

Unusual Foreign Bone Fragment in Femoral Open Fracture

Hanon Sadoni^{1,*} and Hamidreza Arti¹

¹Department of Orthopedic Surgery, Ahvaz Jundishapur University of Medical Sciences (AJUMS), Ahvaz, IR Iran

*Corresponding author: Hanon Sadoni, Department of Orthopedic Surgery, Ahvaz Jundishapur University of Medical Sciences (AJUMS), Ahvaz, IR Iran. Tel: +98-9122131206; +98-6133335935, E-mail: Dr.sadoni@gmail.com

Received 2014 September 12; Revised 2015 April 24; Accepted 2015 June 28.

Abstract

Introduction: Femoral shaft fracture is one of the typical bone fractures due to high energy trauma and may occur as an open fracture. Some foreign materials may enter the fracture site such as sand, cloth particles and so on.

Case Presentation: A 28-year-old motorcycle riding military member and his collaborator were received in the hospital because of multiple traumas due to a fall in a hollow during a surveillance mission. His collaborator died because of head trauma and multiple severe open fractures. When fixing the patients femoral fracture, a large femoral butterfly fragment was removed from the patient's thigh as a foreign segment. The patient's femur was fixed with a plate and screws. No femoral defect was detected during surgery or post-operative X-rays and CT scan. The removed segment was not a part of the patient's femur.

Conclusions: Surgical and post-surgical findings showed that this segment was not related to the patient's femur. The foreign segment may have belonged to the other victim of this trauma.

Keywords: Butterfly, Femoral, Fracture

1. Introduction

Femoral shaft fractures are commonly due to high-energy trauma and are often associated with comminutions, or butterfly segments, or other simultaneous fractures (1).

The thigh contains three compartments. The anterior, posterior and the medial compartments (2). Each compartment has its own nerves and groups of muscles. These compartments are isolated by different fascial layers (3).

In high-energy traumas and open fractures, one or more of these compartments are disrupted. Femoral segments, or comminutions, may be thrown out, or conversely, some foreign bodies may invade the compartments (4). These foreign bodies may be related to the same person or from other sources (5).

Understanding the force and the direction of trauma provides information on soft tissue injuries (6) and the pattern of the femoral fracture (7).

The femoral shaft fails under tensile strength, rather than compressing, mainly in the anterolateral aspect (8). Axial compression with bending leads to a butterfly fracture. This pattern is usually seen in pedestrian car accidents. Some of the butterfly segments can disrupt the compartment and also erode the skin. In high-energy traumas these segments may be thrown out of the thigh (9).

2. Case Presentation

A 28-year-old military member was received in the emergency department. He had multiple open fractures. He was received in the hospital about 4 - 6 hours after the

trauma. His trauma was due to a fall in a hollow when he was riding his motorcycle. There was another victim of this trauma, but that patient died because of head trauma and multiple severe fractures.

At arrival, the patient had low blood pressure, tachycardia and bleeding. First aids were carried out by the emergency team. After stabilizing the patient's hemodynamic status, imaging studies were performed on the patient.

A femoral shaft fracture with a large segment was seen in AP (Figure 1) and laterl view (Figure 2).

