Arterial trauma secondary to hip arthroplasty
Case report

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Abstract

We present a patient with iatrogenic vascular injury of the lateral circumflex femoral artery consecutive to hip total arthroplasty. Upon surgical intervention, the patient shows repeatedly considerable anemia with thigh pain that requires surgery for hematoma evacuation. However, angio-CT scan carried out twice does not show active bleeding. Finally, the patient is diagnosed injury of the aforementioned artery by arteriography, and he is subject to endovascular surgery. We highlight the importance of manipulating delicately the limb operated on and surgical instruments. Moreover, suspicion and adequate diagnostic means are of outmost importance, because if symptoms are not clear, usual tests are normal and there is no considerable active bleeding, a life-threatening vascular injury might be overlooked. We also highlight the advances in the treatment of these injuries by endovascular techniques, which reduce morbimortality rates as compared to classical open techniques.

Key words: Vascular injury; iatrogenic disease; endovascular rapair.
Level of evidence: IV

Traumatismo arterial secundario a artroplastia de cadera. Presentación de un caso

Resumen

Se presenta un paciente con lesión vascular iatrogénica de la arteria circunfleja femoral externa luego de una artroplastia total de cadera. Después de la intervención, el paciente presentó anemia importante en repetidas ocasiones con dolor en el muslo y requirió cirugía para evacuar un hematoma. Sin embargo, la angiografía por tomografía computarizada realizada en dos ocasiones fue negativa para sangrado activo. Finalmente se diagnosticó lesión de esta arteria mediante arteriografía, y el paciente fue sometido a cirugía endovascular. Destacamos la importancia del cuidado en la manipulación del miembro intervenido y los objetos usados. Así mismo, la sospecha y los medios diagnósticos adecuados son fundamentales, ya que, ante una clínica poco definida, pruebas comunes negativas y la ausencia de un sangrado activo importante, puede pasar inadvertida una lesión vascular que pone en riesgo la vida del paciente si no se resuelve. También se pone de relevancia el avance en el tratamiento de estas lesiones mediante las técnicas endovasculares que reducen la morbimortalidad respecto a las técnicas clásicas de cirugía abierta.

Palabras clave: Daño vascular; enfermedad iatrogénica; reparación endovascular.
Nivel de Evidencia: IV

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Introduction

Nowadays hip fractures are a frequent condition among us, especially due to the population's aging. The vast majority of these fractures require surgical treatment and, undoubtedly, this type of fractures is associated with a significant increase in morbimortality rates— the surgical procedure in itself is one of the factors to bear in mind in this increase in morbimortality.[1] One of the likely surgical complications in hip fracture, in either osteosynthesis or (total or partial) prosthetic implantation, is the iatrogenic injury. In the case of the implantation of a total hip replacement, i.e. the case that we present here deals with, arterial injuries are in the third place among the most frequent iatrogenic injuries, although their incidence is low (0.16-0.25%). The most frequent injuries are acute ischemia, bleeding, ischemia associated with bleeding, and the formation of pseudoaneurysms.[2] The treatment of vascular injuries secondary to prosthetic surgeries of the hip include endovascular surgery, endovascular surgery followed by open surgery, and open surgery.[3]

Therefore, because of the great importance of these complications, which can end in the patient's amputation or death, we present the case of a traumatic injury of the femoral artery secondary to the implantation of a hip total replacement due to hip fracture.

Case

Seventy-seven-year old male who consults the Orthopedics Department due to pain in his right hip consecutive to low energy traumatism due to fall from his own height. The patient's medical history shows benign prostatic hyperplasia, vertiginous syndrome, atrial fibrillation, mild aortic failure, and Gilbert's disease.

The patient has pain and functional impairment in his right lower limb consecutive to an incidental fall, with neither distal neurovascular abnormalities nor other associated symptoms.

At the ER he is evaluated with hip X-rays and he is diagnosed a hip subcapital fracture in his right femur with no other significant findings.

The patient undergoes the implantation of a hip total replacement; he is discharged from hospital with good medical and radiographic outcomes on postoperative day 4.

Few days after hospital discharge, he consults the ER due to severe pain in his right hip, with no history of previous traumatism, sudden movement or falls.

Findings

The patient suffers severe pain in his right hip, with edema without fovea in his right thigh, with local heat and neither rash, nor fluctuation, nor fever. Distal neurovascular exploration is normal, and distal pulses are all right.

Diagnostic evaluation

US and CT scan studies reveal a collection which may convey an abscess. The patient is admitted for follow-up and IV antibiotic treatment. While in hospital, he requires blood transfusion twice. Upon improving, he is discharged. The report of the angio-CT scan states soft tissue hematoma without active bleeding.

