New Method to Remove a Broken Guide Pin in the Hip Joint

MOHAMMAD TAGHI PEIVANDI, MD; AMIR REZA KACHOOEI, MD; ZOHREH NAZEMIAN, MD

abstract

Removing a broken guide wire is difficult and challenging. This article reports a method that was used to successfully remove a broken guide wire in 3 patients who underwent operative treatment for intertrochanteric fractures of the femur. Under general anesthesia, the first patient was placed on the orthopedic fracture table, and closed reduction of the hip fracture was performed under the image intensifier. A 2-mm non-threaded pin was used in the center of the femoral neck, and the amount of reaming required was determined. The reaming proceeded without any difficulty until the reamer failed to progress, which was attributed to the presence of a sclerotic or calcar region. Under fluoroscopy, on an anteroposterior view, the pin was parallel with the reamer; however, the authors failed to check the lateral image. After reaming through the hard tissue, the reamer suddenly passed through easily. On checking under the scope, it was noted that the pin was broken. The tip of the pin passed the acetabulum but did not enter the pelvis. Efforts to remove the broken pin failed. An attempt to reach the pin using a dynamic hip screw reamer also failed. Ultimately, the broken pin was removed using a 2-mm cannulated drill bit under fluoroscopy. After the experience with the first patient, in the other 2 cases, the authors used a cannulated drill bit to avoid any extensive reaming and trauma to the tissues. With this method, the authors were able to remove the broken pin easily in a few minutes.

Drs Peivandi and Kachooei are from the Department of Orthopedic Surgery, Shahid Kamyab Hospital, and Dr Nazemian is from the Department of Treatment Affairs, Mashhad University of Medical Sciences, Mashhad, Iran.

Drs Peivandi, Kachooei, and Nazemian have no relevant financial relationships to disclose.

Correspondence should be addressed to: Mohammad Taghi Peivandi, MD, Department of Orthopedic Surgery, Shahid Kamyab Hospital, Mashhad University of Medical Sciences, 10 Fadaian Estam St, Mail Box 9666637477, Mashhad, Iran (drpeivandy@yahoo.com).

doi: 10.3928/01477447-20110826-25

Figure: Broken pin in a 30-year-old patient at the time of reaming. The broken pin is removed by a cannulated instrument.
Removing a broken guide wire is difficult and challenging. Care must be taken to avoid iatrogenic trauma such as intrapelvic pin migration, injury to the arteries and nerves, articular damage, and overreaming.1,2 This article reports 3 cases of broken guide wires during dynamic hip screw placement for intertrochanteric fracture of the femur and discusses a new approach for quickly removing the broken guide wire with minimal complications.

CASE REPORTS

Three patients with intertrochanteric fractures of the femur were admitted for dynamic hip screw fixation. The patients included a 55-year-old woman with a fracture of the right femur, a 63-year-old man with a fracture of the left femur, and a 30-year-old man with a fracture of the left femur.

Under general anesthesia, the first patient was placed on the orthopedic fracture table, and closed reduction of the hip fracture was performed under the image intensifier. A 2-mm nonthreaded pin was used in the center of the femoral neck, and the amount of reaming required was determined. The reaming proceeded without any difficulty until the reamer failed to progress, which was attributed to the presence of a sclerotic or calcar region.

Under fluoroscopy, on an anteroposterior view, the pin was parallel with the reamer; however, we failed to check the lateral image. After reaming through the hard tissue, the reamer suddenly passed easily. On checking under the scope, it was noted that the pin was broken. The tip of the pin passed the acetabulum but did not enter the pelvis. Efforts to remove the broken pin failed. An attempt to reach the pin using a dynamic hip screw reamer also failed. Ultimately, the broken pin was removed using a 2-mm cannulated drill bit under fluoroscopy.

After our experience with the first patient, in the other 2 cases, we used a cannulated drill bit to avoid any extensive reaming and trauma to the tissues. With this method, we were able to remove the broken pin easily in a few minutes (Figure).

