Case Report

Pseudoaneurysm of Profunda Femoris Artery Following Internal Fixation of Intertrochanteric Fracture: Two Cases Report

Anupong Laohapoonrungsee MD*,
Yuddhasert Sirirungruangsarn MD*, Olarn Arpornchayanon MD*

** Department of Orthopedics, Faculty of Medicine, Chiang Mai, University, Chiang Mai*

The authors report two cases of an uncommon but preventable complication after fixation of intertrochanteric hip fracture, the pseudoaneurysm of the profunda femoris artery. Both cases in the present study presented as proximal thigh mass, and soft tissue sarcoma was suspicious in one case. The diagnosis was confirmed by angiographic study and the feeding vessels were successfully occluded during angiography. Proper placement of the retractors, using a shorter drill or drill guard, accurate screw length and a shorter side-plate DHS were recommended to prevent this problem.

Keywords: *Internal fixation of intertrochanteric fracture, Complication, Pseudoaneurysm*

J Med Assoc Thai 2005; 88 (11): 1703-6
Full text. e-Journal: *http://www.medassocthai.org/journal*

Surgical treatment is considered to be the standard care in the treatment of intertrochanteric fracture. Varieties of internal fixation devices are available including; fixed angle and sliding devices. The rigid nail-plate does not allow fracture impaction and may results in nail penetration or cutting out as the fracture impacts into a more stable position. The sliding screw provides secure fixation, while allowing controlled impaction, and it is now the most commonly used device[1]. However, the most frequent reported complication of sliding screw used is superior cutting out of the lag screw through the femoral head[2-4]. The complication of vascular injury in hip fracture fixation is uncommon. The injury that penetrates the arterial wall may result in the formation of a pulsatile hematoma, and a pseudoaneurysm. The complication of pseudoaneurysm of the profunda femoris artery after hip fracture fixation was first noted in 1964 and has been reported sporadically since then[5-9]. The authors report two cases of this uncommon complication resulting from internal fixation of intertrochanteric fractures by different devices.

Correspondence to : Laohapoonrungsee A, Department of Orthopaedics, Faculty of Medicine, Chiang Mai University, Chiang Mai 50200, Thailand. E-mail: alaohapo@mail.med.cmu.ac.th

Case Report

Case No. 1

A 71 year-old female was referred from a provincial hospital with a suspicious soft tissue tumor mass at the proximal left thigh. The patient had intertrochanteric fracture in her left hip which was internally fixed with a Gamma nail two years previously. After the operation, the left thigh was swollen. The patient was able to ambulate and the pain decreased gradually. However, swelling of the left thigh persisted and rapidly increased in size during the previous couple of months. Two weeks prior to referral, pain in left thigh was increased and the patient refused to ambulate. She was diagnosed as having a soft tissue tumor at the proximal thigh and was referred to our hospital.

Her plain film showed good healing of the fracture with a huge soft tissue shadow at the proximal thigh. Magnetic resonance imaging revealed a pseudoaneurysm with a 21x9x8 cm. hematoma of different age at the proximal thigh. The soft tissue sarcoma with extensive intratumoral hemorrhage was in the differential diagnosis. Angiography revealed a pseudoaneurysm 3x5 cm. in diameter, originating from the profunda femoris artery was demonstrated (Fig. 1). The feeding arteries were embolized at the same episode (Fig. 2).

