



WHAT'S UP WITH THAT LEG



Femoral access complications

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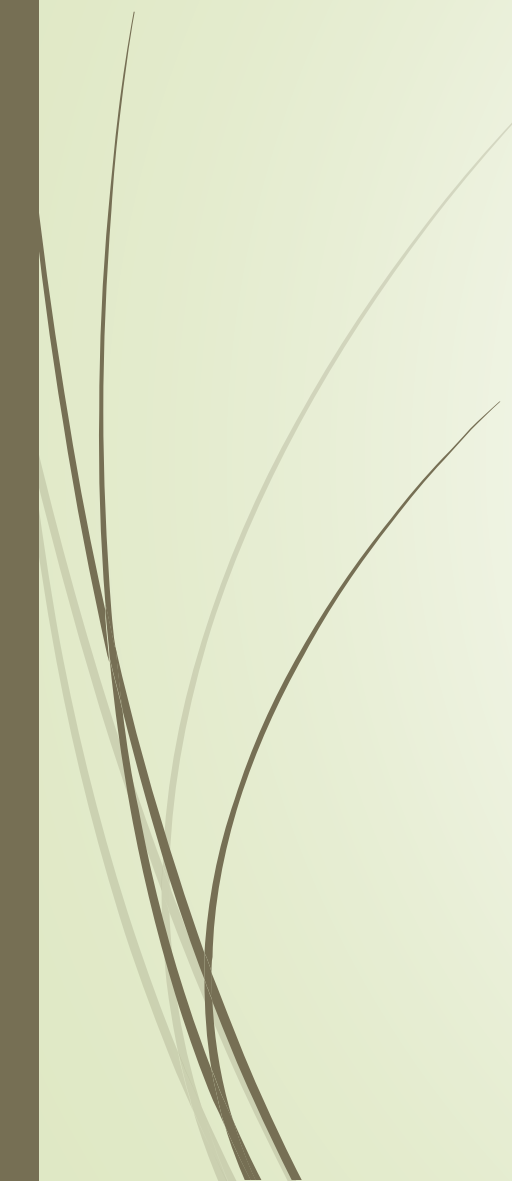


INTRODUCTION

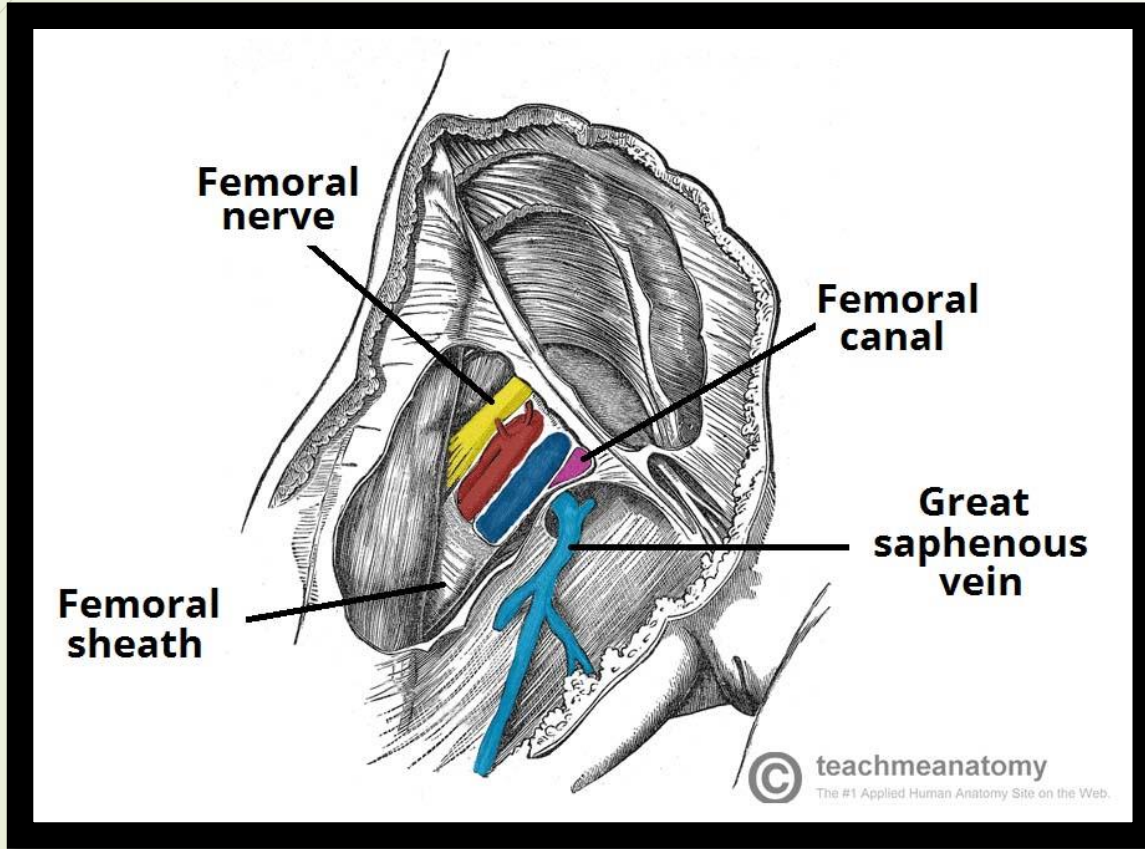
- In children femoral complications are essentially iatrogenic
- Often related to the procedure, the technique, and post procedure haemostasis.
- Mostly minor complications: minor bleeding
 - ecchymosis
 - stable haematoma
- MAJOR COMPLICATIONS:...



