SHORT REPORT

Rupture of an Infected Popliteal Aneurysm. Case Report and Review of the Literature

A. Ysa, M.R. Bustabad, A. Arruabarrena, E. Perez, I. Lopez-Vidaur and J.A. García-Alonso

1Department of Vascular Surgery, Hospital de Cruces, Baracaldo, Spain
2Department of Radiology, Hospital Cruces, Baracaldo, Spain

We present a case of a ruptured popliteal aneurysm in the context of an E. Coli sepsis secondary to a gastrointestinal infection. The diagnosis was made on history and examination and was confirmed by Ultrasound, scintigraphy and CT scan. A broad debridement and revascularization by means of a femoral-popliteal bypass with the great saphenous vein was performed. The literature of infected popliteal aneurysms is discussed.

Keywords: Popliteal aneurysm; Infected aneurysm; Mycotic; E. Coli.

Popliteal aneurysms are the most frequent aneurysms found in the lower limbs. They are found in about 1% of the adult population and are infrequent in females. They are associated with the presence of contralateral aneurysm in 30–50% of cases and with abdominal aortic aneurysms in 30–60%. Their main complication is arterial ischemia secondary to the thrombosis of the aneurysm, although it can also be presented in the form of compression symptoms or distal embolization. Spontaneous rupture is an uncommon complication 2.5–6% and the rate of infectious colonisation of these aneurysms is less than 2%.3

We present a case of rupture of an arteriosclerotic popliteal aneurysm after infection by E. Coli.

Case Report

A 73-year old male patient who consulted to the Emergency Department complaining of pain and swelling in the right popliteal fossa associated with a fever on the previous day. The medical history revealed a previous TIA in the context of moderate carotid stenosis and surgery to his right meniscus. He had an allergy to penicillin and was an ex smoker. No respiratory, abdominal or urinary symptoms or signs were found. No previous trauma, endocavitary prosthesis, bladder catheterization within recent months or dental disease were reported. The patient recalled an episode of self-limited diarrhoea 45 days before the consultation.

The physical examination showed inflammation in the popliteal fossa with a mild increase in its diameter (Fig. 1). All peripheral pulses were palpable, with broad popliteal pulses on both sides. Lab investigations showed an increased C-reactive protein of 18.6 mg/dl (0–1.1 mg/dl) and an ESR of 83 with a leukocytosis of 18.700 (82% Nt).

Urgent duplex scanning was performed, showing an aneurysm of the right popliteal artery of 35 mm, with thickened walls and trabeculation of the surrounding fat compatible with signs of superinfection. Ectasia of the contralateral popliteal artery was also seen.

The patient was admitted with the diagnosis of an infected popliteal aneurysm. Broad-spectrum antibiotics were started (Vancomycin + Piperacillin/Tazobactam). The blood cultures, taken in the Emergency Department, grew an E. Coli, sensitive to ciprofloxacin.
Subsequent imaging did not reveal any other aneurysms. Transthoracic Echocardiogram ruled out the presence of endocardic vegetations. The scintigraphic findings with indium-labelled leukocytes showed a right paragenicular pathological deposit (Fig. 2).

The patient reported sudden pain in the popliteal fossa with a significant increase of the limb diameter two days after his admission. An emergency CT scan was performed which confirmed the rupture of the popliteal aneurysm, as well as the existence of an arteriovenous fistula (AVF) at an infrapopliteal level (Fig. 3). As the patient was haemodynamically stable, an arteriogram was performed (Fig. 4). The aneurysmal rupture was clearly seen, as well as the AVF that seemed to depend on the posterior tibial artery. Urgent surgical intervention using the medial approach was decided upon. A ruptured arteriosclerotic aneurysm with severe surrounding inflammation was found. The sac and the perilesional infected tissue were excised and the distal flow was reconstructed by means of an extra-anatomic bypass from the superficial femoral artery to the distal popliteal artery with a reversed saphenous vein. The perioperative cultures (including the popliteal wall) were negative. The postoperative course was uneventful apart from mild oedema of the limb. The control duplex scanning reported good patency of the graft without signs of DVT, leaks or refilling at the location of the aneurysmal sac. The patient was discharged from the hospital with antithrombotic and antibiotic treatment (ciprofloxacin) for 6 weeks. After a three-month follow-up a selective AVF embolization was performed due to the persistence of the oedema of the extremity with objective improvement of the symptoms. No other significant incidents after 7 months of follow-up were reported.

