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Case Report

Broken guidewire retrieval from the hip joint: A case report

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ABSTRACT

Hardware breakage during orthopaedic surgery especially closed intramedullary nailing is a nightmare for orthopaedic surgeons. During hip fracture surgery a mechanical failure of the guidewire or the reamer poses an additional risk of intrapelvic migration and neurovascular or visceral injury which can lead to devastating complications and litigation. We report a case of removal of the broken guidewire using a cannulated reamer & discectomy forceps and recommend some suggestions for prevention of this catastrophe.

Introduction

Hardware failure is a possible complication of fracture surgery which is a nightmare for orthopaedic surgeons. If the failure occurs during closed intramedullary nailing it poses an additional difficulty of metalware being lodged inside the medullary cavity or areas of the bone far away from the surgical incision making exposure and removal of the broken metalware difficult and technically challenging. Guidewire breaking during hip fracture surgery poses an additional risk of intrapelvic migration and neurovascular or visceral injury which can lead to devastating complications if not addressed timely [1,2]. For accurate placement of implants like dynamic hip screw, cancellous screws or recon nails like PFNA threaded guide wire and cannulated instruments are used. When the threaded guide wire breaks its retrieval is difficult as the threads engage the cancellous bone in the proximal femur and cannot be easily dislodged. Additionally if there is intrapelvic migration there is risk of incarceration of blood vessels or bowel around the threads leading to lacerations and life-threatening bleeding or perforations [3]. Sometimes while reaming the broken end of the guide wire it may move further forward and breach the acetabular wall to enter the pelvis and damage the obturator vessels. There has been one such report case that needed an emergency embolization [4]. Previously reported techniques for removing broken guidewires in the hip joint include use of over-reaming, use of discectomy forceps, arthroscopically assisted methods and arthrotomy of the hip joint. In this article, we report a case of complete removal of the implant and then removal of the broken guidewire by combining the use of a cannulated reamer & Codman's discectomy forceps.

Methods

A 76 year-old man presented with right intertrochanteric hip fracture. We decided to fix the fracture surgically using a proximal intramedullary femoral nail due to comminuted nature of the injury and subtrochanteric extension. The patient underwent surgery on the next day after the injury after optimisation as per routine protocol. During the surgery, the patient underwent uneventful spinal anaesthesia and was positioned supine on a fracture table and the fracture reduced under fluoroscopic guidance. A standard skin incision was made 5 cm proximally to the tip of the greater trochanter and guide wire entry was made through the tip of the greater

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trochanter. After reaming under fluoroscopy control to confirm maintenance of the reduction, a long proximal femoral nail was inserted. A threaded guidewire was then placed with the aid of the insertion device, to guide the insertion of the helical blade. However, during reaming over the cannulated guidewire, a sudden loss of resistance was unexpectedly encountered. On checking with fluoroscopy it was observed that the proximal end of the guidewire had sheared from the shaft with its tip lying within the subchondral area of the femoral head. Fortunately, the broken tip had not breached hip joint and entered the pelvis. The surgeon immediately consulted with his colleague and several options on how to retrieve the guidewire were discussed. It was decided to remove the nail and then attempt to reach the broken guide wire by careful over reaming the guide wire track with the same cannulated reamer to create a channel to retrieve the guide wire with either a long Kocher's forceps or a dissection forceps (Fig. 1). The incision was enlarged and the reaming track was exposed. Under direct vision & fluoroscopic control careful over reaming was performed over the guide wire and once the track was large enough a dissection forceps was passed through it and the distal end of the guide wire was firmly grasped with it (Fig. 2).

After confirming the hold of the forceps over the guidewire, the forceps was rotated by 180 degrees in the opposite direction of the reaming to dislodge the tip of the threaded guide wire from the cancellous bone and it was carefully pulled out of the reamed channel (Fig. 3).

Following successful retrieval of the broken guidewire, a long proximal femoral intramedullary nail was introduced and locked with a helical blade to achieve fracture fixation.

Discussion

On literature review for similar cases or a technique for retrieval we found that a few cases have been published. Abstracts or full texts were analysed and it was observed that a few reports were similar to ours [5–9]. This literature review suggests that the most commonly broken orthopaedic hardware is the drill bit, followed by guidewires. This can lead to damage to neurovascular structures

