

Femoral Access in Neuro-Interventional Procedures

Arterial Puncture Complications and Management

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Disclosures

The presenter has no conflicts of interest to disclose.

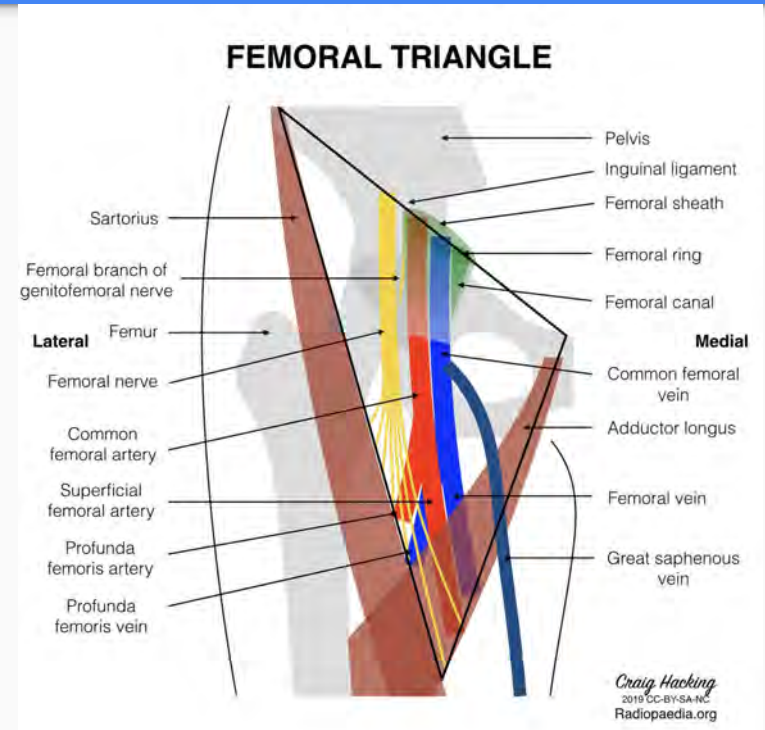
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Objectives

- Understand femoral access in neurointerventional procedures
- Classify access-site complications (minor vs. major)
- Identify patient- and procedure-related risk factors
- Outline diagnosis and management for each complication
- Summarize nursing interventions

Obtaining Femoral Access

- Common Femoral Artery (CFA) 1-2cm below inguinal ligament and above femoral bifurcation
- High puncture: Increased risk of retroperitoneal bleed
- Low puncture: increased risk of pseudoaneurysm, AV fistula, thrombosis, and ischemic complications



Contraindications to Femoral Access

Severe peripheral arterial disease

-Pre-procedure peripheral vascular assessment

Local infection or groin hematoma

-Assess for erythema, ecchymosis, swelling, drainage

Uncorrectable coagulopathy

-Baseline pt/inr, ptt, accurate history/med rec

Obtaining Access

- Local Anesthetic administered
 - US guided access leads to significantly reduces complications, access attempts and time
 - 21g access, 5fr sheath
- Guidewire inserted to aorta
- Sheath inserted: 5-8fr typical



Major vs Minor Complications

Rate of complications range from 1.5-9% of cases, higher in interventional

Minor

- Bruising, minor bleeding, stable hematoma

Major

- Pseudoaneurysm, AV fistula, retroperitoneal hemorrhage, arterial dissection, embolism, thrombosis, limb ischemia