Postoperatively, all 3 patients remained in the hospital up to 7 days for observation. None of the patients reported pain or abdominal tenderness, and no pathologic signs or symptoms were found on vascular and neural examination. Abdominal sonography for patients 2 and 3 was normal, and none of the patients had problems with urination or defecation. All 3 patients were discharged from the hospital after an uneventful recovery.

DISCUSSION

Having a guide wire break while operating on hip, although a rare event, is of concern to every surgeon.1,3 In this article, we describe a method that was used successfully to remove a broken guide wire from 3 patients who underwent surgery for intertrochanteric fracture of the femur. One possible reason for a broken pin is reuse of the pin.1 Repeated use of guide wires can result in deformation and loss of bending and torsional strength. Subsequent passage of the more rigid drill or reamer over the wire will result in jamming.

It also is possible for a pin to break when it reaches the hard subchondral bone of the femur and acetabulum. The pin enters the bone using a perforator and then is compressed using a hammer. At times, the direction of pin changes slightly and the pin twists. The pin then can break after coming into direct contact with the reamer. Fortunately, because the shape of the pin changes to an oval rather than a round shape at the point of the break, reaming with a cannulated drill bit engages the pin, allowing the pin to be removed easily.

Removing the broken pin using a reamer is also helpful because of the presence of bone particles and debris in the lumen of the device.1 This results in lessening the effective diameter of a cannulated device while reaming. The engagement between the pin and the cannulated drill bit results in removing the cannulated device and the pin together. In our 3 patients, new nonthreaded pins were used.

Guide wires can break during any operative procedure in which guide pins are used. For instance, breaking has been reported during core decompression for osteonecrosis of the femoral head,1 gamma nailing in peritrochanteric fractures,4 and resurfacing arthroplasty.5

Sharma et al1 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. The disadvantage to this technique is the large diameter (8 mm) of the dynamic hip screw reamer, which makes a large gap and damages the articular cartilage. In contrast, a cannulated drill bit has a much smaller diameter of 4 mm.

Another method reported in the literature is to make a wide entrance with a dynamic hip screw reamer and try to retrieve the pin using Kocher forceps or a needle holder under fluoroscopic guidance.6 We tried using this method without any success.

A case of a broken guide wire with intrapelvic protrusion during dynamic hip screw fixation has been reported.7 The authors concluded that removal of the broken wire via the window made in the femoral neck was safe and effective. In another case report, Sayegh et al2 reported a complete intrapelvic migration of the threaded guide pin, which remained unnoticed during operation. They managed to remove the pin by laparotomy and found no damage to the pelvic viscera.

Recently, Sen et al8 reported 4 cases of K-wire and guide pin removal in peritrochanteric fracture fixation. They used a
Smith-Peterson and Watson-Jones approach for 2 cases without pelvic penetration and lateral window of ilioinguinal approach for the other 2 cases with guide wire penetration into pelvis. They believe pin breakage is more common in young patients with dense bones and concluded that the approach to remove the pin depends on its location and preoperative radiograph, computed tomography scan, and computed tomography angiography when needed.

Sometimes when reaming the broken end of pin, the pin may move forward, entering the pelvis and damaging the obturator vessels. There is at least one such report that resulted in an emergency embolization.6

These different methods for removing a broken pin are not without risk and complications, and prevention seems to be the best approach. The surgeon should verify both anteroposterior and lateral views under fluoroscopy to ensure any problem is detected before the pin is broken.

However, in cases of a broken pin, the safest method to remove the pin is with a cannulated drill bit, which has the smallest diameter and causes the least trauma in the surrounding tissue. With this technique, the broken pin can be removed much more quickly compared with the other available methods. We managed to remove the broken pin in our third patient in 5 minutes, given our experience gained from our previous 2 cases. Based on our experience, it would be advisable for companies to include a fine cannulated drill bit in the package in case for emergencies.

REFERENCES