Case Report

Broken guidewire protruding into the hip joint: A bone endoscopic-assisted retrieval method

Sumit Arora, Lalit Maini, Vinay Aggarwal, Anil Dhal

Abstract

Broken implants, especially broken wires at difficult sites, may pose a challenge for the treating orthopedic surgeon. We describe a method for extraction of a broken guidewire that was, protruding into the hip joint following the insertion of a proximal femoral nail. A 35-year-old man with displaced femoral neck fracture with ipsilateral fracture shaft of femur was operated and fixed with long proximal femoral nail. The guidewire of proximal screw broke during the process of drilling. The tip of the 2-cm-long broken guidewire was touching the articular surface. The guidewire was misdirected posteroinferiorly from its path for the insertion of the proximal screw (6.8 mm), this screw was removed and bone endoscopy was performed with a 30° arthroscope. The broken end of the guidewire was located under direct vision. The grasper was introduced with its jaws at the 8 O'clock position and its position was confirmed under a C-arm image intensifier in both anteroposterior and lateral views. The broken end of the guidewire was grasped and it was retrieved. The screw was replaced in its original track to complete the procedure. The fractures united and patient was asymptomatic when last followed-up at 12 months.

Key words: Bone endoscopy, broken guidewire, proximal femoral nail, femoral neck fracture

Introduction

A broken wire within a bone usually does not warrant removal. Rarely a wire may break inside the bone and protrude into the neighboring joint, necessitating its removal in order to avoid damage to articular cartilage and consequent early degenerative arthritis. Several techniques have been described for the removal of a broken intramedullary nail.[1–5] Bone endoscopy (actually medulloscopy) has been used for removal of a broken intramedullary nail, assisted closed reduction of long bone fractures, intramedullary loss of reamer, cement removal in revision hip arthroplasty, curettage in simple bone cyst, and direct visual confirmation of cannulated screw placement in slipped capital femoral epiphysis.[6–11] Here, we describe a method for removal of a broken guidewire in the hip joint.

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To the best of our knowledge, a bone endoscopic–assisted method for removing a broken guidewire has not been described before in the English-language literature.

Case Report

A 35-year-old man presented to the orthopedic emergency with the history of road traffic accident a few hours back. He was diagnosed as closed, short oblique fracture of the mid shaft of the right femur, with a small butterfly fragment (involving less than 25% of its circumference), and ipsilateral displaced femoral neck fracture. Skeletal traction through an upper tibial pin was applied pending operative fixation of both the fractures.

A closed reduction and fixation of the shaft as well as the neck of femur was performed using a long proximal femoral nail (Yogeshwar Pvt. Ltd, Mumbai, India). During surgery, the guidewire of the proximal-most screw of the neck of femur broke during the process of drilling and became misdirected posteroinferiorly. Anteroposterior, lateral, and oblique views taken under a C-arm image intensifier showed that the tip of the 2-cm-long broken guidewire was just touching the articular surface of the femoral head, without any protrusion into the hip joint. The surgical procedure was completed in the usual manner. The postoperative period was uneventful, although patient did complain of hip pain. Clinical examination failed to elicit crepitus in the hip joint. As the postoperative radiographs were equivocal [Figure 1], fine-cut multidetector computed tomography of

the involved hip was performed, which suggested a 3-mm wire-tip protrusion into the hip joint [Figure 2].

It was necessary to preempt the possibility of articular cartilage abrasion by the protruding wire, and so the various options considered for the removal of offending wire were (1) arthroscopic extraction, (2) arthroscopic push down into the femoral head, or (3) bone endoscopy–assisted extraction. We attempted the bone endoscopy–assisted method for extraction of the broken wire. Since the guidewire was misdirected posteroinferiorly from its path for the insertion of the proximal screw (6.8 mm), this screw was removed and bone endoscopy was performed with a 30° arthroscope [Figure 3a]. The broken end of the guidewire was located under direct visualization [Figure 3b]. The grasper was introduced with its jaws at the 8 O'clock position and its position was confirmed under a C-arm image intensifier in both anteroposterior and lateral views [Figure 4a]. The broken end of the guidewire was grasped and it was retrieved [Figure 4b]. The screw was replaced in its original track to complete the procedure. The screw purchase was found to be satisfactory.

The patient was started on quadriceps exercises and active knee bending exercises 3 days after surgery. As the patient's comfort increased, he was mobilized without weight bearing on the operated side and graduated to partial weight bearing at 12 weeks. Both the fractures united and patient was asymptomatic when last followed-up at 12 months [Figure 4c].