Patient Specific Risk Factors

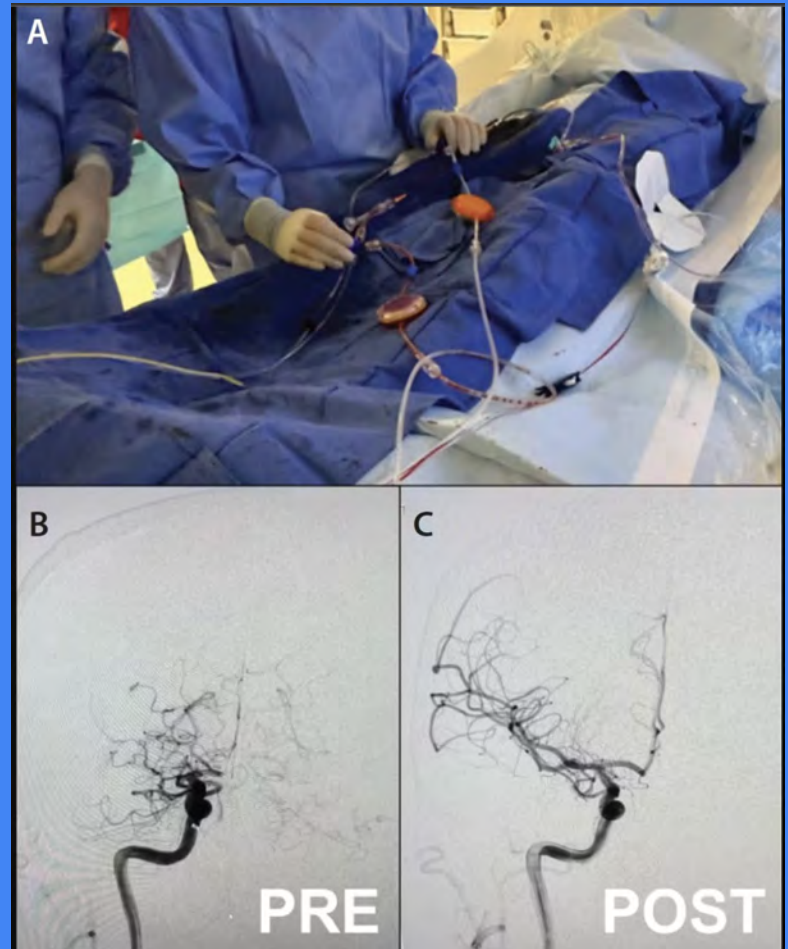
- Female Sex
- Obesity
- Hypertension
- Dual Antiplatelet Therapy (DAPT) and/or anticoagulation therapy
- Recent femoral access

Procedural Risk Factors

- Large Sheath size, over 8 Fr
- Prolonged sheath insertion time
- Puncture site above/below common femoral artery
- Blind femoral puncture



Complications In-Depth



Shakir, H. J. M. (2025, June 19). Embracing New Technologies and Techniques for Mechanical Thrombectomy. Endovascular Today. <https://evtoday.com/articles/2025-june/embracing-new-technologies-and-techniques-for-mechanical-thrombectomy>

Hematoma

Signs/Symptoms

- Presents as pain, swelling, and bruising
- Can continue to expand in 10-15% of patients, potentially leading to hemorrhagic shock