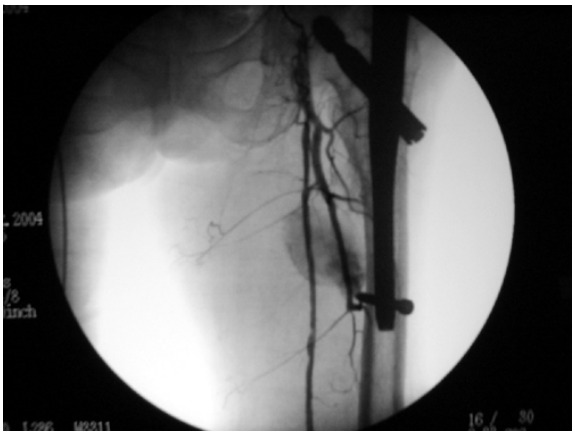

Fig. 1 Pseudoaneurysm of the profunda femoris artery at the protruded locking screw tip in case 1

Fig.2 Complete obliteration of the feeding vessels after embolization in case 1

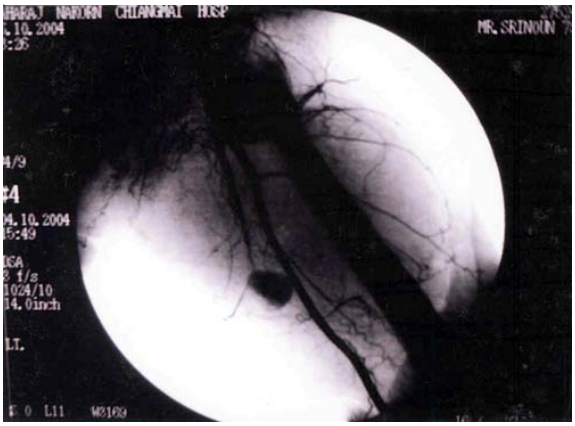

Fig. 3 Pseudoaneurysm of the profunda femoris artery at the fourth screw level in case 2

The mass was excised one week later and there was no malignancy change in the tissue pathology.

Case No. 2

A 78 year-old male was referred to our hospital with the problem of early postoperative thigh swelling and pain. He had undergone a DHS internal fixation for his intertrochanteric hip fracture three months previously. After the operation, his thigh was swelling and thought to be posttraumatic swollen. The postoperative physical therapy was progressing very well and the patient was discharged from the hospital one week later. One month after the operation, the thigh was increased much in size causing more pain. The patient was then referred to our hospital.

On physical examination, the proximal left thigh was larger than the contralateral side. There was no thrill and bruit. Plain x-ray showed good alignment and fixation of the fracture. Magnetic resonance imaging demonstrated a pseudoaneurysm with a 12 x 15 x 14 cm hematoma at the proximal thigh. Angiograhy revealed a 2 x 2.5 cm vascular mass with surrounding hematoma at the left thigh. There was extravasation of the contrast medium from the profunda femoris artery. (Fig. 3) Embolization was successful in occlusion of the feeding vessels without complication (Fig. 4). The thigh circumference decreased about 5 cm. after 6 weeks of follow up, but there was no change at 3 months. The pain was less and the fracture healed uneventfully.

Anatomy

The profunda femoris artery is the largest branch of femoral artery and provides major blood supply to the thigh muscles. It arises from the lateral

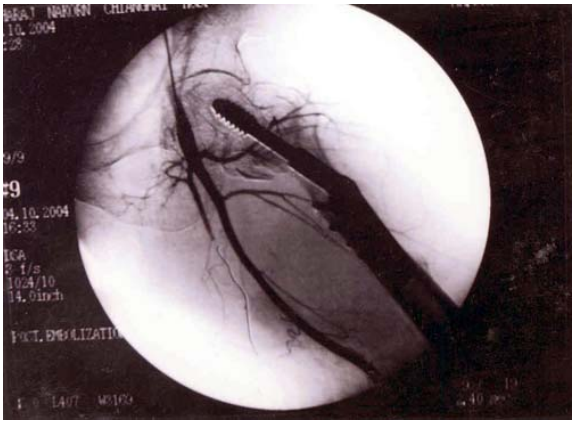

Fig. 4 Sucessful embolization of the feeding vessels in case 2

side of the femoral artery within the femoral triangle about 4 cm. inferior to the inguinal ligament. Branches include the medial femoral circumflex, lateral femoral circumflex and four perforating branches. With the cruciate anastomosis, the union of the medial and lateral femoral circumflex arteries with the gluteal artery superiorly and the first perforating artery inferiorly, either the superficial femoral artery or profunda femoris artery can be ligated if necessary. The four perforating branches traverse the adductor magnus to terminate in the vastus lateralis or penetrate the femur as nutrient arteries.