Percutaneous femoral approach

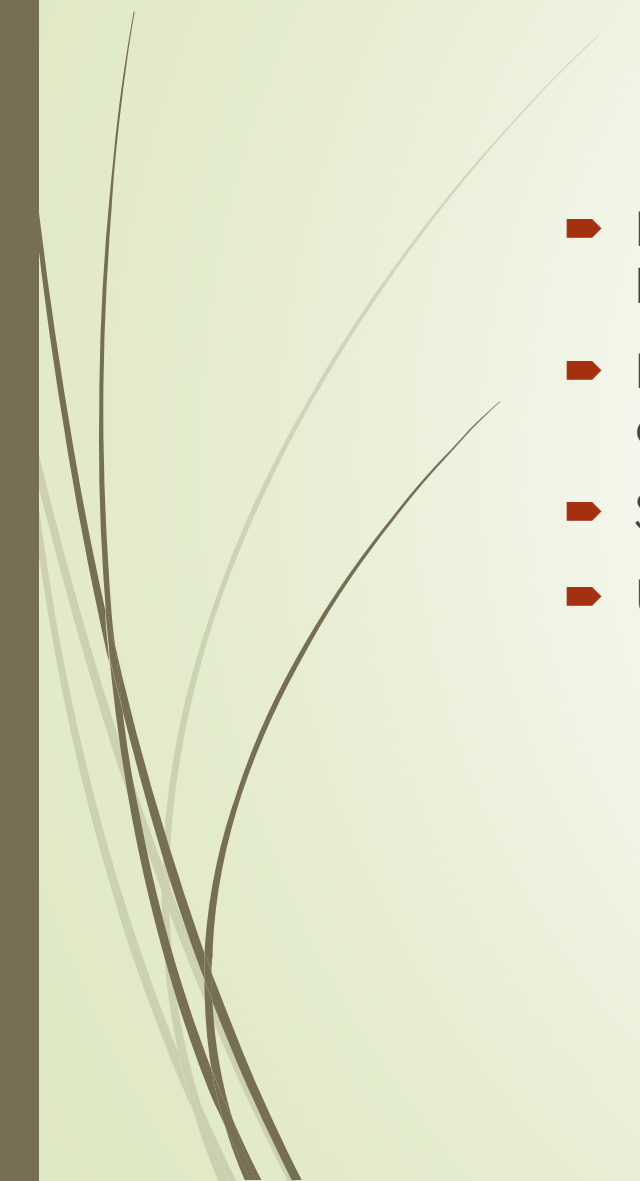
- ▶ Dominant technique
 - ▶ Does not require arteriotomy and arterial repair
 - ▶ Able to do repeated procedure using same access site
 - ▶ Suture closure of skin is not necessary
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Anatomy





Ideal puncture site

- ▶ Femoral artery is punctured below the inguinal ligament and above the bifurcation of the common femoral artery
 - ▶ Femoral vein is also 1 cm below the ligament and 0.5 to 1 cm medial to the artery.
 - ▶ Seldinger technique
 - ▶ Ultra-sound guidance can be used
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CASE ONE