Management

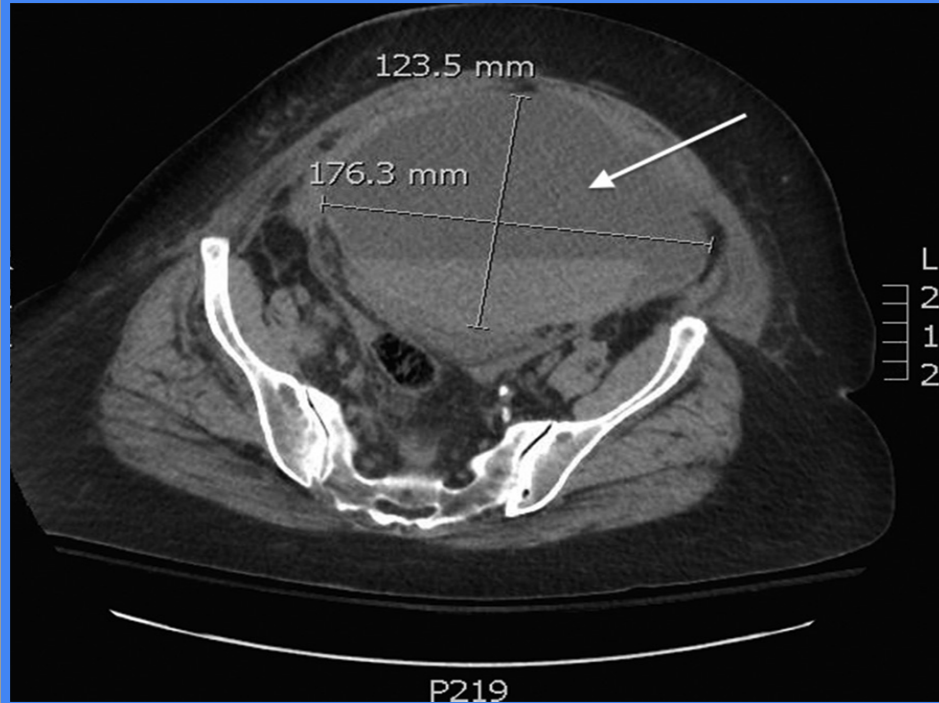
- Manual compression, mark site and monitor for expansion, US if concerning

Retroperitoneal Hemorrhage (RPH)

- Bleeding occurs behind the membrane lining the wall of the abdomen and pelvis. Risk significantly increased with high puncture site
- Flank, back, or abdominal pain, bruising on the lower abdomen
- Signs of hemorrhagic shock: Tachycardia, hypotension, downtrending HGB/HCT
- 6.6% mortality rate

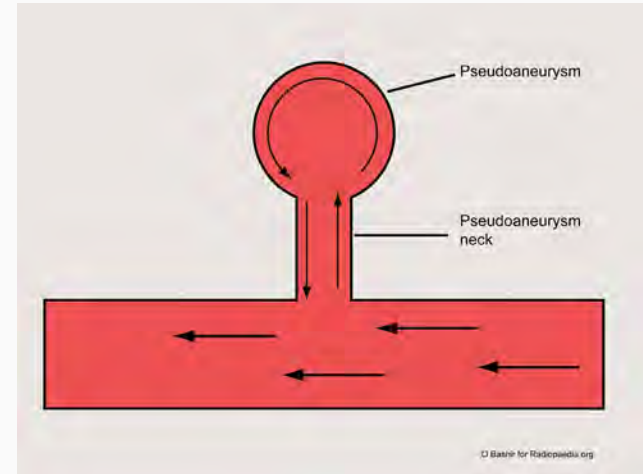
RPH Management

- Fluid resuscitation, blood transfusion, upgrade level of care
- Reverse coagulopathies
- CTA for evaluation, planning for possible endovascular therapy with Interventional Radiology/ Vascular Surgery
 - Balloon occlusion, covered stent placement



Pseudoaneurysm (PSA)

- Aneurysm - Outcropping in the arterial wall
- PSA - break in the arterial wall with a neck that does not close forming a hematoma that can continue to expand
- Turbulent blood flow inside, wall formed by fibrin/platelet cross links
- Weaker than the arterial wall, risk of rupture, hemorrhage
- Incidence of <1%



Case courtesy of Omar Bashir,
Radiopaedia.org, rID: 17030

Diagnosis

- Painful, pulsatile mass occurring <24 hours post-procedure
- bruit on auscultation
- Confirmed on doppler US
- Pulsatile mass in groin - 92% sensitivity and 93% specificity
- Emergent Surgical evaluation for
 - Expanding hematoma
 - Motor or neuro sensory deficit
 - Ischemic skin changes
 - Pulse deficit
 - Hemodynamic instability



Case courtesy of Charlie Chia-Tsong Hsu, Radiopaedia.org, rID: 19203

Management of PSA

- Small size <3 cm typically resolve spontaneously within 4 weeks
- US guided compression
- US guided thrombin injection
 - 97-100% success rate, even on DAPT
 - Decreased success observed plt <130
- Can be repeated if unsuccessful, surgical intervention considered after
 - Risk for embolization, pulmonary embolism
 - Higher risk with aneurysm neck <2mm
- Covered stent placement