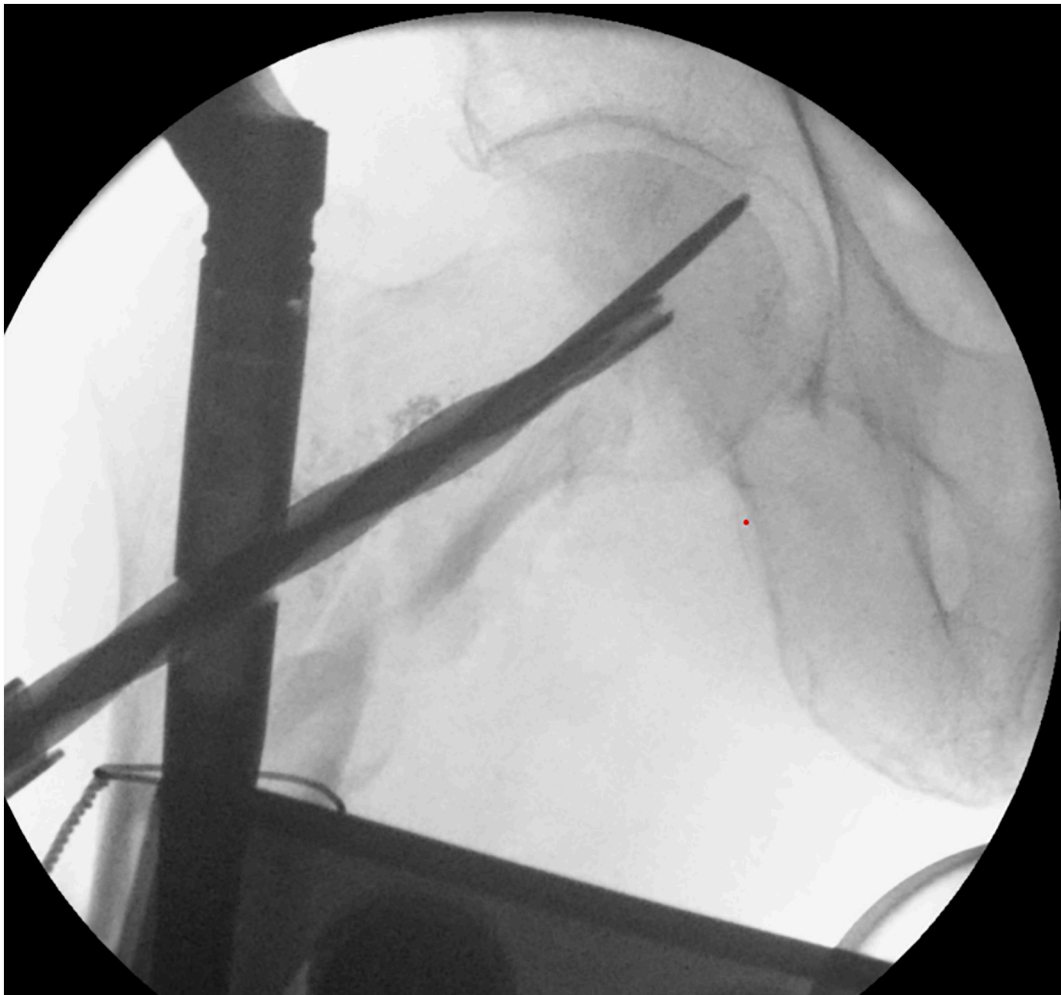


Fig. 1. Over-reaming around broken Guide wire tip.



Fig. 2. Using a dissection forceps to grasp the broken tip of the wire.

and viscera immediately and probably joint arthritis in long term. Hardware may break due to fatigue failure by repeated usage or improper technique such as drilling at low angle of insertion or inadvertent bending during insertion. Price et al. and Sharma et al. studied the reasons for hardware failure due to repeated use of guidewires and concluded that continued use of the same guidewire increased the chances of failure by causing deformation and loss of bending and torsional strength [6,7]. In addition, technical errors that predispose towards breakage of guidewire are changes in direction during insertion or improper insertion of a reamer or screw at an angle to the guidewire causing excessive contact stresses.

The known methods of removing of broken guidewires include over-reaming, use of pituitary forceps, arthroscopically assisted methods and open arthrotomy and dislocation of the hip joint [5–9]. Over-reaming leads to formation of large bone defects, which predispose towards pathological fractures. Use of pituitary forceps is effective as the cross section of the guide wire changes from circular to oval following breakage making easier to grasp and dislodge with gentle rotational manoeuvres. Arthroscopic methods are cumbersome and not universally available. The last resort for removal of broken guidewires is arthrotomy and hip dislocation which has high rate of complications including loss of fracture reduction, avascular necrosis of the hip and recurrent hip dislocations.

Conclusion

Removal of a broken guidewire from the hip is a surgical challenge but can be accomplished by judicious use of over-reaming and dissection forceps as demonstrated by our team. Occasionally, a combination of different techniques may have to be used to achieve successful removal.



Fig. 3. Successful retrieval of broken tip of guide wire.

Declaration of competing interest

None.

References

- [1] J.D. Brodell, A.R. Leve, Disengagement and intrapelvic protrusion of the screw from a sliding screw-plate device. A case report, *J. Bone Joint Surg. Am.* 65 (5) (1983) 697–701.
- [2] P. Mishra, P. Jain, A. Aggarwal, et al., Intrapelvic protrusion of guide wire during fixation of fracture neck of femur, *Injury* 33 (9) (2002) 839–841.
- [3] A.V. Kyriakidis, S. Papanikolaou, I. Perysinakis, et al., Intraabdominal injuries caused by migration of guide wire after intramedullary osteosynthesis in intertrochanteric hip fracture, *Hell. J. Surg.* 82 (6) (2010) 397–400. December.
- [4] K.J. Koval, J.D. Zuckerman, *Hip Fractures: A Practical Guide to Management*, 1st ed., Springer, New York, NY, 2000.
- [5] Abhijeet Ashok Salunke, Prem Haridas Menon, et al., Removing a broken guidewire in the hip joint: treatment options and recommendations for preventing an avoidable surgical catastrophe. A case report, *Sao Paulo Med. J.* 133 (6) (2015) 531–534.
- [6] M.V. Price, S. Molloy, M.C. Solland, A. Sutton, D.M. Ricketts, The rate of instrument breakage during orthopaedic procedures, *Int. Orthop.* 26 (3) (2002) 185–187.
- [7] H. Sharma, M. Chauhan, L. Maini, A technique to remove a broken guide wire transfixing the hip joint, *Acta Orthop. Belg.* 74 (5) (2008) 683–685.
- [8] R.K. Sen, S.K. Tripathy, S. Aggarwal, et al., Broken Kirschner or guide-wire retrieval: a report of 4 cases, *Hip Int.* 20 (4) (2010) 551–554.
- [9] P.L. Docquier, E. Manche, J.C. Autrique, B. Geulette, Complications associated with gamma nailing. A review of 439 cases, *Acta Orthop. Belg.* 68 (3) (2002) 251–257.