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Case Report

An unpredictable complication of femoral reaming: When the reamer gets stuck

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ABSTRACT

Intramedullary nailing has become the gold standard in surgical treatment for long bones shaft fractures. Many intraoperative complications may occur. We report an unusual complication of trapped bone fragments between the reamer and the cortex during intramedullary nailing of a simple femur shaft fracture. All Attempts to withdraw the reamer were unsuccessful. The fragments had to be removed through an open incision.

This complication was probably caused by a migrated chip of cortical bone fragment from the inner cortex which caused incarceration of the reamer.

If a loose intramedullary fragment is noted during nailing, it must absolutely not be ignored.

Introduction

The most effective method for treating femoral and tibial shaft fractures is intramedullary nailing. This surgery has been expanded to include metaphyseal fractures with a simple articular involvement. Actually, intra medullary nailing has been hailed as a straightforward, secure, and reproducible treatment [1]. However, perioperative accident and technical errors with intramedullary nailing are widespread [1].

Trapped bone fragments between the reamer and the cortex has never been reported in the literature before.

The aim of the present report is to describe an unusual case of trapped bone fragments between the reamer and the inner cortex during intramedullary nailing of a femur shaft fracture.

Clinical case

We report the case of a 34-year-old man with no previous personal medical or surgical history, who was a victim of a road traffic accident: collision between a car and a motorcycle. The patient was brought to the emergency room on the same day with a main complaint of a painful deformed left thigh.

On clinical examination, the patient was hemodynamically stable. After ruling out any vital emergency, the orthopedic examination showed a swollen and deformed left thigh. The skin was intact and there were no associated neuro-vascular complications in the left lower limb. Radiographic evaluation showed a left diaphyseal femur fracture without comminution. The fracture was type 32/A3 according to AO/OTA classification (Fig. 1).

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The patient was taken to the operating room 6 h after the injury. The procedure was done by a senior registrar in orthopedic surgery. Under general anesthesia, the patient was placed on a traction table and sterile draping was done. The entry point at the piriformis fossa was prepared and the proximal femoral canal was opened. The reaming guide was advanced through the fracture site and into the distal femur metaphysis after close reduction of the fracture was achieved by means of external maneuvers under fluoroscopic guidance. Progressive reaming of the femoral canal using flexible powered reamers was undertaken with 0.5 mm increments until diameter 11.5 was reached. Unfortunately, when withdrawing the reamer, it was trapped into the proximal fragment almost 05 mm beyond the fracture site. Intra operative fluoroscopy showed an incarcerated bone fragment between the reamer and the anterior femoral cortex preventing the reamer from being retrieved (Fig. 2). After several unsuccessful attempts to remove the reamer, decision was made to approach the fracture site and remove the incarcerated bony fragments.

Through a lateral incision exposing the fracture site, an anterior, 1 cm wide, rectangular corticotomy was made just proximal to the fracture line on the proximal segment using an oscillating saw. Two bone fragments were found trapped between the anterior cortex and the reamer. These fragments were removed and the anterior cortical window was replaced in its position (Fig. 3). The nailing procedure was carried on without any further incidents. Intra operative fluoroscopic control showed a good reduction of the fracture and the anterior cortex (Fig. 4).

Discussion

One of the surgical techniques used the most frequently by orthopedic surgeons is closed reamed intramedullary fixation. The literature has numerous descriptions of intraoperative problems.

We believe that this is the first instance of a trapped reamer in the proximal segment to have ever been documented in the literature. The most often reported complication from femoral nailing was an imprisoned bone fragment at the nail tip [2]. The mechanism described by the authors involved the tip of the nail detaching a tiny piece of cortex as it advanced through the fracture site. In our case; we think that the cause of our complication might be similar, with the reamer detaching a chip of inner cortex on its way back into the proximal fragment with the fracture mal reduced. Another possibility is that during withdrawing the reamer, a small preexisting fragment that was missed on the initial X-ray is aspirated into the proximal medullary canal. The midshaft femur fracture in our case appeared to be straightforward and showed no signs of comminution.

The issue of loose cortical pieces in the medullary canal was noted as “rare but not exceptional” by Branca Vergano et al. [3] According to Eastman et al., there are two imprisoned fragments out of every 80 femur fractures (2.5 %) and one out of every 70 tibia fractures (1.4 %) [1]. These free fragments have been associated to numerous intraoperative issues, including imprisonment during femoral nailing 2 and intra-articular joint invasion [4,5].