However, the patient comes back to the ER twice due to right thigh pain, with tense hematoma in his right thigh and venous return edema in the remaining right lower limb. On the first occasion, he is subject to another angio-CT scan, which reveals soft tissue hematoma by disinsertion or the anterior rectus muscle. On the second occasion, he is subject to surgery by opening of the surgical wound, what allows great amounts of clotted blood to flow with great pain relief. After daily surgical wound dressings and persistence of bleeding, he is subject to arteriography. By this technique it is possible to verify in the lateral circumflex femoral artery a 46 x 31 mm pseudoaneurysmatic dilation with 2 mm-arterial size.

Upon undergoing arteriography the patient is diagnosed pseudoaneurysm in the lateral circumflex femoral artery (Figure) what, while causing the patient's symptoms, was originated in the injuries caused by one of the bone lever instruments during hip arthroplasty.

Surgical intervention

The patient is subject to catheterization, with the nutrient artery got by Microcoil embolization (MReye®, Cook Medical, IN, USA) (small-caliber metallic spiral, made up of platinum and mainly used for the treatment of saccular aneurysms), with complete blockage and final control of the postoperative pseudoaneurysm.

Follow-up and outcomes

After carrying out this procedure the pain decreases, the hematoma goes away, surgical wound bleeding stops, and RBC count comes back to normal.

Discussion

Vascular injuries in hip fracture surgery are low-incidence complications; however, they can occur due to the proximity of vascular structures, especially the iliac and the femoral arteries.

The main mechanisms of injury are direct traumatism caused by bone lever instruments, thrombosis due to rupture of atheroma plaques or due to heat polymerization, the protrusion of the implanted acetabular material or its displacement, permanent or temporary material protrusion through the femur, and traction or mobilization of the limb. The vessels most frequently injured in hip prosthetic surgeries are the lateral iliac artery and the common femoral artery, although there are some others, such as

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Figure. Arteriography showing pseudoaneurysm in the lateral femoral circumflex artery.

the hypogastric artery and the deep femoral artery.[4] It is necessary to consider the implantation area for the material, because it is what the risk of vascular injury depends on. At the time of implanting the acetabular component, the risk of vascular injury increases if it is implanted with screws, which should be inserted in the posterior-superior quadrant— the safest one, although the superior gluteal artery could end up injured. The anterior-superior quadrant should be avoided, because here the risk of injuring the obturator artery and vein and the external iliac artery and vein increases. As regards the femoral implant, it is necessary to be especially careful with bone lever instruments in the femoral triangle, because femoral vessels can end up injured.[5]

According to the specialized bibliography, 39% of these injuries are detected in later revision surgeries, and 43% requires urgent surgery. The most frequent emergencies are acute ischemia and active bleeding, and also pseudoaneurysms or ateriovenous fistula to a lesser extent.[2]

With a patient operated on his or her hip, it is necessary to consider these likely complications and suspect them on time; especially because of the average age of these patients: among us, 90% of these fractures occur in >64 year-old persons.[6] For these reasons it is necessary to be acquainted with the patient's medical history and the risky cases (patients with diagnosed previous vascular injury). Old age, high blood pressure, dyslipidemia, alcoholism, obesity and smoke are the most relevant risk factors in vascular injuries.

If vascular injury is suspected, adequate medical exploration should be carried out in the first place, with special attention to the absence of distal pulses, skin coldness, murmur, thrill, or hemodynamic instability; under these circumstances surgical exploration should be indicated at once for fear that hypovolemic shock occurs.[3] In case of peripheral neurologic deficit with pulse present but diminished, or anemia that does not respond to transfusions, angio-CT scan or Doppler US should be indicated so as to plan therapeutic actions.[3,7]

There are different therapeutic options for the treatment of a vessel traumatism or injury, from conservative treatment to open surgery. The criteria for the conservative management of a vascular injury are: low-speed injury, minimal interruption of the artery wall (<5 mm), adherent or distal protrusion of the flaps of the arterial innermost layer, preserved distal circulation and absence of active bleeding. Surgery is indicated if these criteria are not met.[8] Over the past years the use of endovascular surgery has been increasing, from 0.1% to 9% in 10 years.[9]

According to recent studies, despite similar mortality rates the use of endovascular techniques decreases amputation and permanent disability rates as compared to open surgery in vascular injuries secondary to hip prosthetic surgery.[10] In the case of femoral artery traumatism, such as the one that the patient we present here undergoes, the indication would be arterial repair by endovascular techniques, because it allows us better bleeding control, it avoids larger ischemia and this is an anatomic region open surgery increases the risk of iatrogenic injury of other structures in.[11]

To conclude, it is worth highlighting the importance of preserving nervovascular structures during the surgery of implantation of hip prosthesis, so as to avoid iatrogenic injuries. Moreover, patients' postoperative follow-up should be strict. It is necessary to consider the possibility that a vascular injury has occurred if the patient does not do postoperatively well, even if symptoms are unspecific or the vascular structure suspected is not frequently injured, as the case in this work is.

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