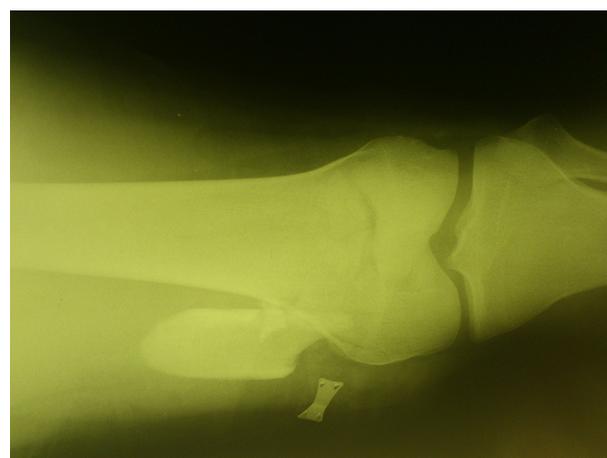


Figure 1. Antero-Posterior View of Femoral Segment

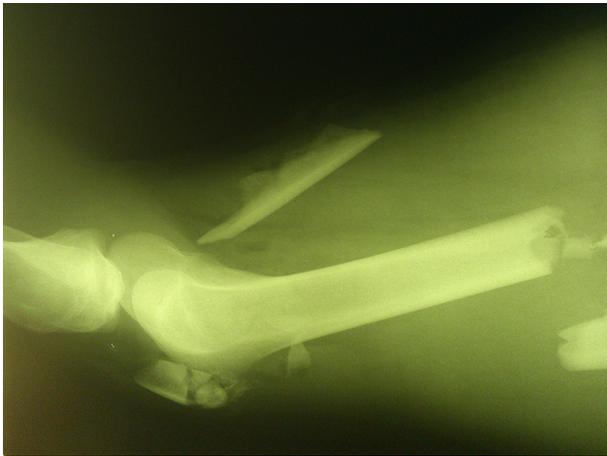


Figure 2. Lateral View of Femoral Segment

The radiographic findings were as follows:

Right humerus open fracture, right forearm fracture, right distal radius fracture, a femoral shaft fracture with a large segment was seen in AP (Figure 1) and laterl view (Figure 2) and right multiple metatarsal fractures.

The femoral shaft fracture was in the middle third, with some comminutions. But a large butterfly fracture was also seen in X-ray. According to the initial evaluation and wound condition, the open fracture was a Gustilo Type II. We usually start antibiotics and tetabuline routinely in the emergency department, but do not send culture samples from the open fracture site.

This butterfly was in the posterior aspect of the thigh; its lumen was facing posteriorly and had a distance of about 12 - 15 cm from the fracture site. A 5 - 6 cm laceration was seen on the posterior surface of the thigh.

Because of the patient's multiple fractures, such as the humerus fracture, forearm fracture (floating elbow), distal radius and ulnar fracture, patellar fracture and possible knee ligamentous injuries, and the probability of iatrogenic neurovascular damage in lateral positioning of the patient, we preferred to treat the patient in the supine position. Therefore, plating was more suitable and easier than intramedullary nailing.

After surgical debridement and irrigation, we were able to establish a clean wound so we could use a plate and screws and avoid external fixation and its related problems. During surgery an anatomical reduction and rigid internal fixation was performed by means of a plate and screws via a lateral surgical approach.

When exploring the fracture site, no femoral defect was detected. After fixation, the integrity of the femur was checked again, and no site for the butterfly was detected. The continuity of the hamstring muscles was also intact, and no direct connection could be found between the butterfly or posterior wound and the femoral fracture site. Finally, the butterfly was removed from the posterior wound.

Femoral X-Ray confirmed the integrity of the femoral shaft and its lumen, and no defect was seen. CT scan was

also done for the patient to confirm the radiographic findings. A three dimensional model (3D) of the CT scan was obtained and no defect was detected.

3. Discussion

This large butterfly fragment was located in the posterior compartment of the thigh and did not reach the fracture site. Its lumen was facing posteriorly (an unusual finding in posterior fragments, which usually are facing anteriorly) (10).

A non-disrupted mass of hamstring muscles was isolating this fragment from the fracture site. These finding showed that the fragment entered the patient's thigh from the posterior aspect and through the posterior wound and was not related to the patient's femur.

According to the surgical site findings, as well as X-ray and 3D CT scan, this butterfly fragment did not belong to our patient's femur and probably belonged to the other victim of this trauma.

Because the other victim died we could not explore and evaluate his femoral site fracture and find the exact location for this fragment.

There are some reports about foreign materials in joints (11, 12) or body reactions to foreign materials (13). Some foreign materials are related to orthopedic instruments such as broken arthroscopic punch (11, 12) or migrated devices like screws or pins (13, 14). Some of these materials may be transmitted to unusual parts or regions of the body (12, 15). Sometimes biomaterials may enter the body accidentally (16), or some devices may migrate to an unexpected region of other limbs (17).

Footnote

Authors' Contribution:The corresponding author for this manuscript was Hanon Sadoni and had the responsibility for writing the text and also management of the patient. The editor of this manuscript was Hamidreza Arti.

