

Case of the Day

January 2015

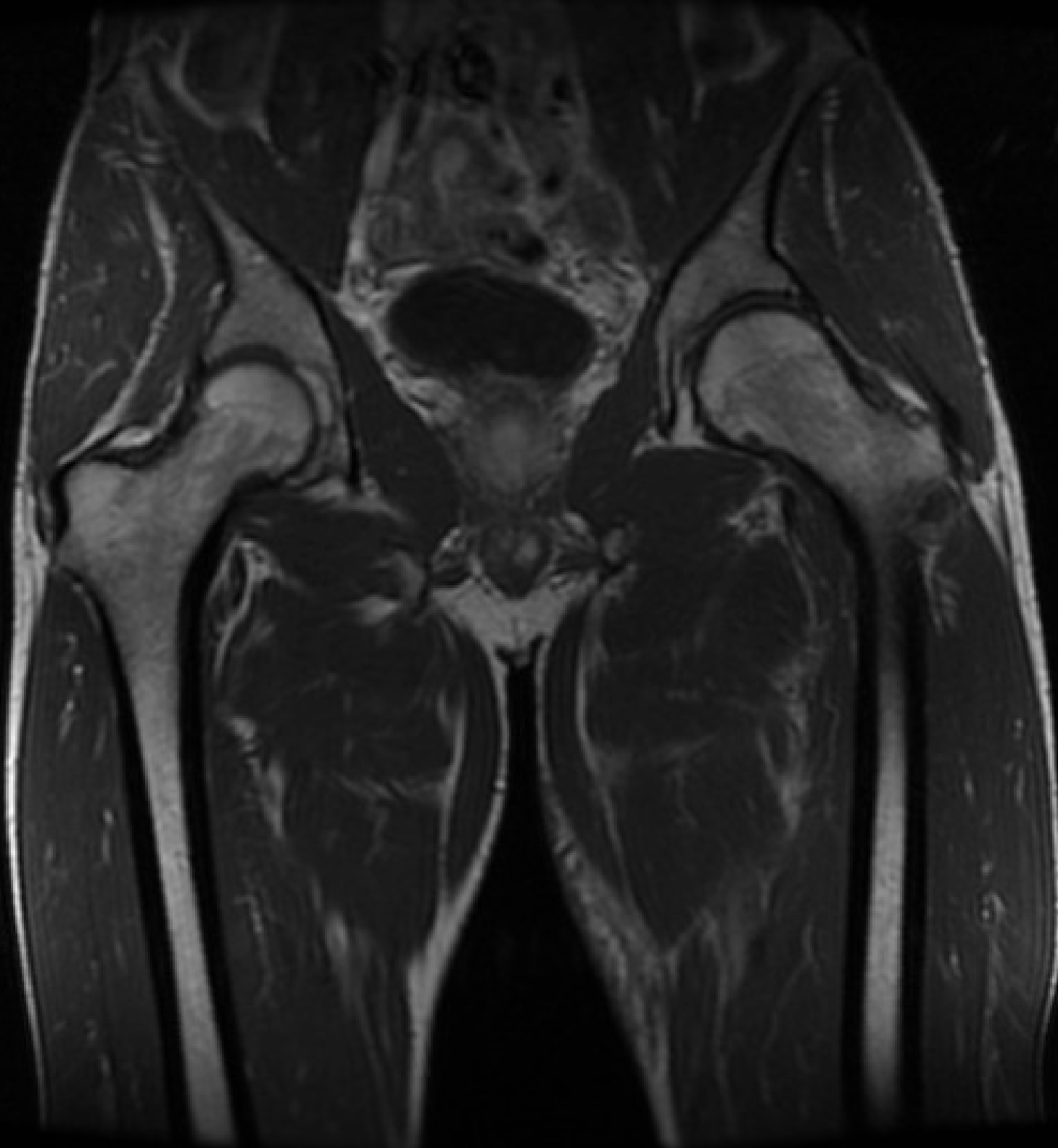
Case courtesy of Dr. R. Meagher, Dr. R. Abraham, Dr. C. Lightfoot, Dr. M. Brown, and Dr. R. Berry