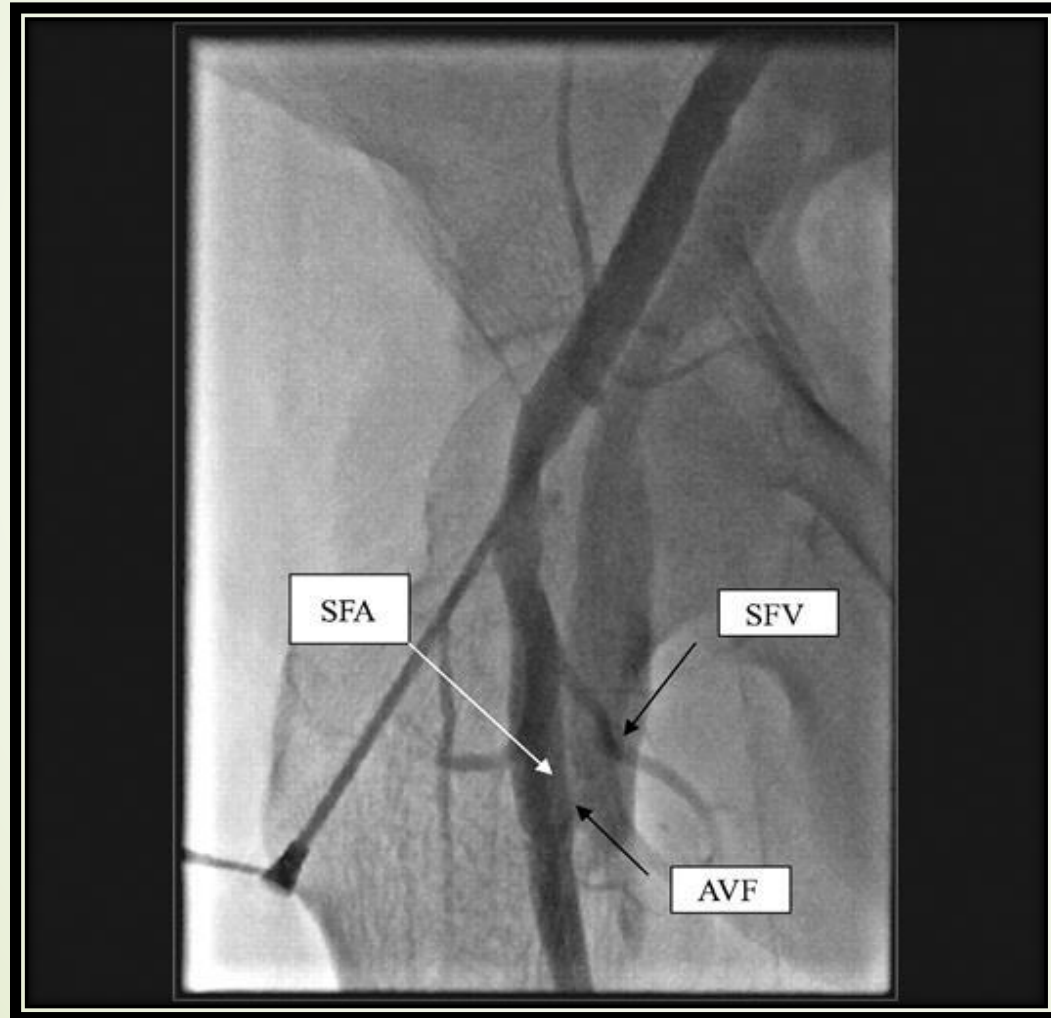
- 4y boy previous truncus repair
- Contegra stenosis and truncal regurg
- Cardiac cath for ballooning of stenosis
- Post cath – well felt pedal pulse
- normal vitals
- Discharged home


