Femoral artery access complications

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Case

76 yo F with HTN, HLD, Afib on Coumadin, PVD presented to Vascular surgicenter with LLE rest pain for angiogram 3/10

- R groin access
  - Hematoma developed; access site removed and pressure applied
- L groin access
  - SFA angioplasty and stent
Case

- R groin hematoma enlarged, pt developed AMS
  - EMS transferred pt from surgicenter to RUMC

- ED
  - FAST + retroperitoneal hematoma
  - Tachycardic, hypotensive
  - Received 2u pRBC, 2u FFP
Case

• OR 3/9
  – R extraperitoneal exploration
    • Proximal iliac artery control
      – No evidence iliac injury
  – R femoral exploration
    • 3-4 mm arteriotomy to CFA with closure device/plaque stenting
    • open arteriotomy
    • 6-0 prolene closure
  – EBL 2L, IVF 2L, UOP 400cc
  – Received 9u pRBC, 3u FFP, 2u plts
Case

• SICU
  – 10.2>9.2/29.8<172
  – PT/INR 35.5/3.4  PTT 89
  – Repeat H/H 14.6/44.4
  – Heparin gtt
  – LLE ischemic, palpably cold to touch
Case

• OR 3/10
  – L CFA endarterectomy
  – L popliteal artery endarterectomy
  – L femoral to below-knee popliteal artery bypass, ATA cutdown, ATA thrombectomy
  – Four-compartment fasciotomy
    • Post procedure: no dopplerable signals
Case

• SICU
  – CXR: left lung opacification
  – Bronchoscopy (7.26/47/66)
    • Secretions noted, no mucus plugs
  – Developed hypotension, oligouria, increased pressor requirements, acidosis
  – ABG 7.04/64/40
Case

• SICU
  – Pan-culture
    • Empiric Vancomycin, Meropenem

  – Discussed need for LLE amputation (3/12)
    • Family made pt DNR with no escalation in care
    • D/c’d Abx

• Death 3/17/2017
Questions?
• Femoral anatomy
• Access techniques
• Risk factors
• Complications and management
  • Retroperitoneal hematomas
  • Pseudoaneurysms
  • Groin hematomas
  • AVF
Femoral artery anatomy

- “NAVEL”
  - Nerve
  - Artery
    - 1/2 distance ASIS to pubic symphysis
  - Vein
  - Empty space
  - Lymphatics
Femoral artery anatomy

- Common femoral artery branches
  - Inferior epigastric artery (medial)
  - Lateral circumflex iliac artery (lateral)

- Superficial femoral artery
  - Popliteal artery
  - Femoral profunda

- 90% femoral artery cross femoral head
- 99% bifurcation below mid-femoral head
Access techniques

- Best pulse
- Fluoroscopy guided access
- Ultrasound directed
  - Better CFA punctures
  - Increase first pass
  - Reduce mean time to access
  - Reduce complications

- Technical
  - Front wall stick
    - Pulsatile flow prior to wire advancement
    - Insert/withdraw wire without resistance
Complications—Risk factors

- Female gender
- Older
- Obesity
- Previous access or bypass procedures
- High femoral artery bifurcation
- Left groin access
- Access technique (landmark)
- Large arterial sheath
- Intra-/postprocedural anticoagulation
- Low platelet count (<200,000/L)
Retroperitoneal hematoma

- Bleed into retroperitoneal space
  - Incidence 0.3-0.5% after cardiac catheterization
  - Mortality 6%

- Presentation within 3 hrs
  - 25% identified after 3 hrs

- Symptoms/Signs
  - Suprainguinal tenderness & fullness
  - Severe back & lower quadrant pain
  - 1/3 femoral neuropathy
  - Tachycardia, hypotension
Retroperitoneal hematoma

• Diagnosis
  • CT with and without contrast

• Management
  • Large series 90+% treated medically—i.e. RESUSCITATE!
    • Transfusion (mean 4 u pRBC, ranging 1-12 u pRBC)
    • Reverse anti-coagulation & anti-platelet medications
Retroperitoneal hematoma

- Management
  - Endovascular treatment
    - Balloon occlusion
    - Stent placement
  - Surgical repair in about 16% cases
  - Indications
    - Refractory hypotension
    - Active blush noted on CT

- Complications
  - Post-op MI, infection, heart failure
  - Mortality 6.6%
Pseudoaneurysm

- Femoral pseudoaneurysms
  - Most common access complication; incidence 5.3-8%

- Symptoms/Signs
  - Groin hematoma and pain at puncture site
  - Bruit
  - Pulsatile mass

- Diagnosis
  - Ultrasound
    - Echolucent mass with flow
Pseudoaneurysm

- Ultrasound
  - Maximum sac size
  - Amount of flow within sac
  - Number of sacs
  - Length and diameter of neck
    - Long vs short neck (>0.9 cm neck spontaneous thrombosis)
    - Origin of pseudo aneurysm

- Complications
  - Rupture
  - Local pain from compression
  - Distal embolization
Pseudoaneurysm

Management options
- Observation < 3cm; 89% spontaneous thrombosis
- US-guided compression; now rare
- Duplex-guided thrombin injection (DGTI)

Management
- Treat large >3 cm or poor compliance with serial duplex
Pseudoaneurysm

• Management
  • Treat large >3 cm or poor compliance with serial duplex
  • DGTI
    • 0.1 mL aliquots of 1000 IU/mL thrombin
    • 97% success rate; even when on anticoagulation
Pseudoaneurysm

Femoral Pseudoaneurysm following percutaneous access

NonSurgical Management

Surgery: Associated Expanding hematoma, infx, neuropraxia etc.

Observation

DGTI

Sac size >3 cm
Sac size >1cm with:
Expected poor compliance with observation, growth during serial examinations, Severe pain or planned CABG

<1cm and growth during observation, worsening symptoms or failure to resolve by 6 weeks

DGTI: Duplex guided thrombin injection

UGC: Ultrasound guided compression

<1 cm psa that fails to resolve at 6 weeks or psa associated with arteriovenous fistula and don’t resolve with observation

<3 cm without reasons for intervention listed above: Serial duplex exams q 1-2 weeks until spontaneous thrombosis
Pseudoaneurysm

• Management
  • Surgical
    • Indications
      • Large hematomas with necrotic skin
      • Infected pseudoaneurysm
      • Severe pain
      • Nerve compression
    • Complications
      • Acute blood loss
      • Infection 19%
      • Incisional dehiscence 12%
      • Femoral nerve injury
AV fistula

- Incidence 0.4%
- Association with low SFA/profunda access and venous branch
- Symptoms/signs
  - Groin thrill/bruit
  - Heart failure
  - Lower extremity edema
  - Distal arterial insufficiency
- Management
  - Compression
  - Surgical ligation of tract
  - Endovascular stenting or coil embolization
Hematoma

- Incidence variable
  - 1990s—7%  2000s—2.8%
  - Smaller sheaths, titrating anticoagulation, decrease use of heparin

- Management
  - Medical
    - Transfusions
  - Surgical
    - Indication
      - Enlarging despite adequate compression
      - Skin necrosis
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