Discussion

Pseudoaneurysm of the profunda femoris artery following an orthopaedic procedure is an uncommon complication. It has been reported after fixation of intertrochanteric, subtrochanteric, femoral neck and femoral shaft fracture[7,10]. This uncommon complication should be considered when an unexplained thigh swelling following surgery is encountered. Penetration by a drill bit, excessive screw length, sharp bone fragment or placement of the retractor too deep during surgery are documented as the causes of formation pseudoaneurysm formation[6-8,11]. The frequent clinical presentation includes an expanding swelling of the upper thigh with audible bruit. Hemorrhage, infection of the aneurysm, shock, expansion and pressure to neighbouring structures resulting in venous outflow obstruction and thigh compartment syndrome have been reported[9]. The interval between fixation and the appearance of the clinical presentation of the pseudoaneurysm may vary from less than one week up to 14 years. The pseudoaneurysm is usually located opposite the third or fourth hole of the DHS side-plate, which is at the same level as the interlocking hole of the intramedullary hip nail[7]. Treatment depends on the patency of the superficial femoral artery. In the absence of superficial femoral artery occlusion, the feeding vessels are simply occluded either by ligation or embolization. On the contrary, in the presence of superficial femoral artery occlusion, either reparation of the profunda femoris arterial wall defect or restoration of the flow of the superficial femoral artery should be considered.

In the two cases described here, both were presented as non-pulsatile and no audible bruit painful thigh mass. The etiology of the first case might be from the excessive length of the distal locking screw. The screw protusion corresponded to the level of the pseudoaneurysm demonstrated during angiography. During thigh motion, the artery is displaced with the intermuscular septum, drawing it in a plane perpendicular to the protrusion screw tip[7]. The vascular wall might be insidiously eroded by the screw tip causing the formation of the pseudoaneurysm. On the other hand, a shorter interval in the second case arouses the suspicion of intraoperative trauma from either the drill bit or placement of the retractors. Deep placement of the retractors could lever and fix the vessels to the bone allowing injury from the perforating drill[6]. Angiography was the investigation to diagnose of both cases. These two patients were successfully treated by embolization of the feeding vessel. However, the first case underwent surgical excision of the mass to exclude soft tissue sarcoma, which was differentially diagnosed by magnetic resonance imaging.

This complication is considered to be caused by technical error during surgery. Careful placement of the retractors, selection of the correct screw length and the use of a shorter drill or drill guard are recommended to prevent this problem[6-8,11]. In the authors' opinion, a shorter two-hole side-plate DHS, which is supported by biomechanical and clinical studies for its stability in fixation[12-14], would be another means of lessening the injury to the vascular wall from drilling or placement of the retractors at the third or fourth screw hole level.

Conclusion

The authors demonstrated two cases of pseudoaneurysm of the profunda femoris artery following internal fixation of hip fracture. Early recognition will help to avoid life- and limb- threatening complications. Typically, this complication is diagnosed as pulsatile mass with audible bruit and confirmed by angiography. Patency of the superficial femoral artery determines the method of treatment for the pseudoaneurysm. Precaution during placement of the retractors, drilling, proper screw length and a shorter side-plate DHS can decrease the chances of this preventable complication.