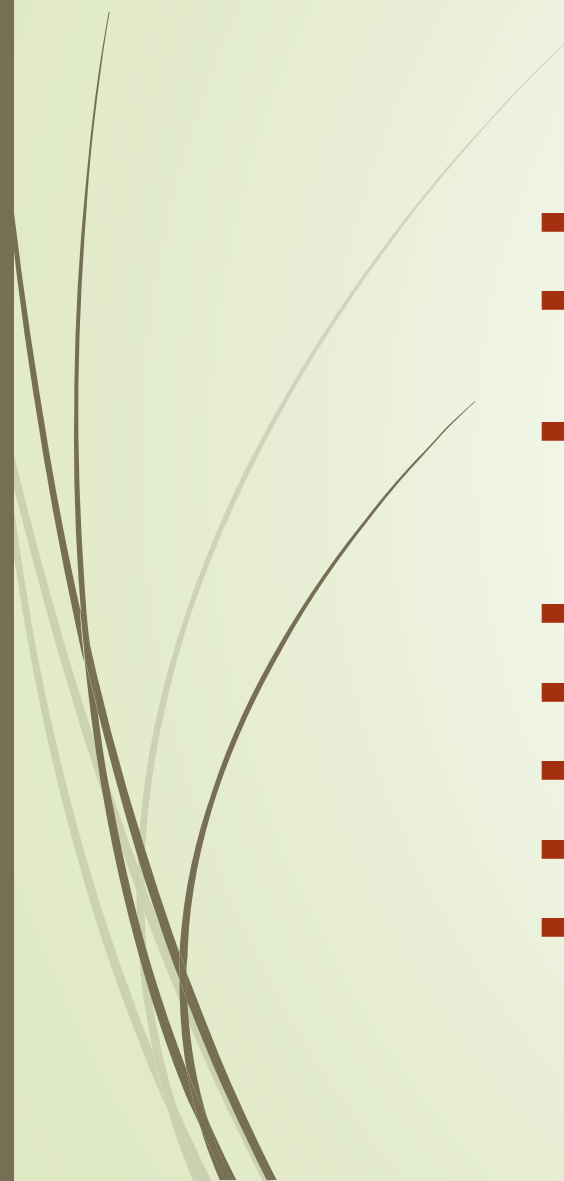


Follow up

- ▶ 6 months later – leg discrepancy
- ▶ Right leg obviously larger than the left (access site)
- ▶ No pain or claudication
- ▶ Obvious femoral bruit
- ▶ Diagnosis?

Femoral AV Fistula



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- Incidence is 0,2 – 2%
 - An AV fistula is an abnormal connection between a vein and artery that is generally asymptomatic.
 - It is more likely to result from arterial puncture below the femoral artery bifurcation and is typically created between the superficial or deep femoral artery and the adjacent lateral circumflex vein
 - Often treated conservatively and resolve (thrombose)
 - Symptomatic ones require treatment
 - Covered stents
 - Often too short or small
 - May need surgical intervention



