

# Deep Femoral Artery Pseudoaneurysm Secondary to Osteosynthesis of a Proximal Femur Fracture. Presentation as a Late Complication

C. Esteve-Balzola, A. Vicente-Guillén and M. Gómez-Guijarro  
Service of Trauma and Orthopedic Surgery Pius Hospital de Valls. Tarragona. Spain.

**Introduction.** Diagnosis of deep femoral artery pseudoaneurysm as a complication of proximal femoral osteosynthesis is unusual. Late presentation of this condition is exceptional and increases the difficulty of its diagnosis.

**Clinical case.** A 40-year-old man presented a subcapital left femur fracture with varus displacement caused by a fall. A dynamic hip screw was used for osteosynthesis to achieve closed reduction of the fracture. Initial evolution was satisfactory. Eight weeks later the patient was hospitalized due to left thigh pain. An arteriography was performed and a pseudoaneurysm together with the rupture of the greater anastomotic branch of the deep femoral artery were diagnosed. Selective embolization was carried out.

**Conclusion.** Late presentation of deep femoral artery pseudoaneurysm is infrequent. As it may evolve subclinically, it is necessary to keep it in mind for an early diagnosis.

## Pseudoaneurisma de arteria femoral profunda secundario a osteosíntesis de una fractura proximal de fémur. Presentación como complicación tardía

**Introducción.** El diagnóstico de pseudoaneurisma de la arteria femoral profunda como complicación tras la osteosíntesis del fémur proximal es poco frecuente. Su presentación de forma tardía es excepcional, aumentando la dificultad de su diagnóstico.

**Caso clínico.** Se presenta el caso de un varón de 40 años que tras precipitación presenta fractura subcapital de fémur izquierdo desplazada en varo. Se procedió a la reducción cerrada de la fractura y osteosíntesis mediante tornillo dinámico de cadera. Su evolución inicial fue satisfactoria. A las ocho semanas el paciente reingresó por dolor a nivel del muslo izquierdo. Tras estudio mediante arteriografía se llegó al diagnóstico de pseudoaneurisma y rotura de la rama anastomótica magna de la arteria femoral profunda, procediéndose a su embolización selectiva.

**Conclusión.** La presentación diferida del pseudoaneurisma de la arteria femoral profunda es poco frecuente. Puede cursar de forma subclínica por lo que para su diagnóstico precoz debemos mantener un alto nivel de sospecha.

**Key words:** *osteosynthesis, pseudoaneurysm, complication.*

**Palabras clave:** *osteosíntesis, pseudoaneurisma, complicación.*

An arterial pseudoaneurysm or false aneurysm is a pulsatile encapsulated hematoma caused by the rupture of all the vessel walls and contained by neighboring tissues. The presentation of an arterial pseudoaneurysm as a postopera-

tive complication is infrequent<sup>1</sup>. Its presentation as a late complication is exceptional. In this article we present a case of a pseudoaneurysm of the deep femoral artery that was a late complication of a subcapital femur fracture osteosynthesis.

### Corresponding author:

C. Esteve Balzola.  
C/ Barón de las Cuatro Torres n.o 5, 6.o 1.a.  
43002 Tarragona.  
Email: cesteve@comt.es

Received: March 2005.  
Accepted: April 2006.

### CASE REPORT

The patient was a 40 year old male, with a history of allergy to penicillin, acute pancreatitis, chronic ferropenic anemia, subtotal gastrectomy, vagotomy and pyloroplasty.

After a 2m fall he suffered a left femur subcapital fracture displaced into varus (Garden III)<sup>2</sup>. Reduction and osteosynthesis were performed using a dynamic hip screw. His evolution was satisfactory and he did not require postoperative transfusions; progressive weightbearing was begun without any problem. He was discharged from hospital after 8 days. Eight weeks later he was readmitted due to pain in the area of the proximal third of the left thigh. The patient did not have fever, left hip mobility was limited and there was a swelling on the inner side of the thigh. On palpation there was no fluctuation nor was there a pulsatile swelling. Peripheral pulses were present and symmetrical. No sensory or motor alterations were found. Hip X-ray was normal. An US was taken which showed subcutaneous edema, with no evidence of deep swelling or tumors. As an infection was suspected a puncture of the left hip joint was performed, and clear liquid was obtained and sent for culture, empirical antibiotic treatment was begun according to protocol. Forty-eight hours later the patient was clinically worse, pain and thigh diameter had increased and there was a fall in hemoglobin and hematocrit values, coagulation values remained within normal limits. A CAT scan was taken (Figure 1), which showed an area of active bleeding. Subsequently arteriography was performed and pseudoaneurysm diagnosed with a rupture of the greater anastomotic arch of the deep femoral artery (DFA) (Figure 2), which was selectively embolized.