References

1. Salminen ST, Pihlajamaki HK, Avikainen VJ, Bostman OM. Population based epidemiologic and morphologic study of femoral shaft fractures. *Clin Orthop Relat Res.* 2000;(372):241-9. [PubMed: 10738433]
2. van der Meulen MC, Boskey AL. Atypical subtrochanteric femoral shaft fractures: role for mechanics and bone quality. *Arthritis Res Ther.* 2012;14(4):220. doi: 10.1186/ar4013. [PubMed: 22958475]
3. Gansslen A, Gosling T, Hildebrand F, Pape HC, Oestern HJ. Femoral shaft fractures in adults: treatment options and controversies. *Acta Chir Orthop Traumatol Cech.* 2014;81(2):108-17. [PubMed: 25105784]
4. Enninghorst N, McDougall D, Evans JA, Sisak K, Balogh ZJ. Population-based epidemiology of femur shaft fractures. *J Trauma Acute Care Surg.* 2013;74(6):1516-20. doi: 10.1097/TA.0b013e31828c3dc9. [PubMed: 23694881]
5. Dousa P, Bartonicek J, Pavelka T, Lunacek L. [Ipsilateral fractures of the proximal femur and the femoral shaft]. *Acta Chir Orthop Traumatol Cech.* 2010;77(5):378-88. [PubMed: 21040649]
6. Schilcher J, Aspenberg P. Incidence of stress fractures of the femoral shaft in women treated with bisphosphonate. *Acta Orthopædica.* 2009;80(4):413-5.

7. Ode A, Duda GN, Geissler S, Pauly S, Ode JE, Perka C, et al. Interaction of age and mechanical stability on bone defect healing: an early transcriptional analysis of fracture hematoma in rat. *PLoS One*. 2014;**9**(9):e106462.
8. Miller B.J, Callaghan JJ, Cram P, Karam M, Marsh JL. Noiseux NO Changing Trends in the Treatment of Femoral Neck Fractures: A Review of the American Board of Orthopaedic Surgery Database. *J Bone Joint Surg Am*. 2014;**96**(17):e14.
9. Gudi N, Chaudhary V. Unusual Foreign Body (Bone) In an Open Fracture of the Femur- A Rare Case Report. *Int J Orthoped Surg*. 2010;**18**:1-4.
10. Flint JH, Sanchez-Navarro CF, Buckwalter JA, Marsh JL. Intrapelvic migration of a gamma nail lag screw: review of the possible mechanisms. *Orthopedics*. 2010;**33**(4):266. doi: 10.3928/01477447-20100225-19. [PubMed: 20415308]
11. Boyle S, Talbot JC, Bismil Q, Schilders E. Arthroscopic removal of a plastic soft drink bottle cap in the knee: a case report. *Cases J*. 2010;**3**:72. doi: 10.1186/1757-1626-3-72. [PubMed: 20181258]
12. Lee BI, Choi HS, Kim JB, Min KD. Arthroscopic retrieval of a very rare penetrating foreign body of the knee. *Arthroscopy*. 2004;**20**(10):1071-4. doi: 10.1016/j.arthro.2004.08.006. [PubMed: 15592237]
13. Solomon LB, Guevara C, Buchler L, Howie DW, Byard RW, Beck M. Does bone wax induce a chronic inflammatory articular reaction? *Clin Orthop Relat Res*. 2012;**470**(11):3207-12. doi: 10.1007/s11999-012-2457-6. [PubMed: 22760602]
14. Meena S, Nag HL, Kumar S, Barwar N, Mittal S, Singla A. Delayed migration of K-wire into popliteal fossa used for tension band wiring of patellar fracture. *Chin J Traumatol*. 2013;**16**(3):186-8. [PubMed: 23735556]
15. Heineman DJ, van Buijtenen JM, Heuff G, Derksen EJ, Poll RG. Intra-abdominal migration of a lag screw in gamma nailing: report of a case. *J Orthop Trauma*. 2010;**24**(12):e119-22. doi: 10.1097/BOT.0b013e3181db7f25. [PubMed: 21063215]
16. Pogorelic Z, Biocic M, Bekavac J. An unusual foreign body in the foot: traumatic implantation of a human tooth. *J Foot Ankle Surg*. 2011;**50**(2):225-6. doi: 10.1053/j.jfas.2010.12.005. [PubMed: 21262576]
17. Dhatt S, Kumar S, Arora N, Dhillon M, Tripathy SK. Migration of anterior spinal rod from the dorsolumbar spine to the knee: an unusual complication of spinal instrumentation. *Spine (Phila Pa 1976)*. 2010;**35**(7):E270-2. doi: 10.1097/BRS.0b013e3181c5d4da. [PubMed: 20228697]