Arteriovenous Fistula

- Abnormal connection of a vein and an artery
- Typically from puncture below femoral bifurcation
- Estimated prevalence 2.2%
- Generally asymptomatic
- Symptomatic:
 - Shunting with distal swelling, tenderness
- Treatment with covered stents, coil embolization, balloon tamponade, surgical repair

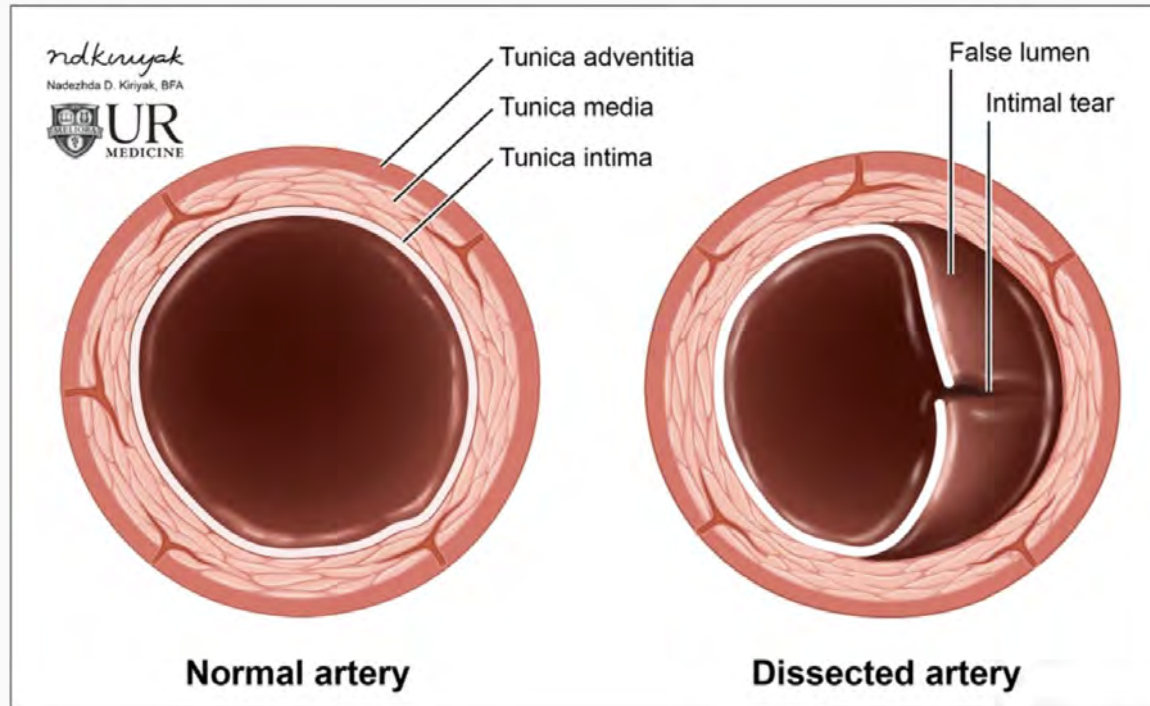


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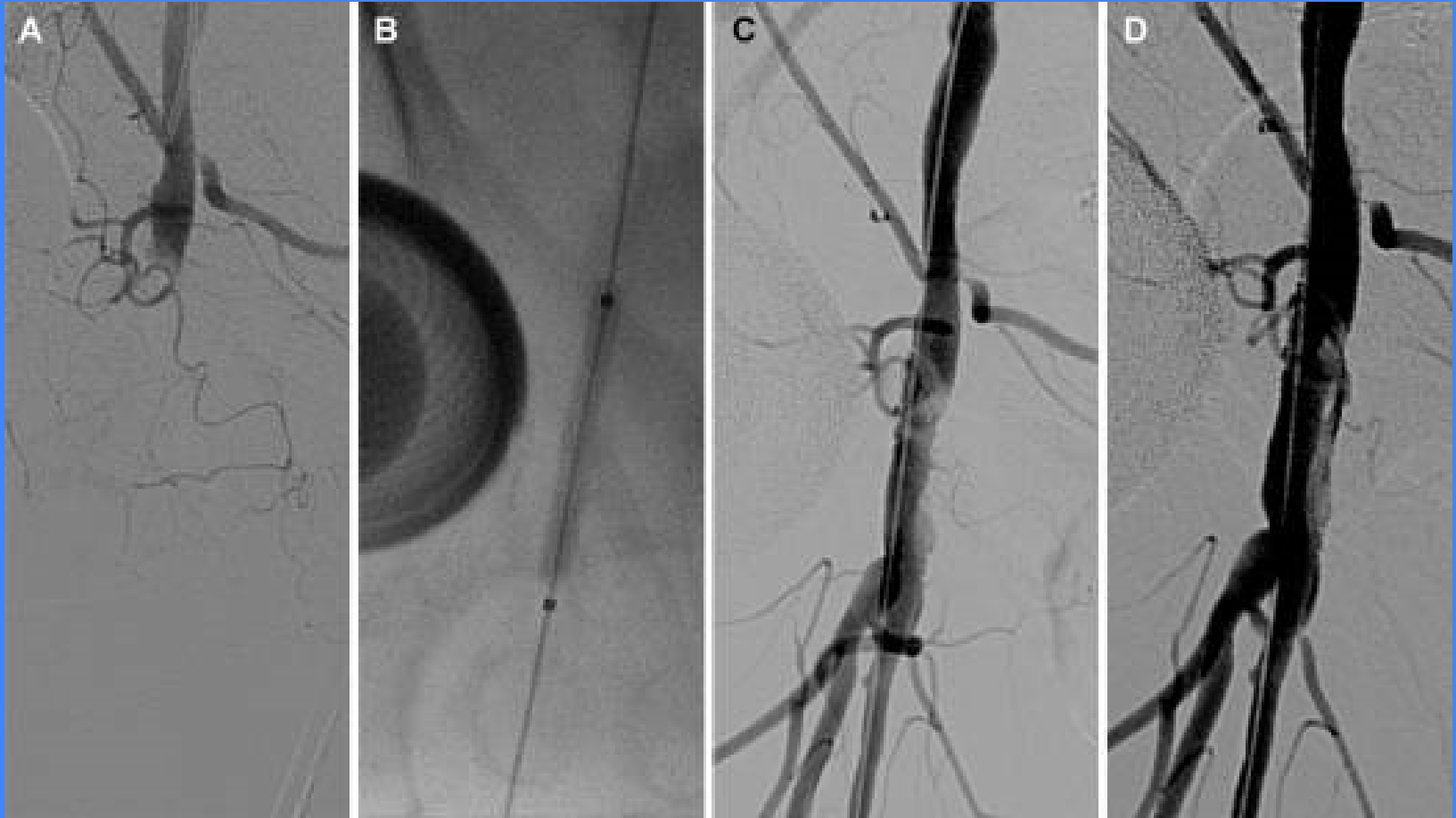
Arterial Dissection

- Tear occurs in the media, blood enters between the media and intima
- Forms a false lumen, high pressure due to no outflow
- Can be caused by wire/catheter, removal can resolve
- If dissection limits arterial flow, treatment required
 - Angioplasty
 - Stenting
 - Surgical repair
- Dissection can result in thrombosis of vessel, can require thrombectomy

Arterial Dissection



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Question #1

You are caring for a patient in the PACU after a neuro embolization procedure for an right ACA aneurysm stenting. The patient's exam has been unremarkable with a nontender right groin femoral artery puncture site. Over the course of 30 minutes they begin to report increasing right lower back pain. Their blood pressure is 91/56, hr 120 sinus tachycardia, SPO2 98%, respiratory rate 20, and temperature is 98.3F. What intervention would you perform?