Clinical History

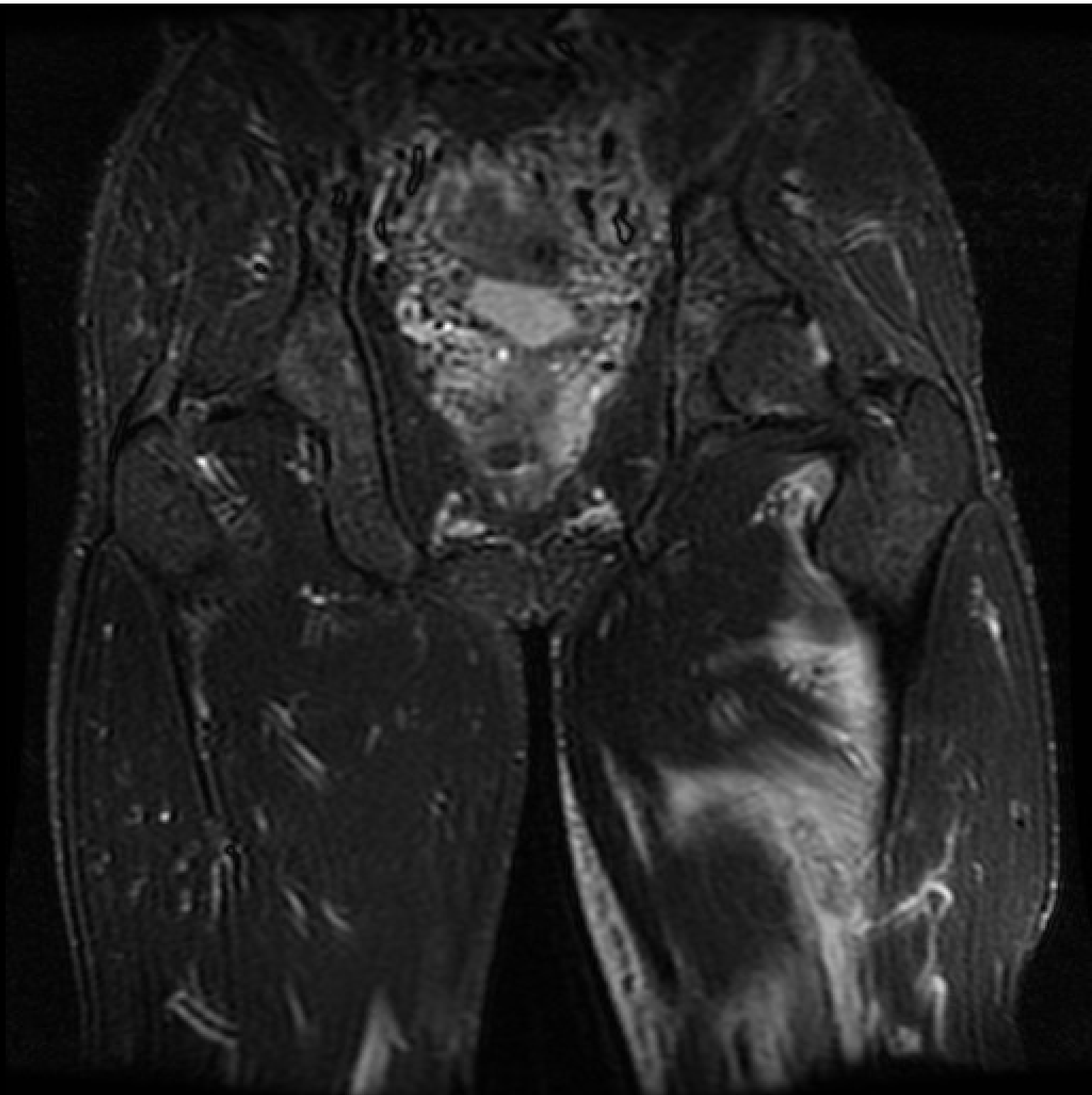
- 46 year old male
- Smoker, otherwise healthy
- Presents to the ER with 7 day history left hip and groin pain
- 5 day history of rigors and chills

