

CASE REPORT

Intrapelvic Protrusion of a Broken Guide Wire Fragment during Fixation of a Femoral Neck Fracture

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During fixation of a femoral neck fracture in a 23-year-old male patient with cannulated screws, a broken guide wire fragment inadvertently advanced through the hip joint and protruded into the pelvis. A second surgical approach was needed to remove the broken fragment from the pelvis. Awareness of such a potentially devastating complication will make surgeons more cautious during implementation of orthopedic instruments and increases patient's safety during surgery.

Keywords: Cannulated screw, Complication, Femoral neck fracture, Guide wire, Patient's safety

Introduction

There are many hazards of internal fixation in the treatment of femoral neck fractures (1). Inadvertent guide wire breakage and/or advance of the guide wire into the joint and pelvic cavity is a dangerous complication. Mueller et al reported such a case with a fatal outcome (4). In long term, chondrolysis diagnosed by pain and reduced cartilage space by one half or more compared with the normal joint space, is another concern described after the pin penetration in to the hip joint (1, 6).

The use of cannulated screws for internal fixation of the femoral neck fracture in young patients is a standard treatment, but possible head penetration with screws, guide wire breakage, and inadvertent advancement of the guide wire leading to penetration of the hip joint or the pelvis cavity are a concern (1-18). Although such complications may occur frequently they are seldom reported in the literature (1-18). The purpose of this report is to present a case in which a broken guide wire fragment inadvertently advanced through the hip joint and protruded into the pelvis during fixation of a femoral neck fracture.

Case report

A 23-year-old male underwent cannulated screw fixation for displaced trans-cervical fracture of the right proximal femur. His accident was fall from 20 feet height. Under image intensifier control, appropriate closed reduction was achieved. Three 2 mm parallel guide wires

were inserted into the femoral neck and advanced to the subchondral bone of the head. The bone had a hard quality. The wires were the first use. The two first screws were inserted after drilling with a cannulated drill bit. Frequent screening was carried out during the drilling and screw insertion. After drilling on the third guide wire, the image intensifier revealed that the guide wire was advanced into the pelvis. The drill bit was withdrawn and it was realized that the guide wire was broken and the distal fragment had migrated through the acetabulum into the pelvis. The other end of the broken wire was at the fracture site [Figure 1]. The broken fragment was situated 6 to 7 cm medial from the lateral femoral cortex. The breakage of the guide wire was not felt.

All attempts to retrieve the broken guide wire through the lateral femoral cortex failed.

Through the ilioinguinal extraperitoneal approach the inner surface of the acetabulum was touched and the protruding tip of the wire was recognized. The wire was retrieved from the pelvis under direct vision with pliers.

When the pictures of the image intensifier were reviewed, it was realized that the third pin somehow was deflected when it was inserted. This happened because of the flexibility of the wire and the hard quality of the bone. When the drilling on the third guide wire was advancing, the guide wire was cut because of a diverging angle and the distal fragment jammed in the cannulated drill bit. As the drill bit advanced further the jammed broken distal fragment of the guide-wire was pushed through the

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Figure 1. Internal oblique view of the right hemipelvis; X-ray shows the broken fragment of the guide wire that was passed through the hip joint and protruded into the pelvis.

acetabulum into the pelvis.

The post operative course was uneventful. The fracture site achieved union in 3 months and the patient started full weight bearing. However, avascular necrosis and late segmental collapse appeared after two years follow up.

Discussion

Guide wires are used with the cannulated instruments to assisted accurate positioning the final device. Breakages of the guide-wires have been reported with the cannulated screws, dynamic compression hip screws, proximal femoral nails that are used for fixations of the proximal femoral fractures, core decompression for avascular necrosis of the femoral head, reduction and fixation for slipped capital femoral epiphysis and resurfacing arthroplasty (1, 3, 6, 7, 9, 10, 12-15, 17, 18).

There are several reports about the dreaded complication of the breakage of the guide-wires in the hip joint, transfixing the hip joint and intrusion through the pelvis with increased morbidity and mortality of the patients (3, 7, 10, 12-15, 17, 18).

The guide-wire may be broken because of jamming of a damaged or notched portion of the guide wire inside the cannulated drill caused by a divergent angle while drilling (2). Guide wire advancement can occur as the result of friction between the wire and the over drilling

instruments. Drills, taps, and screws can become jammed over bent wires or when there is soft tissue or bone debris interpositioned within the cannulation (4).

Intra-operative cleaning of the cannulation in instruments (drill bits and taps) ensures that bone debris does not accumulate and reduces the risk that the instruments will bind about the guide wire (4).

Intra pelvic intrusion of a broken guide wire may be removed by laparotomy or the lateral window of the ilioinguinal approach (13, 15, 16). Thati et al. removed a fractured Kirschner wire from the pelvis by Laparoscopy (18).

A broken guide-wire may be lodged within the hip joint. To remove the offending wire, arthrotomy with dislocation of the hip adds to the morbidity. However, hip arthroscopy may help to remove the offending wire from the joint or push down the protruded tip of the offending wire below the cartilage surface back into the femoral head (7). Ilizaliturri et al retrieved a broken guide-wire fragment from the hip joint by arthroscopy (2). Arora et al. removed of a broken guide-wire transfixing the hip through the proximal femoral nail hole by bone endoscopic-assisted (actually medulloscopy) method (7).

A transfixed hip joint by a broken guide wire prevents dislocation or maneuvering of the hip joint to remove the lodged broken wire. Mishra and Gautam reported a case of broken guide-wire with intrapelvic protrusion during dynamic hip screw fixation of an intertrochantric fracture of the femur. They removed the broken wire through a window made in the femoral neck (13). Enlargement of the entrance of the guide wire with the dynamic hip screw reamer and try to grasp and retrieve the pin using Kocher forceps or a needle holder under fluoroscopic guidance has been suggested (11). However, this method weakens the lateral cortex and removes bone from the neck of the femur.

Sen et al. used a Smith-Peterson and Watson-Jones approach for 2 cases without pelvic penetration and ilioinguinal approach for the other 2 cases with guide wire penetration into pelvis (16). Sharma et al. reported that using a dynamic hip screw reamer to ream the area surrounding a broken pin results in engagement with the pin, making pin extraction easier. However, this method may remove a large amount of bone from the neck of the femur (17). To avoid, it is suggested using a 4 mm cannulated drill bit that is at least 4 times smaller than the hip screw reamer (14). A broken guide-wire transfixing the hip joint may be retrieved through the proximal femoral nail hole (10, 12). Bone endoscopy may also be performed through the holes of the proximal femoral nail to assist for removal a broken guide wire (7).

In this case frequent screening during the guide-wire and drilling were used. However, it is particularly important to use continuous screening with an image intensifier during guide wire insertion and whenever cannulated instruments are advance over a guide wire.

In the current case morbidity was added because of the need for a second surgical approach to remove the broken fragment from the pelvis and the patient being sedated for a longer period of time. The patient achieved union

but avascular necrosis and late segmental collapsed was appeared. Awareness of such a potentially devastating complication will make surgeons more cautious during such procedures and increases patient's safety during surgery.

Drilling only the lateral femoral cortex, using self drilling and self tapping screws to avoid the need for power instruments are appropriate measures to

circumvent potentially devastating complications that accompanies using cannulated systems for fixation of the femoral neck fractures (4).

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