- A) Start maintenance fluids
- B) Administer prn dilaudid for the back pain
- C) Continue post-procedure assessments as ordered
- D) Contact the proceduralist

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Question #2

The patient becomes increasingly hypotensive while contacting the proceduralist. The patient is sent for a stat CTA and emergency release blood is started. What condition would you expect to be diagnosed based off of the scan?

A) Pulmonary embolism

B) Kidney stone

C) Retroperitoneal hemorrhage

D) Sciatica

Question #2 - Answer

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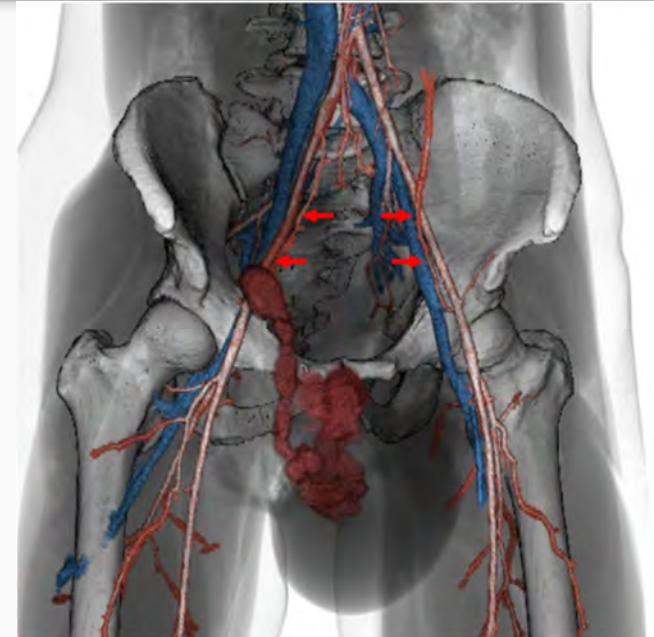
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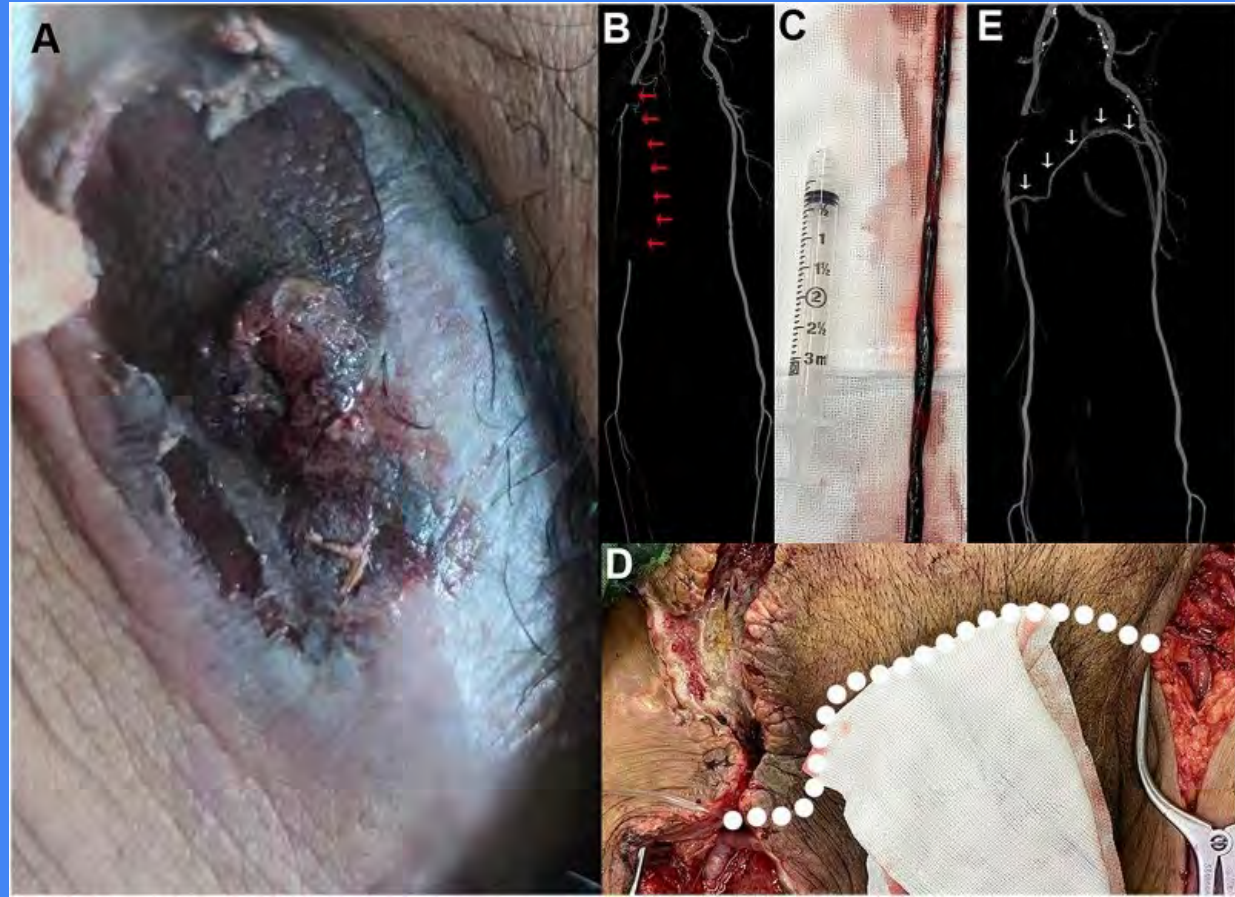
Femoral Nerve Injury and Other Infrequent Complications