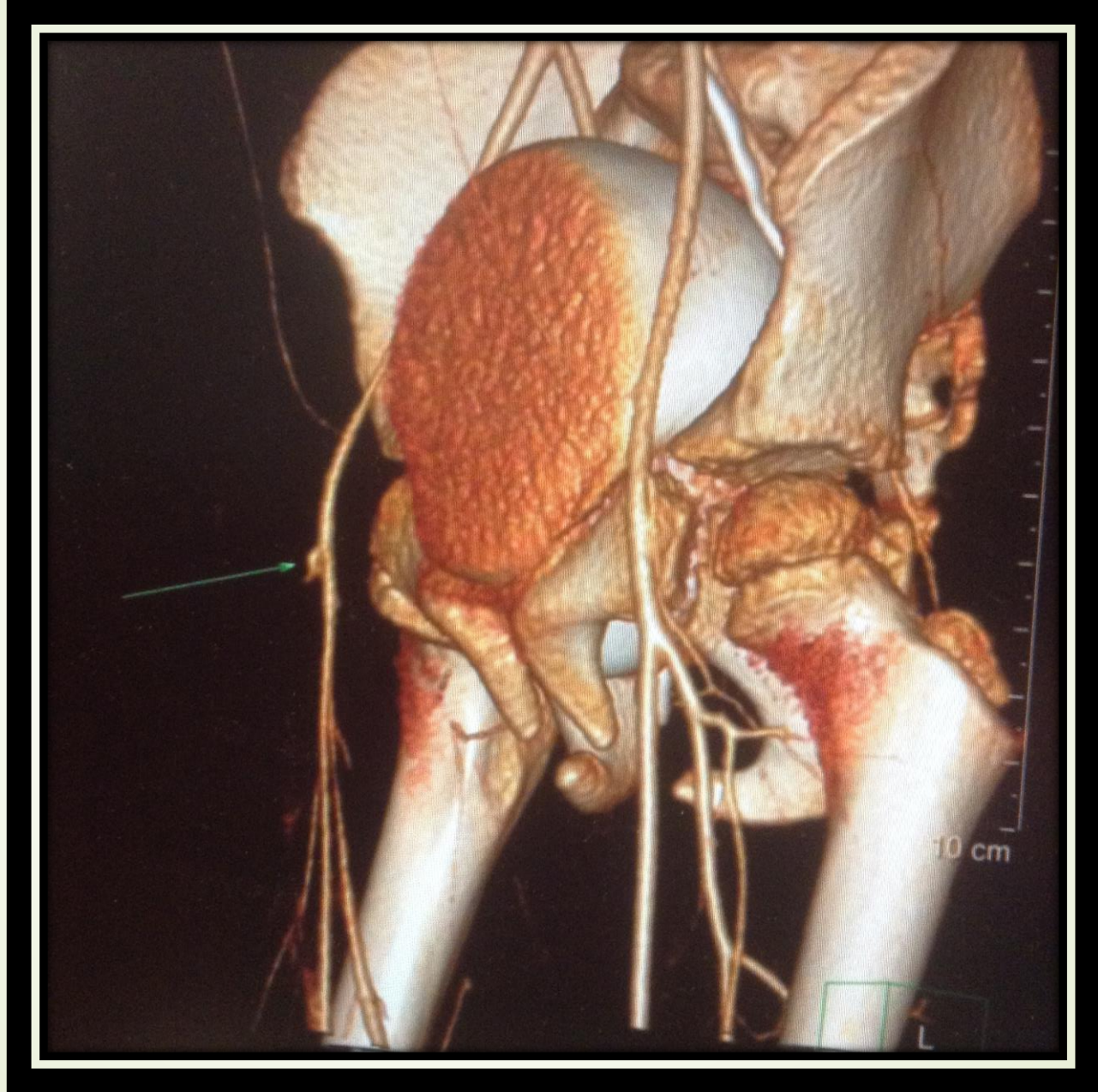
CASE TWO

- ▶ 6y girl underwent cardiac cath for percutaneous closure of PDA
- ▶ Uneventful cannulation
- ▶ At one point difficultly advancing catheter
- ▶ Went over the wire easily
- ▶ Successful, uneventful cath



Post cath

- ▶ Unable to achieve haemostasis
- ▶ Persistent groin swelling despite compression
- ▶ No obvious swelling of the leg
- ▶ ACT done and not excessively high
- ▶ Sent for CT angio





Pseudoaneurysm

- Incidence is 0,1-1,5% in diagnostic caths and 8% in interventional
- is defined as a contained pulsatile hematoma of an artery with disruption of all layers (intima, media, adventitia) which is surrounded by tissue
- It is formed when blood escapes from the lumen of an artery through a defect in one or more layers of the arterial wall and forms a pocket beneath the adventitia of the artery or in the surrounding tissue near the site of arterial puncture.
- A pseudoaneurysm has continuity with the arterial lumen whereas a hematoma does not.
- Pseudoaneurysms frequently result from failure to achieve adequate hemostasis after the catheter or sheath is removed



Treatment

- ▶ Conservative - <3cm tend to resolve and thrombose spontaneously
- ▶ Thrombin injection or coil embolization
- ▶ Surgery for complicated ones
- ▶ Cause distal ischemia
- ▶ Rapid expansion
- ▶ In this case treatment was conservative with compression alone



CASE THREE

- ▶ 8y old girl underwent cardiac cath for PDA closure
- ▶ Some difficulty in advancing wire with the sheath insertion
- ▶ Removed and reinserted with no problem
- ▶ Cath uneventful and PDA closed