Most of the time, the imprisoned fragment may be either dragged out of the medullary canal using a hooked wire or pushed out distally by the guide wire or reamer. This will eventually allow a secure placement of the nail in the proper direction [3]. However, in our situation, it was discovered that the free bone fragment was imprisoned in the proximal femoral canal between the reamer and the

Fig. 1. Simple transverse mid shaft fracture of the left femur.

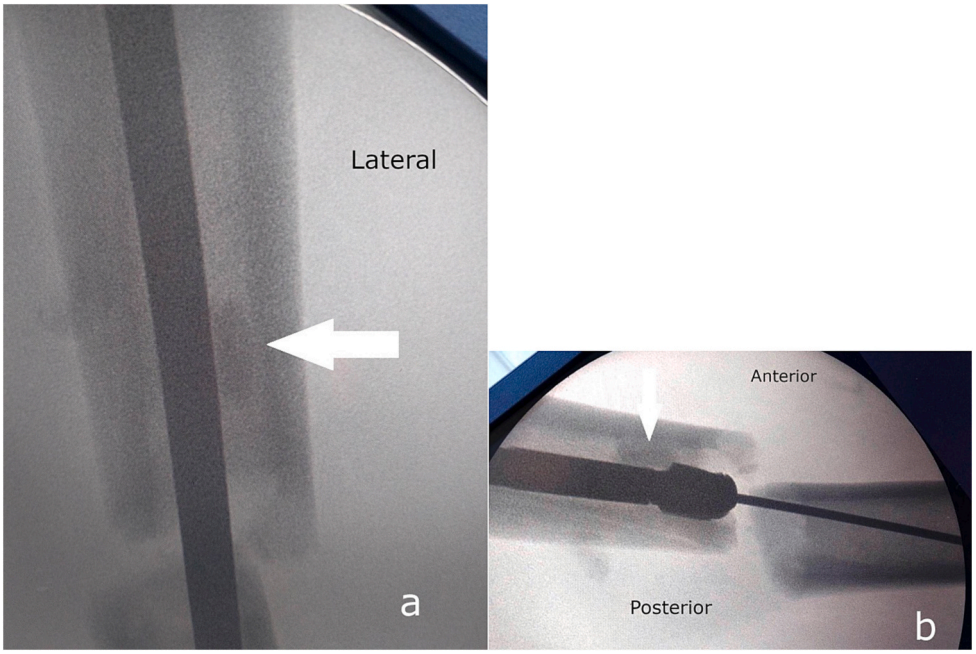

Fig. 2. Intra operative fluoroscopy (a and b) showing an incarcerated bone fragment between the reamer and the anterior cortex (arrow).

anterior cortex, making it impossible to retrieve the reamer backwards.

Vergano et al. advised thorough study of the X-rays during the initial surgical planning, specifically checking for a loose fragment obliterating the medullary canal, to prevent unanticipated intraoperative difficulties during femoral or tibial nailing [3]. Particularly in comminuted shaft fractures with small cortical pieces, it should be highly anticipated that loose fragments will get imprisoned [3].

Conclusion

The process of intramedullary nailing is secure. Many people view it as the gold standard for treating lengthy bone shaft fractures. However, there could be a lot of issues with the reaming or the nailing. Loose bone fragments rarely result in complications. The presence of a loose fragment in the medullary canal during nailing, however, must under no circumstances be disregarded.

CRediT authorship contribution statement

All the authors participated in the design, performance, analysis and drafting of this manuscript.

Ethical approval

Ethical approval was granted by the Ethical Committee of MTM hospital.

Consent to participate

Consent to participate was obtained from patient for publication of the publication.

Consent to publish

Written informed consent was obtained from patient for publication of the publication.