- Femoral nerve injury - typically from compression from hematoma/pseudoaneurysm, not puncture
- Assess for quadricep weakness/paralysis, groin pain
- Requires emergent intervention to relieve pressure
- Scrotal hematoma - rare complication, scrotal pain, edema. Conservative management, intervention required if expanding, hemodynamic instability.



Access-Site Infections

- Can arise from poor site hygiene, closure device use, increased risk if immunocompromised
- Infected PSA-surgical emergency with reconstruction required



Question #3

A 63 year old female patient is being cared for in the Neuro ICU 8 hours post mechanical thrombectomy. On your serial groin assessment the patient reports significant tenderness on palpation. A secondary pulsatile mass is felt lateral to the femoral puncture site. You suspect this is:

- A) hematoma
- B) cellulitis
- C) pseudoaneurysm
- D) femoral nerve injury

Question #3 - Answer

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Question #4

A stat duplex ultrasound is obtained and a diagnosis of a pseudoaneurysm of the right common femoral artery at the femoral puncture site is confirmed. It is measured at 5cm in diameter and not expanding. The priority intervention you would expect is:

- A) apply a warm compress
- B) ultrasound guided thrombin injection
- C) femoral angiogram with stent placement
- D) increased frequency of site assessments

Question #4 - Answer

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Advance Complication Management

Endovascular treatment

- First choice for intervention
- Thrombin injection
- Angioplasty
- Stent placement
- Embolization
- Thrombectomy

Surgical intervention

- Hemodynamic instability
- Expanding hematoma despite compression
- Infected pseudoaneurysm
- Limb threatening ischemia or compressive neuropathy

Key Nursing Takeaways

- Baseline peripheral vascular exam
- Antiplatelet/ anticoagulation status, plt, pt/ inr, any clotting disorders
- Size of sheath used, length of case, US guided vs blind puncture
- Focused serial exams post-procedure with bedside handoff, pulses, neurovascular exam

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