Discussion

The rupture of popliteal aneurysms is an infrequent complication and it is associated with arterial diameters of >4 cm, infection, posttraumatic pseudoaneurysms (following orthopaedic surgery, angioplasty or bone injury) or secondary to osteochondroma.4,5 The amputation rate associated with ruptured popliteal aneurysms is 25%.6

The organisms most frequently isolated in infected aneurysms are Streptococcus, Staphylococcus Aureus and enterobacterias such as Salmonella or E. Coli.7

![Fig. 1. Clinical presentation at admission.](image1)

![Fig. 2. Scintigraphy showing a right paragenicular pathological deposit.](image2)
In our case, there is a prior history of a gastrointestinal infection. On admission, the acute phase reactants were high and the blood cultures taken before the antibiotics were started were positive for *E. Coli*. The bilateral nature of the arterial disease, morphotype and associated risk factors clearly suggest an over-infection of a pre-existing arteriosclerotic aneurysm. The negative intra-operative cultures do not exclude the diagnosis of infection.\(^8\)

A popliteal aneurysm infection is often suspected after a thorough clinical history and physical examination. Ultrasonography or CT scan are the radiological investigations of choice. A CT scan is still the gold standard test for diagnosing ruptured popliteal aneurysms. Depending on the patient’s haemodynamics and degree of associated ischaemia, it is recommended to perform a preoperative arteriogram to assess the run-off and rule out distal embolization. The MRI angiogram is useful for the morphological assessment of the injury as well as for decision taking on the therapeutic strategy. Although ultrasonography is very useful for the diagnosing of aneurysm infection, the CT scan is more precise in showing the presence of gas, collections or peri-lesional inflammatory reaction. Moreover, in our case the CT scan was performed due to clinical changes from the initial presentation. In the diagnostic process of arterial infection, we should not forget the use of the scintigraphy with indium-labelled white blood cells to confirm the presence of infection and involvement of other territories.

![CT scan showing the rupture of the aneurysm.](image1)

**Fig. 3.** CT scan showing the rupture of the aneurysm.

![Arteriography showing the rupture of the aneurysm and arteriovenous fistula.](image2)

**Fig. 4.** Arteriography showing the rupture of the aneurysm (4a) and the arteriovenous fistula that seems to depend on the posterior tibial artery (4b).
Table 1. Review of the published literature

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Sex</th>
<th>Infection</th>
<th>Related Embolization</th>
<th>Type</th>
<th>Other Symptoms*</th>
<th>Diagnostic Ø</th>
<th>Surgery</th>
<th>Material</th>
<th>Antibiotic</th>
<th>Outcome</th>
<th>Follow up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choudhury (1979)</td>
<td>58</td>
<td>δ</td>
<td>axillary abscess</td>
<td>S. aureus</td>
<td>none</td>
<td>No pulsatile mass</td>
<td>US DSA</td>
<td>Excision + bypass fem-pop</td>
<td>Saphenous S. aureus</td>
<td>Ampicillin</td>
<td>No incidents</td>
<td>12 months</td>
</tr>
<tr>
<td>Priolet (1988)</td>
<td>75</td>
<td>δ</td>
<td>gastroenteric</td>
<td>Listeria monocytophages</td>
<td>none</td>
<td>None</td>
<td>US DSA</td>
<td>No data</td>
<td>PTFE Listeria monocytophages</td>
<td>Cefalotina/ amoxicillin</td>
<td>No incidents</td>
<td>2 months</td>
</tr>
<tr>
<td>Patel (1988)</td>
<td>52</td>
<td>δ</td>
<td>endocarditis</td>
<td>Streptococcus B</td>
<td>none</td>
<td>Ulceration with infected atheroscl. aneurysm</td>
<td>1 × 4</td>
<td>Excision + bypass pop-pop</td>
<td>Saphenous S. aureus</td>
<td>Penicillin/ Oxacillin</td>
<td>Breakdown prox, Anastomosis + amputation + Sepsis, Exitus</td>
<td>25 days</td>
</tr>
<tr>
<td>Wilson (1995)</td>
<td>88</td>
<td>δ</td>
<td>gastroenteric</td>
<td>negative</td>
<td>none</td>
<td>Popliteal DVT</td>
<td>US DSA</td>
<td>5.6</td>
<td>Saphenous Salmonella group D</td>
<td>Imipenem + Cilastatin</td>
<td>Cardiac failure + Exitus</td>
<td>1 day</td>
</tr>
<tr>
<td>Hopton (1998)</td>
<td>87</td>
<td>δ</td>
<td>gastroenteric</td>
<td>negative</td>
<td>none</td>
<td>Popliteal DVT</td>
<td>US/CT DSA</td>
<td>7 × 4</td>
<td>PTFE Salmonella enteritidis</td>
<td>Ciprofloxacin</td>
<td>Renal failure + Mild stroke + Pneumonia</td>
<td>20 months</td>
</tr>
<tr>
<td>Safar (2001)</td>
<td>71</td>
<td>δ</td>
<td>endocarditis</td>
<td>negative spleen</td>
<td>Spleen</td>
<td>Skin lesions and DVT</td>
<td>US DSA</td>
<td>No data</td>
<td>Saphenous negative</td>
<td>Gentamicin + trimethoprim cotrimoxazol</td>
<td>No incidents</td>
<td>24 months</td>
</tr>
</tbody>
</table>