## DISCUSSION

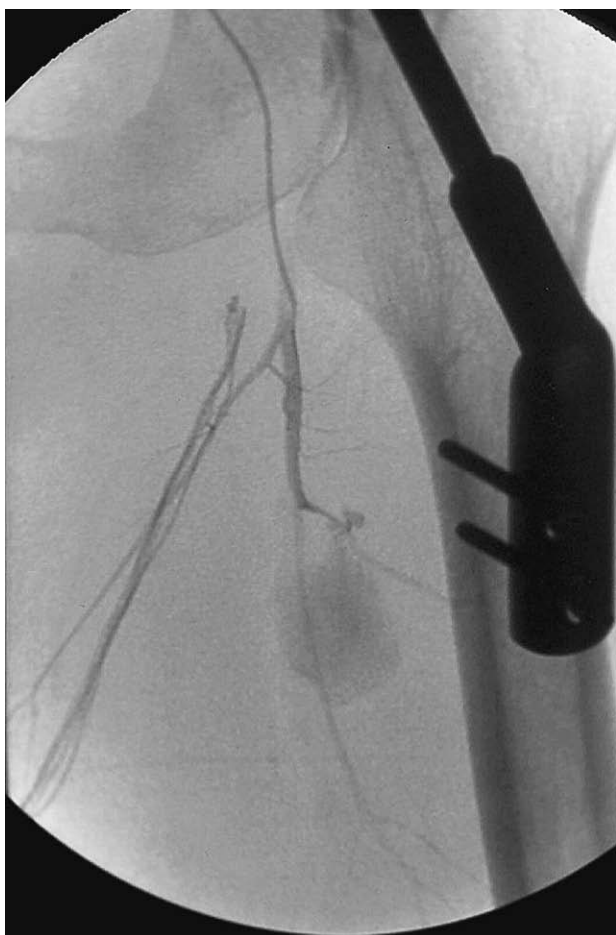
The most frequent cause of iatrogenic vascular lesions (IVL) are endovascular procedures<sup>1,3,4</sup>. Several authors report a progressive increase of this type of complication after osteoarticular surgery<sup>1,5</sup>, especially after minimally invasive and/or percutaneous procedures<sup>3</sup>. In our specialty, hip replacement revision continues to be the surgical procedure with the greatest number of iatrogenic vascular complications<sup>3</sup>. In urgent osteoarticular surgery IVL is a complication that must be kept in mind, although late presentation is very infrequent<sup>1,6,7</sup>. Well known risk factors for IVL are atherosclerotic disease, and previous surgery in the area<sup>1,5,6,8</sup>. This situation must be assessed preoperatively<sup>1,5</sup>; and it is advisable to carry out image studies in the patients at greater risk<sup>1,5,9</sup>. In this case there were no general risk factors for IVL, and the main danger was the anatomical location of the deep femoral artery near the area of osteosynthesis. The best prevention of IVL is precise knowledge of vascular anatomy and its possible variants and the patient's medical history. The deep femoral artery and its branches in the area of the lesser trochanter and the subtrochanteric area of the femur is especially vulnerable<sup>5,8-10</sup>.

At this level osteosynthesis involves a high risk, both due to fracture reduction maneuvers (adduction and inter-



**Figure 1.** Computed tomography: Spiral CT with contrast and multiplanar reconstructions. A) Coronal section that shows a marked increase in the diameter of the proximal region of the left thigh in comparison with the contralateral member. B) Axial section with a complex "layered" structured image with undefined margins, suggestive of active arterial bleeding, located on the inner surface of the thigh, anterior to the adductor muscles, compatible with posttraumatic pseudoaneurysm of the deep femoral artery..

nal rotation bring the deep femoral artery near to the internal cortical artery) and to possible bit perforations and the introduction and manipulation of instruments in the area. IVL in a prone position has been reported due to excessively long screws<sup>9</sup>. Instrument maintenance, especially of bits, as well as the careful use of retractors and the use of stops to limit excessive perforation after perforating the internal



**Figure 2.** Angiography. Pseudoaneurysm and rupture of the greater anastomotic arch of the deep femoral artery.

cortex are basic precautions to prevent IVL<sup>8</sup>. With the exclusion of endovascular procedures, the cause of IVL of the deep femoral artery may be direct laceration, compression (including bedsores) and traction or stretching<sup>8</sup>. In this case, after analyzing the location of the pseudoaneurysm and the maneuvers performed during osteosynthesis, we concluded the cause was traction and stretching or pulling of endovascular structures caused by muscular fibers caught up in the bit after excessive perforation of the internal cortex of the femur. There have been reports of deep femoral artery damage due to direct laceration secondary to fracture of the lesser trochanter<sup>6,7</sup>. The most frequent presentation of deep femoral artery aneurysm after IVL is as an early complication in the first 48 hours after surgery<sup>5</sup>. The usual symptoms are pain and swelling of the inner thigh. Its presentation as a compartmental syndrome has also been reported<sup>5</sup>. Occasionally the only symptom is a non-painful self-limiting hematoma, and it may be underdiagnosed<sup>9</sup>. Large pseudoaneurysms, especially in older patients, may cause symptomatic anemias<sup>7</sup> that may require

