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.[1-6]
- One of the strongest associated risk factors to femoral pseudoaneurysms is a positive smoking history.[2,3]
- Femoral pseudoaneurysms are seen twice as often in males, and a median age varying from late 60's to early 70's.[2-6]
- Patients who develop femoral pseudoaneurysms likely had previous vascular surgeries due to vessel wall weakness, and therefore are predisposed to aneurysms.[4]
- Most patients who are diagnosed with femoral pseudoaneurysms were asymptomatic, and those with symptoms were associated with aneurysms larger than five centimeters.[4,5]
- CT is the most used diagnostic tool followed by doppler ultrasound. The definitive diagnosis cannot be fully made until assessed in the operating room.[2,5]
- Emergent surgical management is rare for femoral pseudoaneurysms due to being small in nature.[3]
- Observation followed by elective surgical management is the standard treatment for femoral pseudoaneurysms less than 3.5 centimeters.[5]
- Excision, debridement, graft replacement, antibiotic treatment, and vacuum-assisted wound closure has shown to be the most effective treatment for infected anastomotic aneurysms.[3]
- With elective surgical management the average hospital stay was eight days.[4]

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 fall. 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, dizziness, chest pain, or shortness of breath.
- Pertinent positives: limited mobility due to pain, deconditioned ambulation since onset 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.
- Previous surgeries: right to left cross femoral artery bypass in 2013 resulted in urgent aorto-uni-iliac stent graft placement, and an open aorta repair in 2016.
- Home medications: aspirin 81mg PO daily, atorvastatin 40 mg PO daily.
- Hospital medications: aspirin 81mg PO daily, atorvastatin 40 mg PO daily, enxoaparin 1mg/kg SQ daily, metolazone 5mg PO daily, metoprolol 15mg IV intra-op, terazosin 5mg PO daily, and vancomycin 15mg/kg IV daily.
- Family history: Father, deceased at 68, ruptured AAA.
- Social history: 1 PPW smoking history for 20 years, quit in 2011.

Physical exam:

- Vitals: HR 87 RR 18 BP 139/79 O2 98% RA Temp: 98.3.
- General: no acute distress.
- Abdomen: morbidly obese.
- Vascular: the left lateral hip 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 groin was tender and pulsatile to palpation. 2+ femoral pulses palpated bilaterally. Lower extremities were noted for 2+ edema, warm, and capillary refill < 2 seconds. Dorsalis pedis (DP) and posterior tibial (PT) pulses were non-palpable bilaterally.
- Neurologic: Alert and oriented x3. Lower extremities neurologically intact.

Diagnostic tests:

- Non-contrast CT of abdomen and pelvis findings- Left groin has a large multiloculated 12cm x 7.3cm mass at the region of arterial anastomosis of the fem-fem 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 mass with monophasic signals in left groin. DP & PT monophasic signals present bilaterally.
- Cultures: *enterococcus faecalis* in the left femoral graft, *staph haemolyticus* in left groin.

Surgical Intervention

Patient Management

- Urgent surgical intervention for open excision of left leg graft, revision of cross femoral bypass, rectus femoris flap to the left groin.
- Findings: completely disrupted left femoral anastomosis. Bleeding was controlled.
- Rifampin soaked femoral-femoral graft replacement with rectus femoris muscle flap.
- wound class: clean contaminated.
- Estimated Blood Loss: 2,600ml.
- Muscle flap indications: rectus femoris flap was used due to the large size of the pseudoaneurysm.
- Drains: 10 french jackson pratt (JP) drains placed in the left thigh and left groin
- Negative pressure wound therapy (wound vac) was applied to the left groin.

Discussion

- In this case the 12.5cm pseudoaneurysm, and high-risk patient, made for an individualized treatment approach which was not determined until the extent of damage was found in the OR.
- Successful surgical outcomes are seen with a treatment approach that is tailored to each high-risk patient.[5-8]
- The patient treatment can be individualized in either the vascular approach or muscle flap utilization.[5-8]
- Although uncommon interventions were used in this patient case, it was successful due to being individualized to the patient profile.