Ø diameter in centimeters.
US ultrasound; CT computer tomography; DSA digital subtraction angiography; LWBC labelled white blood cell scanning.
FEM common femoral artery; SFA superficial femoral artery; POP popliteal artery; TTP tibio-peroneal trunk; TA anterior tibial artery.
AVF arterio-venous fistula.
* moreover than tender pulsatile mass and tumefaction.
** refers to septic arterial emboli from proximal sources or bacteraemia with seeding in arterial wall causing arteritis and subsequent aneurysm formation.
Rupture of an Infected Popliteal Aneurysm

Due to the unique characteristics of our hospital, confirmation of the aneurysm infection by the scintigraphy occurred before the performance of the CT scan and the arteriography after the rupture of the aneurysm. Even more, considering the haemodynamic stability, the arteriography was performed to confirm the correct run-off after the rupture, to rule out embolization in other territories and finally to find out the origin of the AVF.

Table 1 reviews the six cases reported in the literature including their form of presentation, diagnosis, treatment and evolution.9—14

The mean age of patients was 72 years being men the majority of them. Half of the patients had a primary gastrointestinal focus, while in two of the six cases, the primary infection came from an endocarditis. The most frequently bacteria found in haemocultures or in the operating field were Salmonella (33%) and S. Aureus (33%). In the overall series, simultaneous positive haemoculture and positive intraoperative culture were only found in half of the cases, however, these results could be affected by the early antibiotic use. Two patients presented with embolization in other territories, coinciding, in both cases, with endocarditis as the primary infection.

The predominant clinical feature was a pulsatile mass with inflammatory signs (71%), associated with popliteal DVT in 50% of cases.

The superinfection of an existing arteriosclerotic aneurysm was found in three patients, while in the other three, there was a bacterial colonisation or a septic embolization on an apparently healthy artery.

In our case, due to the location and extension of the aneurysm, we decided to fix it through a medial approach in order to guarantee the performance of the anastomosis on a healthy arterial segment. We use an extra-anatomic reconstruction to avoid the infected field. The surgical procedure was conducted first resecting the aneurysm site of the infection and then reconstructing the arteries on a new operative field.

In our review, all patients, underwent revascularisation of the distal territory. A broad debridement of the surrounding tissues was associated in 83% of the subjects and a simply aneurysm exclusion in the remainder. Some authors recommend simple ligation and draining without performing a distal revascularisation because of the high prevalence of bleeding and sepsis (66%).15 However, in our review, only one patient had a rupture of the proximal anastomosis and finally died of a septic complication. We also believe that the strategy of non-revascularization is difficult to take on in the popliteal territory due to the high possibility of severe ischemia associated with this approach.

The technique most frequently performed was saphenous vein bypass (50%), followed by a bypass with a PTFE graft in two cases. In one patient, debridement and end to end anastomosis of the arterial stumps was performed.

We agree with the recommendation of the use of autologous material to prevent the possibility of re-infection associated to revascularizations with prosthetic grafts. Despite the increasing tendency or endovascular repair techniques,16 we believe that they should be avoided in the case of infectious aneurysms due to the possibility of perpetuating infection in the stent-graft.

The surgical therapy must always be accompanied by wide spectrum antibiotic therapy treatment for a minimum of 6 weeks.13

The average follow-up period for the patients was ten months. The morbidity associated with the treatment of this pathology was significant (50%), without there being a clear predominance of affecting a specific system or territory. The rate of limb loss was 17%. This rate is somewhat lower than that reported for the overall series of ruptured popliteal aneurysms, however, we believe that this is probably due to the low number of cases identified. Finally, the early mortality rate associated to the treatment of ruptured infected popliteal aneurysms was 33%.

The follow-up of the revascularization technique (1 month, 6 months and then after annually) through duplex scanning is important, not only for the early detection of potential graft problems, but also to verify the complete exclusion of the aneurysm and to avoid potential problems related to leakages.2,17

The rupture of an infected popliteal aneurysm is an extremely rare condition. Careful anamnesis and physical exams are fundamental for establishing the diagnosis. Early surgical management is recommended, which includes debridement and revascularisation with autologous material as well as prolonged specific antibiotic treatment.

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References


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