Clinical History

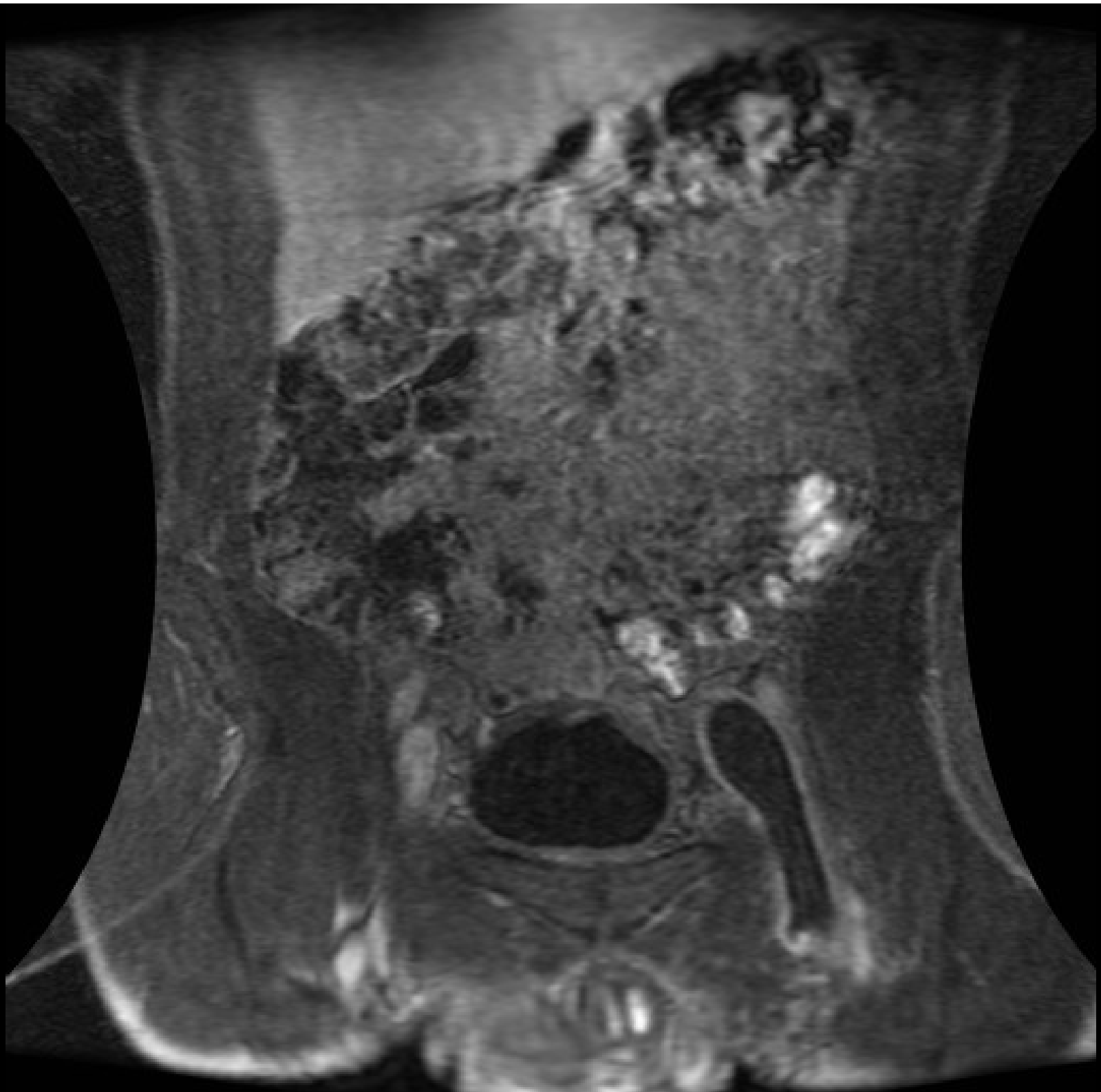
- **VITALS:**
 - T 38.1, HR 106, RR 12, BP 104/78
- **O/E:**
 - ↓ ROM left hip, tender left thigh to palpation.
 - Equal and symmetric pulses bilaterally
- **LABS:**
 - Hgb 123, WBC 13.2, Plt 647
 - Cr 88, LDH 175, **CRP 244**
 - Blood cultures negative
- **IMAGING:**
 - Left hip and pelvis radiographs normal
- **Consults Orthopedic Surgery:**
 - **MR QUERY SEPTIC HIP**



