Femoral Pseudoaneurysm: Rectus femoris muscle flap for a failed vascular graft

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Introduction

- Vascular complications are common in high-risk patients which include co-morbid conditions such as atherosclerosis, diabetes, hypertension, obesity, chronic kidney disease.1,2
- One of the strongest associated risk factors to femoral pseudoaneurysm is a positive smoking history.3
- Femoral pseudoaneurysms are seen twice as often in males, and a median age varying from late 60’s to early 70’s.4,5
- Patients who develop femoral pseudoaneurysms likely had previous vascular surgeries due to vessel wall weakness, and therefore are predisposed to aneurysms.6
- Most patients who are diagnosed with femoral pseudoaneurysms are asymptomatic, and those with symptoms were associated with aneurysms larger than five centimeters.7,8
- CT is the most used diagnostic tool followed by doppler ultrasound. The definitive diagnosis cannot be fully made until assessed in the operating room.9
- Emergent surgical management is rare for femoral pseudoaneurysms due to being small in nature.10
- Observation followed by elective surgical management is the standard treatment for femoral pseudoaneurysms less than 3.5 centimeters.11
- Excision, drainage, graft replacement, antibiotic treatment, and vacuum-assisted wound closure has shown to be the most effective treatment for infected aneurysm.12
- With elective surgical management the average hospital stay was eight days.13

Fig 1: Computed tomography of abdomen

Table 1. Hospital stay trending labs

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Day</th>
<th>Onset</th>
<th>7 days</th>
<th>2 weeks</th>
<th>Follow up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hematocrit (%)</td>
<td>36.7</td>
<td>34.1</td>
<td>37</td>
<td>37</td>
<td>35.2</td>
</tr>
<tr>
<td>Hemoglobin (g/dL)</td>
<td>11.4</td>
<td>10.8</td>
<td>12.3</td>
<td>12.1</td>
<td>11.2</td>
</tr>
<tr>
<td>WBC (10^3/µL)</td>
<td>7.9</td>
<td>8</td>
<td>12.5</td>
<td>1.4</td>
<td>9.2</td>
</tr>
<tr>
<td>Platelets (10^3/µL)</td>
<td>246</td>
<td>28</td>
<td>189</td>
<td>199</td>
<td>176</td>
</tr>
<tr>
<td>BUN (mg/dL)</td>
<td>11</td>
<td>40</td>
<td>37</td>
<td>18</td>
<td>57</td>
</tr>
<tr>
<td>Creatinine (mg/dL)</td>
<td>0.7</td>
<td>2.2</td>
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<tr>
<td>eGFR (mL/min/1.73m²)</td>
<td>560</td>
<td>28.8</td>
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<td>Glucose (mg/dL)</td>
<td>183</td>
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<td>Vancomycin (mg/kg)</td>
<td>16.6</td>
<td>30.2</td>
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Case Description

Patient History:
- HPI: 78 year-old male presented to the ED with three-week history of progressive left groin swelling with pain status post a full. Patient reported limited mobility due to constant pain since the initial injury. Lives at home alone and ambulatory at baseline.
- Pertinent negatives: fever, chills, nausea, vomiting, diziness, chest pain, or shortness of breath.
- Pertinent positives: limited mobility due to pain, deconditioned ambulation since early three weeks.
- PMH: chronic kidney disease (CKD) IIIb, Ruptured abdominal aortic aneurysm (AAA) followed by a persistent type II leak, hyperlipidemia, and type II diabetes mellitus.

Physical exam:
- Vitalis: HR 87 RR 18 BP 139/79 RA Temp: 98.3
- General: no acute distress.
- Abdomen: morbidly obese.
- Vascular: the left lateral leg to the medial groin area was noted for erythema and ecchymosis with no skin breakdown. A large mass approximately 5cm x 5cm noted in the left thigh, dimpled tender and palpable to palpation. 2+ femoral pulses palpated bilaterally. Lower extremities were noted for 2+ edema, warm, and capillary refill < 2 seconds. Donasals pedis (DP) and posterior tibial (PT) pulses were non-palpable bilaterally.
- Neurologic: Alert and oriented x3. Lower extremities neurologically intact.

Test results:
- Non-invasive CT of abdomen and pelvis: Left groin has a large multi-calcified 12cm x 7.5cm mass at the region of arterial aneurysm of the femo-femoral bypass. The CT was concerned for a large pseudoaneurysm which can be seen in Figure 1. An ultrasound recommended for further evaluation. Patient has multiple stents in the aorta and iliac vessels.
- Bedside doppler ultrasound-pulsatile ultrasound with monophasic signals in left groin. DP & PT monophasic signals present bilaterally.
- Cultures: enterococcus fecalis in the left femoral graft, staph luteus in left groin.

Diagnostic tests:
- CT is the most used diagnostic tool followed by doppler ultrasound. The definitive diagnosis cannot be fully made until assessed in the operating room.
- Observation followed by elective surgical management is the standard treatment for femoral pseudoaneurysms less than 3.5 centimeters.
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Patient management and Outcome

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Surgical Intervention

- Vascular treatments are focused mainly on the size of the pseudoaneurysm as well as the patient’s symptoms if they were present.3,4
- Emergent surgical procedures were rare for treatment but was necessary in this case due to the extensive size of the pseudoaneurysm.
- Many vascular grafts can be saved during surgery.3 However, this case required a replacement of a new graft due to the amount of vascular damage.
- During surgical correction bovine patches were most used while this case used a dacron graft and the average estimated blood loss was 122ml.
- This patient’s previous surgical history made it necessary to use an individualized approach due his unique vascularity and previous vessel damage.
- Muscle Flaps:
  - The most used muscles for flap repairs are the sartorius and the rectus femoris.3,5,6
  - The sartorius flap is performed twice as often compared to the rectus femoris muscle flap used in this patient case, but there was no definitive difference between the muscles.3,5,6
  - The sartorius flap had minimally decreased rates of amputations and increased 30-day survival rate post-operatively.3,4,5,6
  - The rectus femoris muscle flap had the benefits of covering a larger pseudoaneurysm and decreased risk of graft loss post-operatively.3,4,5,6
  - This case contained an unusually large pseudoaneurysm and an infected graft, which favored the rectus femoris flap to this specific patient.

Conclusion

- Femoral pseudoaneurysm is common in patients with comorbid conditions. A diagnosis can be made with a thorough patient history, CT scan, and confirmed with bedside ultrasound.
- When a treatment plan is evaluated for femoral pseudoaneurysms, an individualized patient approach is needed in high-risk patients.
- Despite the unusual size of this pseudoaneurysm, the patient still had successful post-operative outcomes as seen in classic cases of pseudoaneurysms.