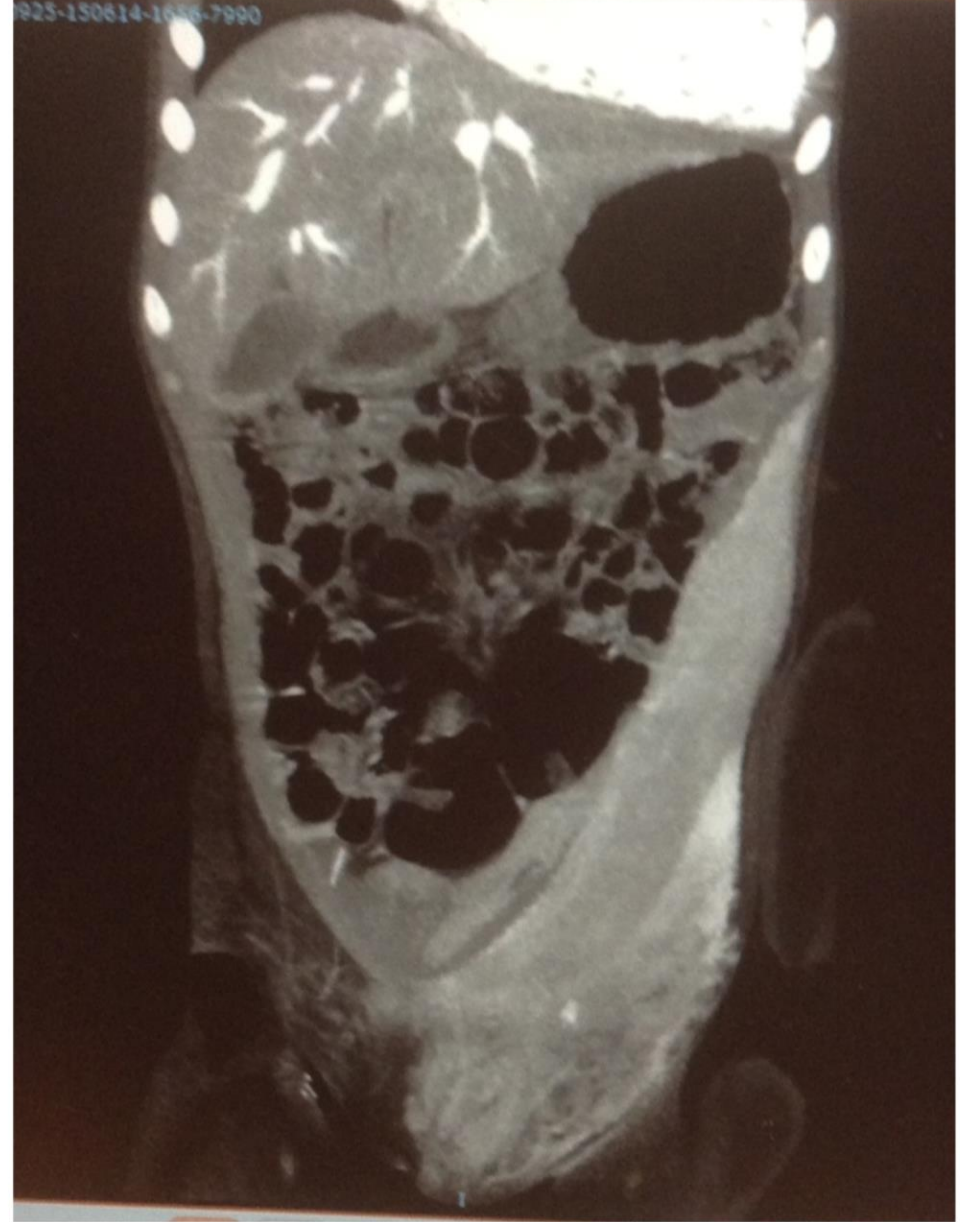
Post cath

- ▶ Unable to achieve hemostasis
- ▶ Bleeding at insertion site
- ▶ Swelling of groin with extension into the thigh
- ▶ Drop of Hb to 6.5mg % requiring blood transfusion
- ▶ Sent for urgent CTA?

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Arterial perforation

- ▶ Resulting in retroperitoneal haemorrhage.
- ▶ A retroperitoneal haemorrhage is a potential life threatening complication of femoral artery puncture that should be suspected in any post catheterization patient who develops hypotension, ipsilateral flank, abdominal or back pain, or a drop in haemoglobin without a source.
- ▶ Incidence of 0,1- 0,5%
- ▶ A higher femoral arterial puncture site is an important procedure-related risk factor.
- ▶ It is defined as a puncture above the inguinal ligament. Puncture and sheath insertion above the inguinal ligament, and hence into the external iliac artery, may predispose to uncontrolled bleeding due to the difficulty in achieving compression of this vessel.



