating hardware involve smooth Kirschner wires or loosening/fracture of hardware involved with joint stabilization/fixation. It is unusual for hardware to migrate within the soft tissues. In some cases, smooth Kirschner wires have migrated within the thoracic cage—a proposed mechanism for this phenomenon is the negative intrathoracic pressure. While wires have also been reported to gain access to circulation, transporting them over larger distances, the majority of broken or retained wires remain local. We report a case of a 34-year-old man in whom numerous fragments of braided cable migrated from the hip to the knee.

Case report

A 34-year-old man presented for radiographic evaluation of "lateral thigh pain." The patient had a remote history of osteosarcoma with resection of the distal femur and placement of a left oncologic knee prosthesis. In addition, he had sustained several falls and fractures over the years, requiring a left total hip arthroplasty and left patellar cerclage fixation. Six months before presentation, the patient suffered a left periprosthetic proximal femur fracture, and hardware was revised to a left total femur prosthesis with braided cerclage wires securing the greater trochanteric fragment.

Regular follow-up imaging at 6 weeks postoperatively revealed appropriate placement of the femoral prosthesis, with (incidentally noted) previously broken patellar cerclage wires and periprosthetic heterotopic ossification (Fig. 1).

At 6 months after surgery, follow-up radiographs revealed frayed trochanteric cerclage wires around the proximal fe-

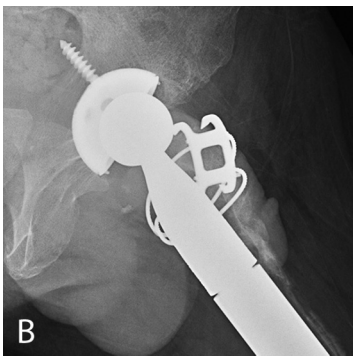

Figure 1. 6 weeks post surgery. A) Frontal & B) frog-leg lateral radiographs of the left hip demonstrate intact cerclage wires around hip joint. C) Lateral radiograph of the distal left femur. Note fracture of the patellar wires (arrow); this had been similar in appearance for several years.

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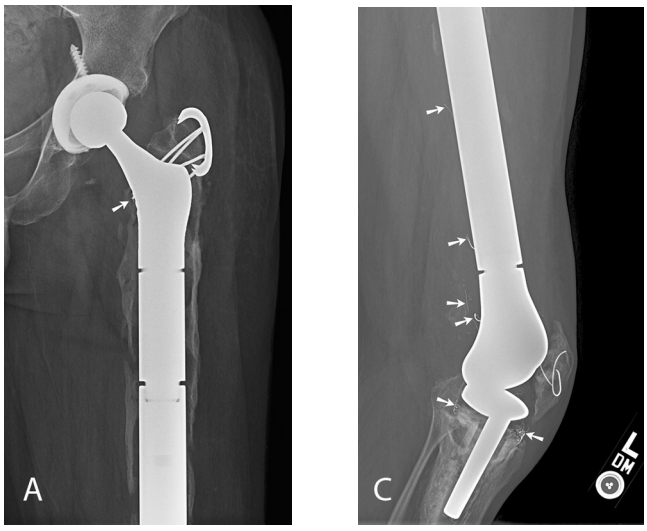

Figure 2. Six months post surgery. A) Frontal and B) frog-leg lateral radiographs of the left hip demonstrate fraying of the greater trochanteric cerclage wires (arrows). C) Lateral radiograph of the distal left femur. Multiple wire fragments have migrated distally from the hip joint (arrows); some are now located within the knee joint space.