Written informed consent was obtained from the patient. He was also informed that data concerning the case would be submitted for publication.

Discussion

A broken Kirschner wire/guidewire/drill bit usually does not require removal except in exceptional circumstances, like breakage with protrusion into the joint, intra-articular migration, or compression over neurovascular structures. Removal from difficult situations such as when there is

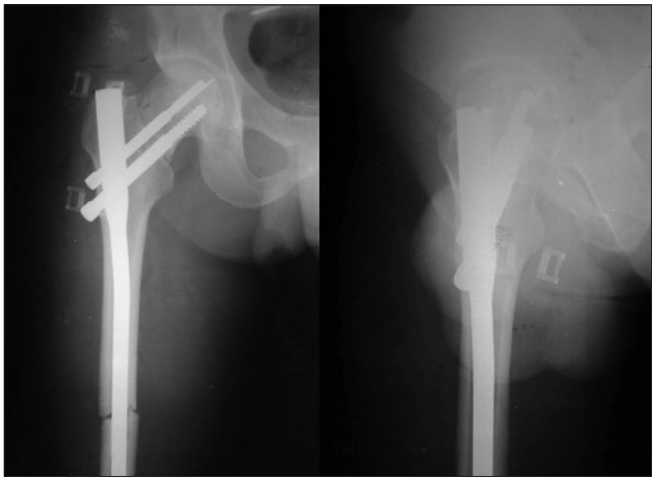

Figure 1: Postoperative radiographs (anteroposterior and lateral view) showing the long proximal femoral nail and the broken guidewire near the lower margin of the proximal-most screw

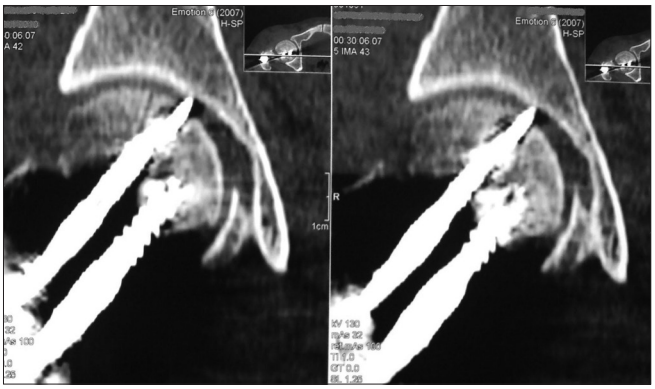

Figure 2: 3 mm cuts of computed tomography, coronal images, showing wire-tip protrusion into the hip joint

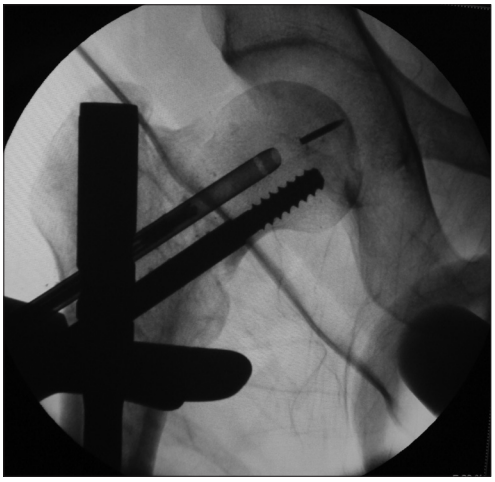

Figure 3a: Fluoroscopic view showing insertion of scope into the screw tunnel

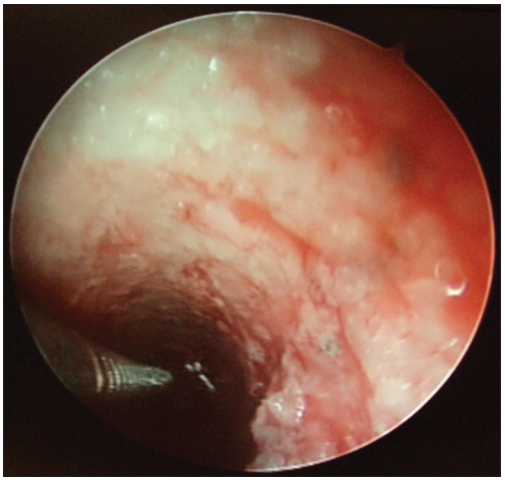

Figure 3b: Bone endoscopic view of the tunnel showing the broken wire posteroinferiorly