Clinical signs

- Often varies and may be vague.
- Delayed because the retroperitoneum serves as a noncompressible area where a large amount of blood can accumulate rapidly without causing obvious stigmata of an underlying expanding hematoma.
- Results in hypovolemic shock requiring blood transfusion.
- Rarely as abdominal compartment syndrome or femoral neuropathy



Management

- ▶ Coil embolization using the contralateral side for access
 - ▶ Consult the vascular surgeons.
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CASE FOUR

- ▶ 2 week prem baby of 1.6kg
- ▶ Tricuspid atresia 1a on prostin
- ▶ Discussion with surgeons – too small for shunt
- ▶ Decision to insert PDA stent



Cath Lab

- Unable to get arterial access
- Called for help from CT surgeons
- Cut down performed and 5F sheath inserted
- Stenting of PDA successful
- Sheath removed and hemostasis achieved



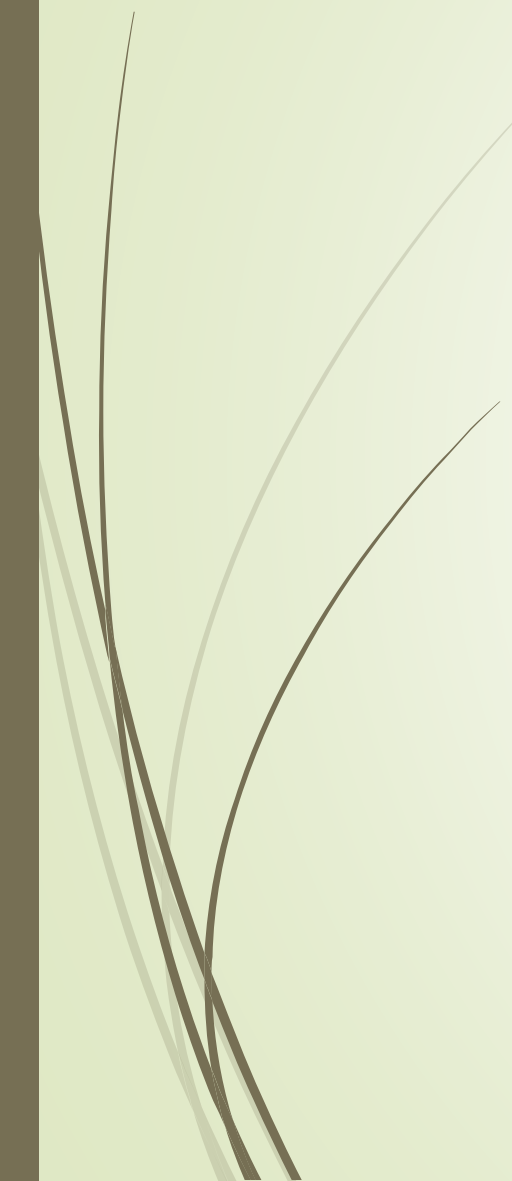
Post cath

- ▶ Baby back in ICU and leg noted to be cold and white
- ▶ Immediately started on heparin infusion
- ▶ Vascular surgeon consulted – agreed with current management in face of such a small baby.
- ▶ Leg did not improve....





Arterial Thrombosis

- Most common complication
 - Usually presents as decreased or absent pulse
 - Most often responds to heparin infusion
 - Younger and smaller patients are clearly at higher risk
 - Age <3y, interventional procedures, multiple caths, >6F sheath
 - Polycythaemia, hypercoagulable state, congenital heart
- 



Prevention

- ▶ Use of heparin prior to procedure
- ▶ In prolonged procedure either an infusion or repeated bolus
- ▶ ACT monitoring to keep $> 250 - 300$
- ▶ Size of sheath



Treatment

- ▶ Anticoagulation with unfractionated heparin infusion
- ▶ LMW heparin has also been shown to be effective
- ▶ Thrombolysis recommended for children with limb threatening complications, if no response to heparin, and no contra-indications
- ▶ Surgical thrombectomy when contra -indication to thrombolytics, and limb death imminent



Major complications

- ▶ Bleeding requiring transfusion
- ▶ Non haemorrhagic complication:
 - ▶ Pseudoaneurysm
 - ▶ Arteriovenous fistula
 - ▶ Arterial dissection and perforation
 - ▶ Thrombosis
 - ▶ Limb ischemia



Conclusion

- Incidence of major vascular access site complications are relatively low
- When they do occur – morbidity and mortality
- Challenge to the cardiologist
- Early recognition, early preventative measures are mandatory
- **Get help early!**