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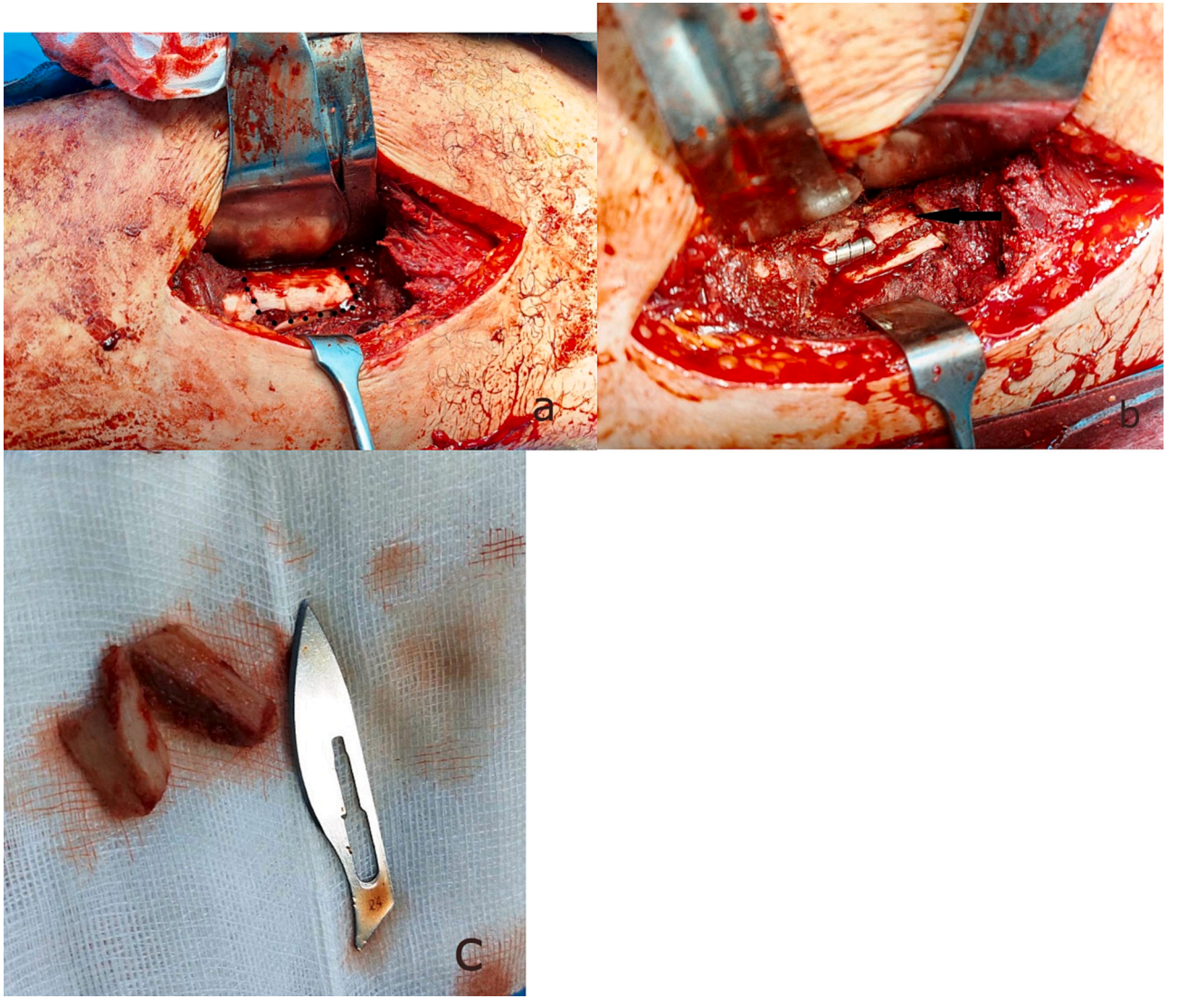

Fig. 3. Antero-lateral corticotomy (dotted line) just proximal to the fracture line through a direct lateral approach (a). After removal of the cortical window, we discovered the trapped cortical bone fragments (arrow b) which we removed (c).