the transfusion of red-blood-cell packs. This case was a late complication, and presented clinical symptoms 8 weeks after surgery, which is very infrequent. In contrast to this case, the cases of IVL of the deep femoral artery previously published that presented in the long term were due to bedsores<sup>6,9</sup>. It is important to maintain a high level of surveillance since delay in diagnosis is the most important factor as far as greater morbidity and a poor prognosis<sup>1,5,10</sup>. The use of Color Eco-Doppler is useful for early diagnosis and followup<sup>7,12</sup>. In our opinion the practice of using a simple ultrasound does not provide conclusive results, and CAT scans or MRIs are better. Final diagnosis is obtained by arteriography, the diagnostic test of choice<sup>8,12,13</sup>. The treatment of pseudoaneurysms depends on their size and location<sup>9</sup>. Embolization provides good results in small-diameter arteries with a competent collateral vascular network. In lesions affecting large-diameter vessels open surgery with direct vascular repair will be performed. According to the extension of the lesion different techniques may be used: direct lateral suture, graft with a venous patch and resection with primary anastomosis and the use of an inverted venous graft. Arteriography with selective lesion embolization is the usual treatment of choice<sup>9,13</sup> and was the treatment used in this case. If it is carried out during diagnostic procedures it provides very good results and the patient undergoes a rapid recovery.

## REFERENCES

1. Wilson JS, Miranda A, Johnson BL, Shames ML, Back MR, Bandyk DF. Vascular injuries associated with elective orthopedic procedures. *Ann Vasc Surg.* 2003;17:641-4.
2. Garden RS. Stability and union in subcapital fractures of the femur. *J Bone Joint Surg (Br).* 1964;46:630-47.
3. Giswold ME, Landry GJ, Taylor LM, Moneta GL. Iatrogenic arterial injury is an increasingly important cause of arterial trauma. *Am J Surg.* 2004;187:590-2.
4. Steinsapir ES, Coley BD, Fellmeth BD, Roberts AC, Hye RJ. Selective management of iatrogenic femoral artery injuries. *J Surg Res.* 1993;55:109-13.
5. Chervu A, Quinones-Baldrich WJ. Vascular complications in orthopedic surgery. *Clin Orthop.* 1988;235:275-88.
6. O'Donoghue D, Muddu BN, Woodyer AB, Kumar R. False aneurysm of the profunda femoris artery due to malunion of a hip fracture. *Injury.* 1994;25:681-2.
7. Fernández-González J, Terriza MD, Cabada T, García Araujo C. False aneurysm of the femoral artery as a late complication of an intertrochanteric fracture. A case report. *Int Orthop (SICOT).* 1995;19:187-9.
8. Handolin L, Pajarinen J, Tulikoura I. Injury to the deep femoral artery during proximal locking of a distal femoral nail. A report of 2 cases. *Acta Orthop Scand.* 2003;74:111-3.
9. Hanna GB, Holdsworth RJ, McCollum PT. Profunda femoris artery pseudoaneurysm following orthopaedic procedures. *Injury.* 1994;25:477-9.
10. Freischlag JA, Sise M, Quinones-Baldrich WJ, Hye RJ, Sedwitz MM. Vascular complications associated with orthopedic procedures. *Surg Gynecol Obstet.* 1989;169:147-52.

11. Obry C, Mertl P, Woestelandt T, Vives P. Faux anéurysme de l'artère fémorale profonde après fracture de l'extrémité du fémur. A propos d'un cas. Rev Chir Orthop. 1988;74:585-7.
12. Ortiz-Carrellán F, Mesa-Mateo A, Martínez-Torres A. Pseudoaneurisma de la arteria geniculada inferolateral secundario a artroplastia total de rodilla. Rev Ortop Traumatol. 2003;47:417-8.
13. Entwisle JJ, De Nunzio M, Hinwood D. Case report: Transcatheter embolization of pseudoaneurysm of the profunda femoris artery complicating fracture of the femoral neck. Clin Radiol. 2001;56:424-7.

**Conflict of interests:** We, the authors, have not received any economic support to carry out this study. Nor have we signed any agreement with any commercial firm to receive benefits or fees. On the other hand, no commercial firm has provided nor will provide economic support to non-profit foundations, educational institutions or any of the other non-profit organizations that we are members of.