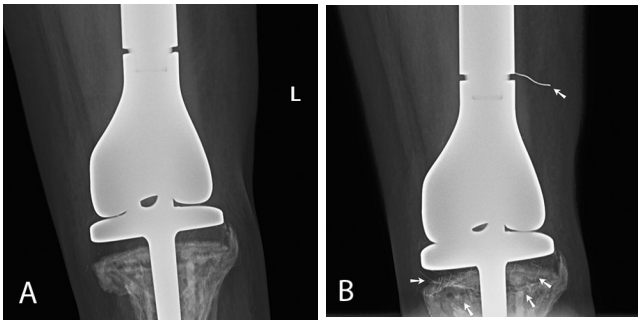

Figure 3. Frontal radiographs of the left distal femur and knee A) immediately post surgery and B) 6 months post surgery. The immediate image is free of any unanticipated radioopaque foreign bodies. The 6-month image demonstrates multiple new metallic wire fragments within the knee joint and a dominant wire fragment projecting laterally into the distal thigh (arrows).

mur (Fig. 2), with radioopaque debris collecting around the anterior and posterior aspects of the knee joint (Fig. 3).

A new, thicker-appearing wire was seen just proximal to the femoral trochlear flare. The appearance of the broken patellar cerclage wires remained unchanged. It was concluded that the soft-tissue wire (likely responsible for the patient's lateral thigh pain) and the multiple fragmented wire fragments within the knee joint were due to fraying of the proximal cerclage fixation at the greater trochanter.

Discussion

Cerclage wires and cables are commonly used in orthopedic surgery for both provisional and permanent fracture fixation. Cerclage wires may be used to counteract hoop stresses in the proximal femur during intramedullary nailing, during insertion of hip arthroplasty hardware to prevent fracture fragment displacement, or to secure the greater trochanter to the femur in hip arthroplasty. Wires are also frequently used as tension bands, which convert distracting forces to compression forces in areas such as the olecranon and patella, where traditional lag screws may not be strong enough to overcome the pull of muscular attachments.

The migration of orthopedic Kirschner wires has widely been reported. Smooth Kirschner wires are often used as temporary fixation devices, intended for removal after bony union or ligamentous healing has been observed (1, 2). There are a large number of reports of intrathoracic pin migration, such as from the clavicle into adjacent structures such as the lung (3), the aorta (1), or the innominate vein (4). Migration over long distances, such as from the pelvis into the right ventricle, has also been reported, and the wires are thought to gain entry to the circulatory system for transport (5, 6).

Reports of migrating cerclage wires are less common. In the cardiothoracic literature, there are reports of broken sternal wires penetrating into the heart, causing cardiac tamponade (7), or into the lungs, causing pneumothorax (8). Orthopedic cerclage wires have also been reported to migrate to vital structures via the circulatory system, with one report of a broken piece of patellar wire migrating to the heart (9). Trochanteric wires, generally for use in hip arthroplasty, have been reported to migrate locally into the hip joint (10) or into the popliteal fossa (11). Here, we report the migration of frayed braided cable wire fragments from the proximal femur distally into the knee joint. In this case, the temporal proximity of the wire migration to the total femur surgery suggests that a fluid-filled space continues to surround the implant. As fraying and breakage of the proximal cerclage cable occurred, small and large fragments of the braided cable were able to migrate and settle in a dependent fashion in the thigh and knee joint.

Treatment recommendations depend on symptoms and perceived risk of damage to nearby structures or further migration into vital organs (9). It has been recommended that patients with known broken hardware be periodically monitored with radiographs to assess risks and benefits of removal versus watchful waiting, though no formal protocol has been developed. One may wish to consider a chest radiograph in a situation with large amounts of migrating wire fragments, given the propensity for these fragments to lodge within the heart and chest.

As with all orthopedic hardware, the risks and benefits of a particular fixation device must be evaluated on a case-by-case basis. We report a complication that, while rare, may be taken into consideration when selecting orthopedic hardware. This case may also prove useful to the radiologist in the diagnosis of metallic foreign bodies. Finally, cerclage cables and wires are sharp and pose an intraoperative risk to the surgeon for wire-stick injuries. Foreknowledge of their location may be helpful in preventing exposure injuries, should removal be indicated.

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