References

1. McLoughlin SW, Wheeler DL, Rider JR, Bolhofner B. Biomechanical evaluation of the DHS with two- and four-hole side-plate. J Orthop Trauma 2000; 14: 318-23.
2. Pitsau E, Samuel AW. Functional outcome after intertrochanteric fractures of the femurs: does the implant matter? A prospective study of 100 consecutive cases. Injury 1993; 26: 35-6.
3. Gundle R, Gargan MF, Simpson AHRW. How to

minimize failures of fixation of unstable intertochanteric fractures. Injury 1995; 26: 611-4.
4. Koval KJ, Friend KD, Aharonoff GB, Zuckermann JD. Weight bearing after hip fractures: a prospective series of 596 geriatric hip fracture patients. J Orthop Trauma 1996; 10: 526-30.
5. Abraham E, Pankovich AM, Jansey F. False aneurysm of the profunda femoris artery resulting from intertrochanteric fracture: a case report. J Bone Joint Surg [Am] 1975; 57: 871.
6. Fordyce A. False aneurysm of the profunda femoris artery following nail and plate fixation of an intertrochanteric fracture. J Bone Joint Surg 1968; 50B: 141-3.
7. Wolfgang GL, Barnes WT, Hendricks GL. False aneurysm of the profunda femoris artery resulting from nail-plate fixation of intertrochanteric fractures. Clin Orthop 1974; 100: 143-50.
8. Ebong WW. False aneurysm of the profunda femoris artery following internal fixation of an intertrochanteric femoral fractures. Injury 1978; 9: 249-51.
9. Karkos CD, Hughes R, Prasad V, D'Souza SP. Thigh compartment syndrome as a result of a false aneurysm of the profunda femoris artery complicating fixation of an intertrochanteric fracture. J Trauma 1999; 47: 393-5.
10. Hanna GB, Holdsworth RJ, McCollum PT. Profunda femoris artery pseudoaneurysm following orthopaedic procedures. Injury 1994; 25: 477-9.
11. Yang KH, Park MW, Park SJ. Pseudoaneurysm of the superficial femoral artery after closed hip nailing with a Gamma nail. J Orthop Trauma 2002; 16: 124-7.
12. Yian EH, Banerji I, Matthews LS. Optimal side-plate fixation for unstable intertrochanteric hip fractures. J Orthop Trauma 1997; 11: 254-9.
13. Bolhofner B, Russo P, Carmen B. Results of intertrochanteric fracture treated with a 135-degree sliding screw with a two-hole side-plate. J Orthop Trauma 1999; 13: 5-8.
14. DiPaola M, Razbruch SR, Helfet DL. Minimal incision technique using a two-hole plate for fixation of stable intertrochanteric hip fracture. Orthopaedic 2004; 27: 270-4.

Pseudoaneurysm ของหลอดเลือดแดง *profunda femoris* ตามหลังการยึดตรึงกระดูกสะโพก รายงานผู้ป่วย 2 ราย

อนุพงษ์ เลาหพูนรังษี, ยุทธเสริฐ ศิริรุ่งเรืองสาร, โอฬาร อาภรณ์ชยานนท์

Pseudoaneurysm ของหลอดเลือดแดง profunda femoris เป็นปัญหาแทรกซ้อนภายหลังการยึดตรึงกระดูกสะโพกที่พบได้ไม่บ่อยนัก การศึกษานี้เป็นการรายงานผู้ป่วย 2 รายที่มีการบวมโตของโคนขาภายหลังการผ่าตัดยึดตรึงกระดูกสะโพกที่หัก การตรวจรังสีหลอดเลือดแสดงให้เห็นการโป่งพองของหลอดเลือดแดง profunda femoris และแพทย์สามารถทำ embolization หลอดเลือดที่มาเลี้ยงได้ในคราวเดียวกัน การใส่เครื่องมือดึงรั้งในการผ่าตัดไม่ลึกเกินไป การใช้สว่านเจาะกระดูกที่สั้นลงหรือมีเครื่องป้องกัน การใช้สกรูที่มีความยาวพอเหมาะ และการใช้ side-plate DHS ที่สั้นลง จะช่วยลดอุบัติการณ์ของปัญหาแทรกซ้อนนี้ได้