Vascular approach:

- Vascular treatments are focused mainly on the size of the pseudoaneurysm as well as the patient's symptoms if they were present.[3,5]
- Emergent surgical procedures were rare for treatment but was necessary in this case due to the extensive size of the pseudoaneurysm.[3]
- Many vascular grafts can be saved during surgery.[4] However, this case required a placement of a new graft due 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.[4,7]
- This patient's previous surgical history made it necessary to use an individualized approach due his unique vasculature and previous vessel damage.

Muscle Flaps:

- The most used muscles for flap repairs are the sartorius and the rectus femoris.[5,7,8]
- 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 advantage between the muscles.[5,8]
- The sartorius flap had minimally decreased rates of amputations and increased 30-day survival rate post-operatively.[5,6,8]
- The rectus femoris muscle flap had the benefits of covering a larger pseudoaneurysm and decreased risk of graft loss post-operatively.[5,6,8]
- This case contained an unusually large pseudoaneurysm and an infected graft, which favored the rectus femoris flap to this specific patient.

Conclusion

- Femoral pseudoaneurysms are 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.

Fig 1. Computed tomography of abdomen

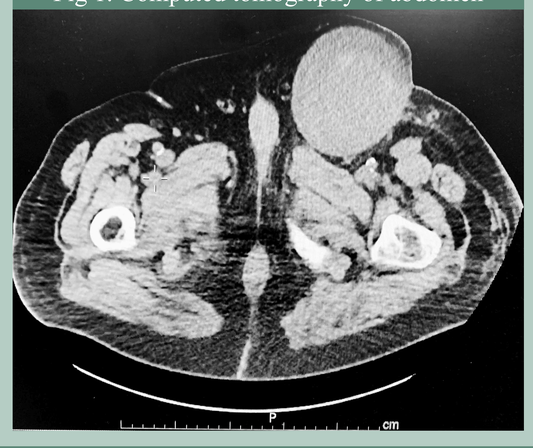

Table 1. Hospital stay trending labs

Hospital Day:	0 (ED)	0 (pre-op)	0 (post-op)	1	2	3	8	Follow up
Hematocrit (%)	36.7	34.1	37	37	35.2	32.4	34.4	32.8
Hemoglobin (g/dL)	11.4	10.8	12.3	12.1	11.2	10.9	10.7	10.4
WBC ($10^3\mu L^{-1}$)	7.9	8	12.5	1.4	9.2	8.6	7.5	7.8
Platelets ($10^3\mu L^{-1}$)	246	28	189	199	176	193	301	305
BUN (mg/dL)	11	40	37	38	37	40	47	49
Creatinine (mg/dL)	0.7	2.2	1.7	1.7	2.2	2.2	2.1	1.7
eGFR (mL/min/1.73m³)	>60	28.8	38.8	38.8	28.8	28.8	30.4	38.8
Glucose (mg/dL)	183	92	139	103	107	141	130	113
Vancomycin (mg/kg)						16.6		30.2

Patient management and Outcome

Hospital Course:

•POD#0: Patient received 6 units of packed red blood cells, two units of fresh frozen plasma, 250mL of albumin, and 2L of crystalloid intra-op with urine output of 360cc. The patient was transferred to the intensive care unit (ICU) post operatively and was intubated and sedated.
•POD#1: Patient alert and responding to commands, extubated later in the day. No immediate post-op complications.
•POD#2: transferred out of ICU on strict bed rest to prevent flap avulsion.
•POD#3: strict bed rest lifted. Physical therapy done to get out of bed and transfer, and then discharged.
•POD#4-8: Wound vac on incision site was changed every other day. Labs were trended throughout the stay and can be seen in Table 1.

Patient Outcome and follow-up:

•Outcome: Patient stable and discharged to a rehabilitation facility to fully recover.
•Follow-up: One week post-operative with the vascular surgeon, and four weeks post-operative with infectious disease specialist.

References

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