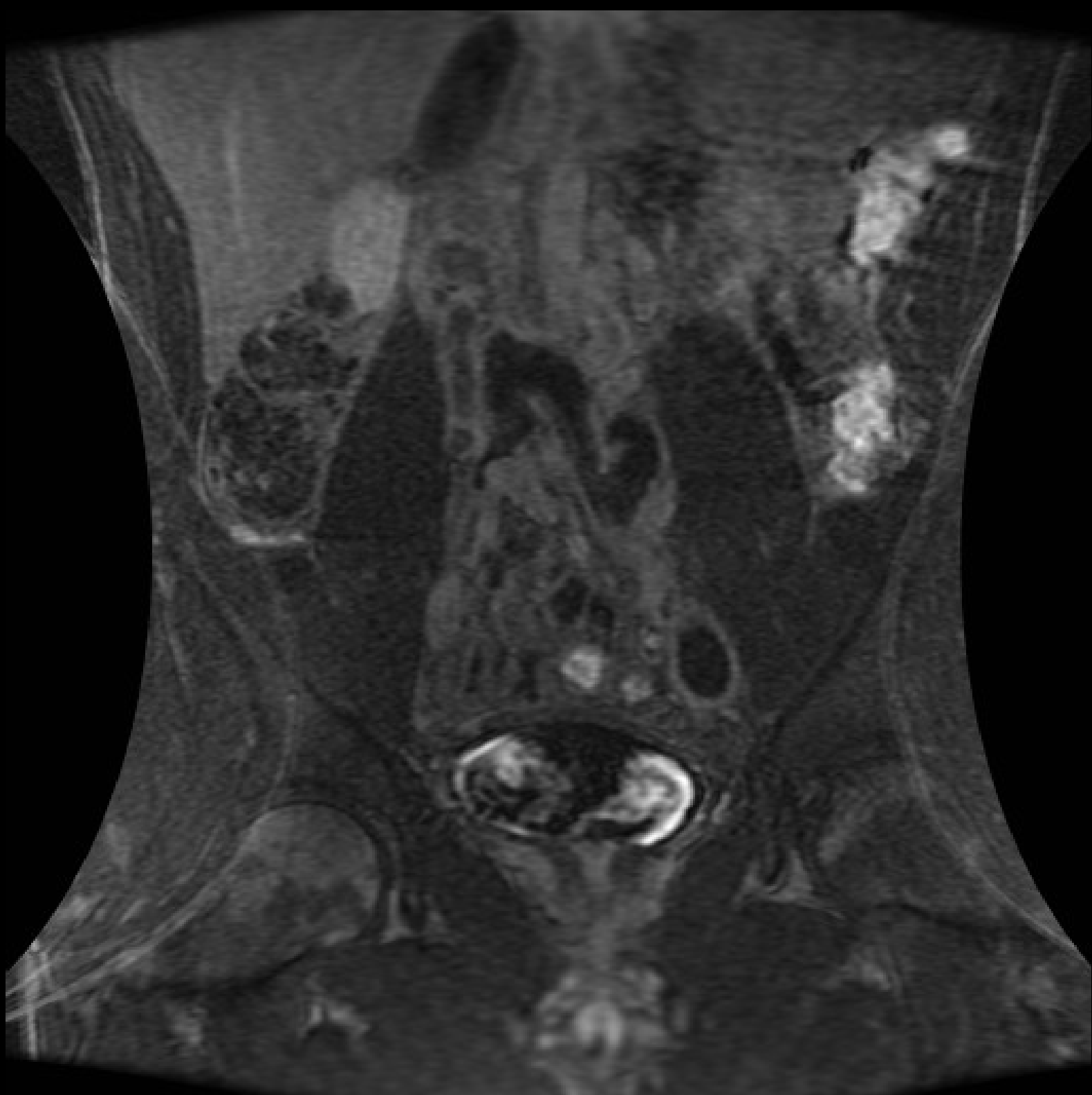
T1



STIR