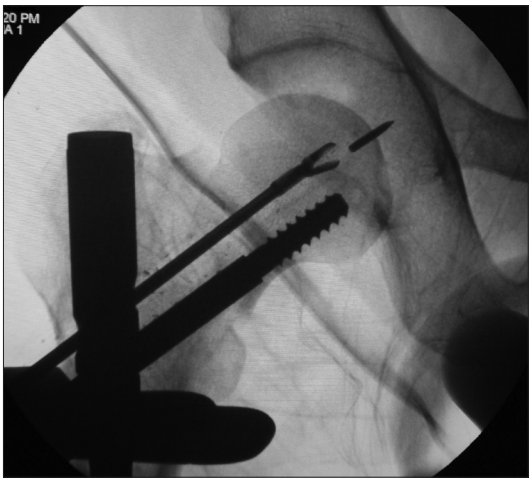

Figure 4a: Fluoroscopic view showing the grasper being advanced in the direction of the visualized misplaced broken guidewire and the jaws were opened after directing them towards the broken guidewire

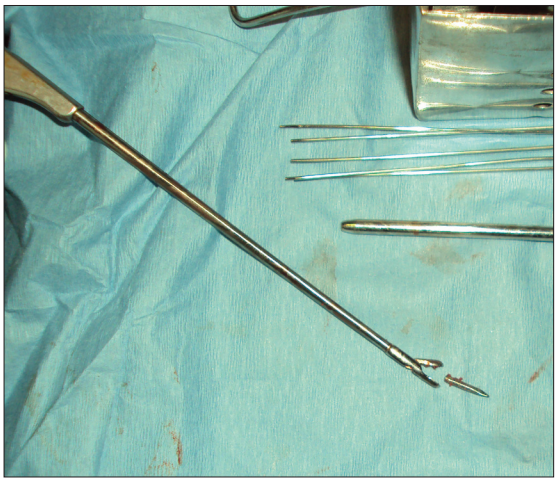

Figure 4b: The retrieved guidewire (approximately 2 cm), along with the grasper used to retrieve it

Figure 4c: Follow-up radiograph (anteroposterior view) showing union of both the fractures

intraosseous breakage of the wire with protrusion into the joint can pose a dilemma, considering the magnitude of iatrogenic damage caused by an arthrotomy, especially in the hip joint.

Oberst *et al.* pioneered the technique of intramedullary bone endoscopy (IBE) or medulloscopy.[6–8,12,13] They first performed IBE in the cadaveric femur and tibia and then extended its use to clinical situations for removal of broken nail and assisted closed reduction of long bone fractures. They used a special endoscope with an oval working canal. Govaers *et al.* successfully used the method of medulloscopy for cement removal in revision arthroplasty of the hip.[10]

We considered various options for the extraction of the offending wire, including hip arthroscopic extraction, hip arthroscopic push down into the femoral head, and bone endoscopy–assisted extraction. An arthroscopic extraction of the wire would have required sufficient distraction of the joint and would have been difficult to catch hold of the small protruding wire-tip using graspers. We also considered the hip arthroscopic push down of the wire into the femoral head to be a suitable option, but engagement of threaded end of the guidewire in the subchondral bone would have posed an obstacle. Considering the magnitude of damage caused by surgical dislocation of the hip, we thought it would be imprudent to use this method for the guidewire removal. Bone endoscopy through the screw track after temporary removal of the screw was considered the most suitable option. It may be desirable to use the grasper under direct scope visualization. We were, however, restricted by the screw tract diameter, which could accommodate only one instrument at a time. Scope visualization helped in direct visual localization of the broken guidewire in the screw tract. This gave us a fairly accurate impression about its location, which was in the 8 O'clock position in the relationship to the cross-section of screw tract. This helped in the ultimate retrieval of the broken wire using the grasper, with help from the image intensifier. We strongly feel that preliminary scope visualization reduced the overall radiation exposure; had the image intensifier being the only tool for localization, there would have been greater radiation to the patient due to the repeated attempts that are usually required for retrieval of a broken guidewire. Furthermore, the procedure done without visual localization is blind procedure, with the risk of articular cartilage perforation and joint penetration by the instruments.

The advantages of this method were its minimally invasive nature and the direct visualization of the guidewire, which resulted in overall reduction in radiation exposure to surgeons as well as patient. However, the need for sophisticated instrumentation may limit its use in centers with limited resources. Removal of the screw and reinsertion into the same track after the procedure carries the inherent risk of loss of purchase and the need for an additional screw insertion. An arthroscope can be used in

place of the special endoscope in selected circumstances. As in the present case, the canal (that we utilized for passing the scope) was prepared for screw insertion during the original surgery. The need for an image intensifier may be completely obviated with the use of a special endoscope with a working canal.[7]

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