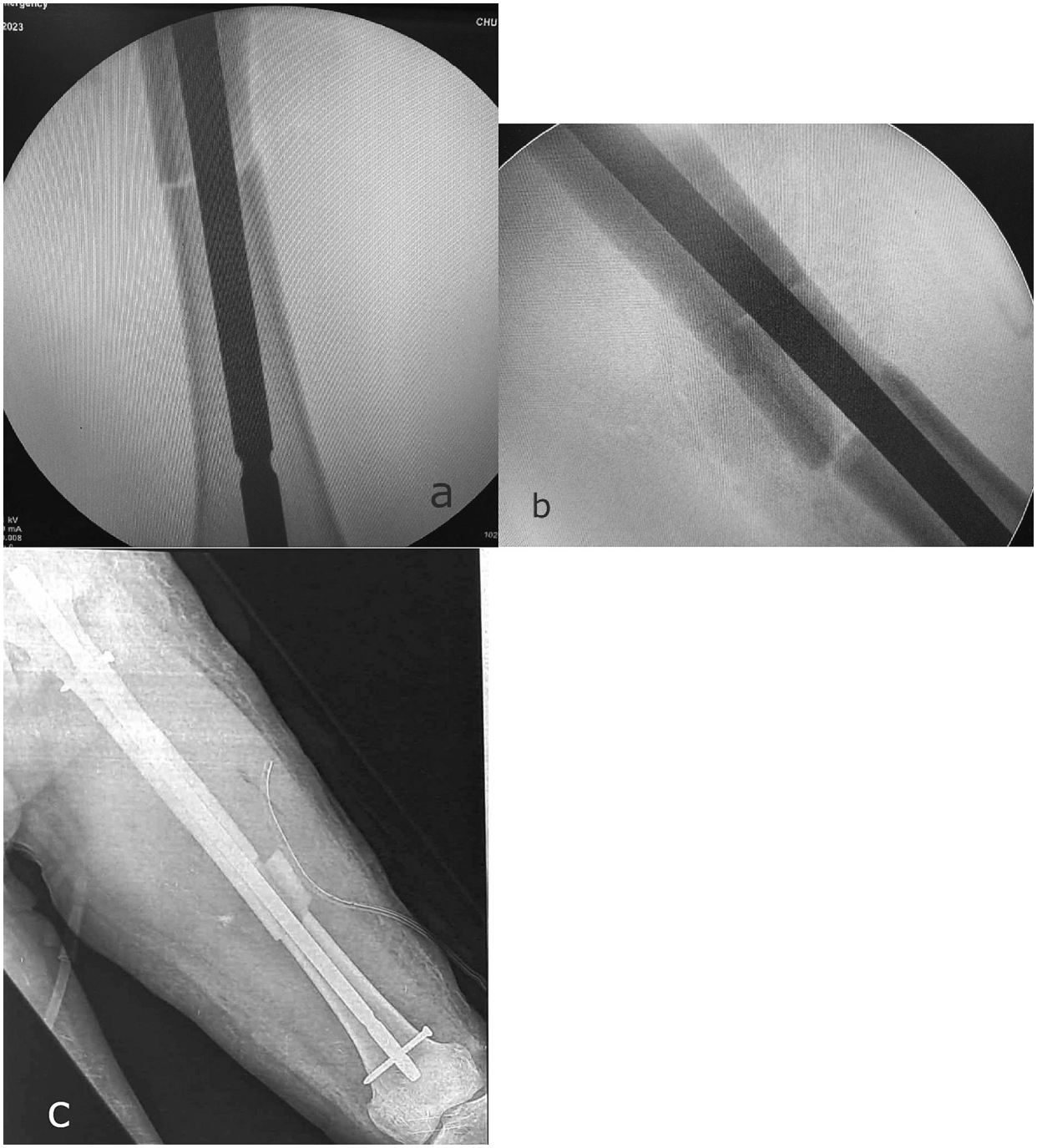

Fig. 4. Post-operative fluoroscopy (a and b) and control X-ray (c) showing the good reduction of the fracture and the repositioning of the cortical bone window.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

[1] J.G. Eastman, R. Firoozabadi, L.E. Cook, D.P. Barei, Incarcerated cortical fragments in intramedullary nailing 39, 2016, p. 3, https://doi.org/10.3928/01477447-20160414-04.
[2] D. Sabat, T. Wangchuk, A. Dhal, Inadvertent advancement of guide wire across the knee caused by incarcerated bone fragment at the nail tip during femoral nailing, Chin. J. Traumatol. 17 (2) (2014 Apr 1) 118–120, https://doi.org/10.3760/cma.j.issn.1008-1275.2014.02.013.
[3] L.B. Vergano, V. Prezioso, M. Monesi, Intramedullary cortical fragment in tibial nailing: push it, remove it or ignore it? 92, 2021, https://doi.org/10.23750/abm.v92is3.11714.
[4] D. Roider, C. Busch, H. Hertz, P. Weninger, Cortical fragment penetration into distal joints after intramedullary nailing – a rare complication, Injury 44 (11) (2013) 1644–1647, https://doi.org/10.1016/j.injury.2012.07.194.
[5] S. Rajappa, N. Kumar, Unusual complication following intramedullary nailing of tibia: a case report 2(1), 2009, p. 7343, https://doi.org/10.4076/1757-1626-2-7343.