MRV

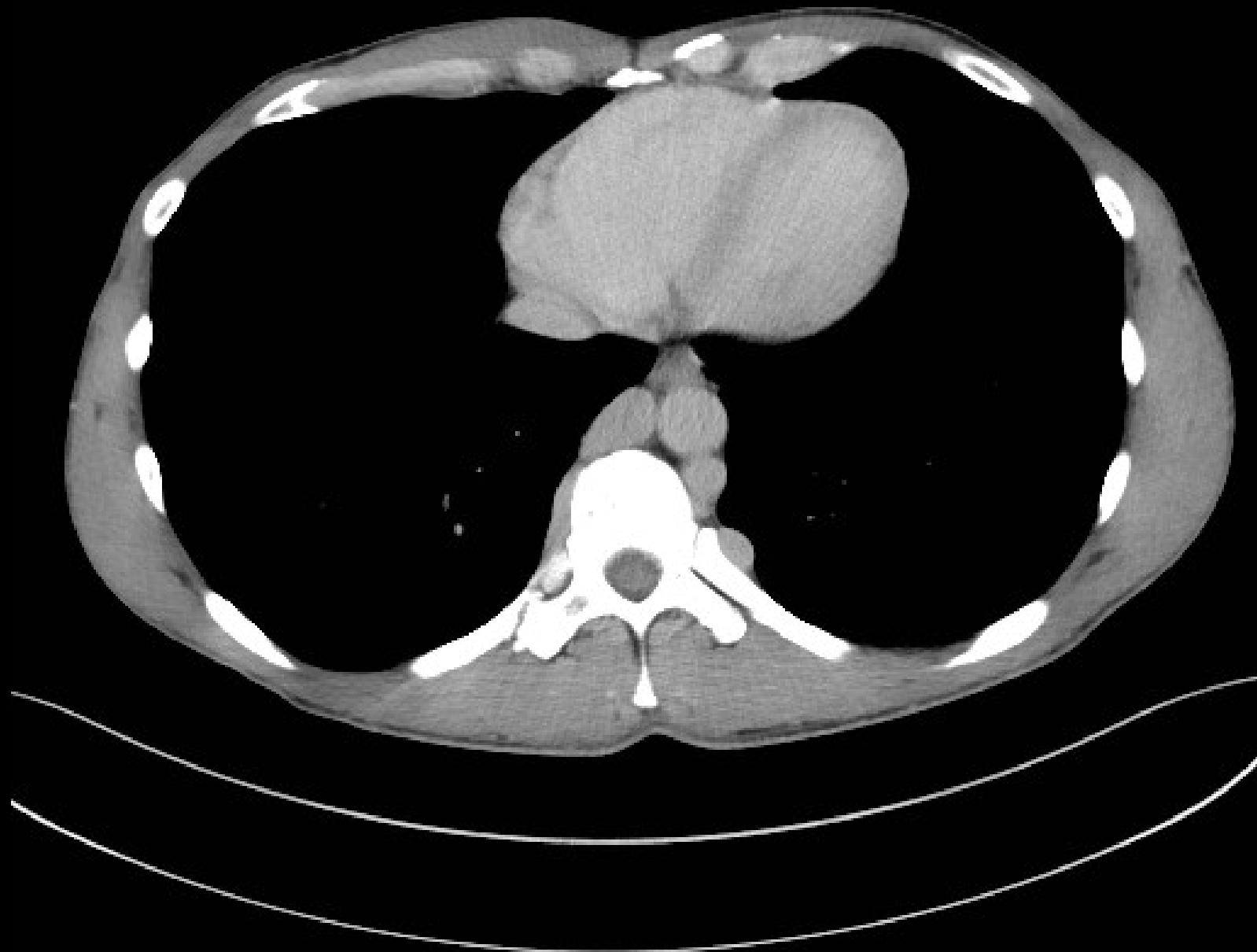


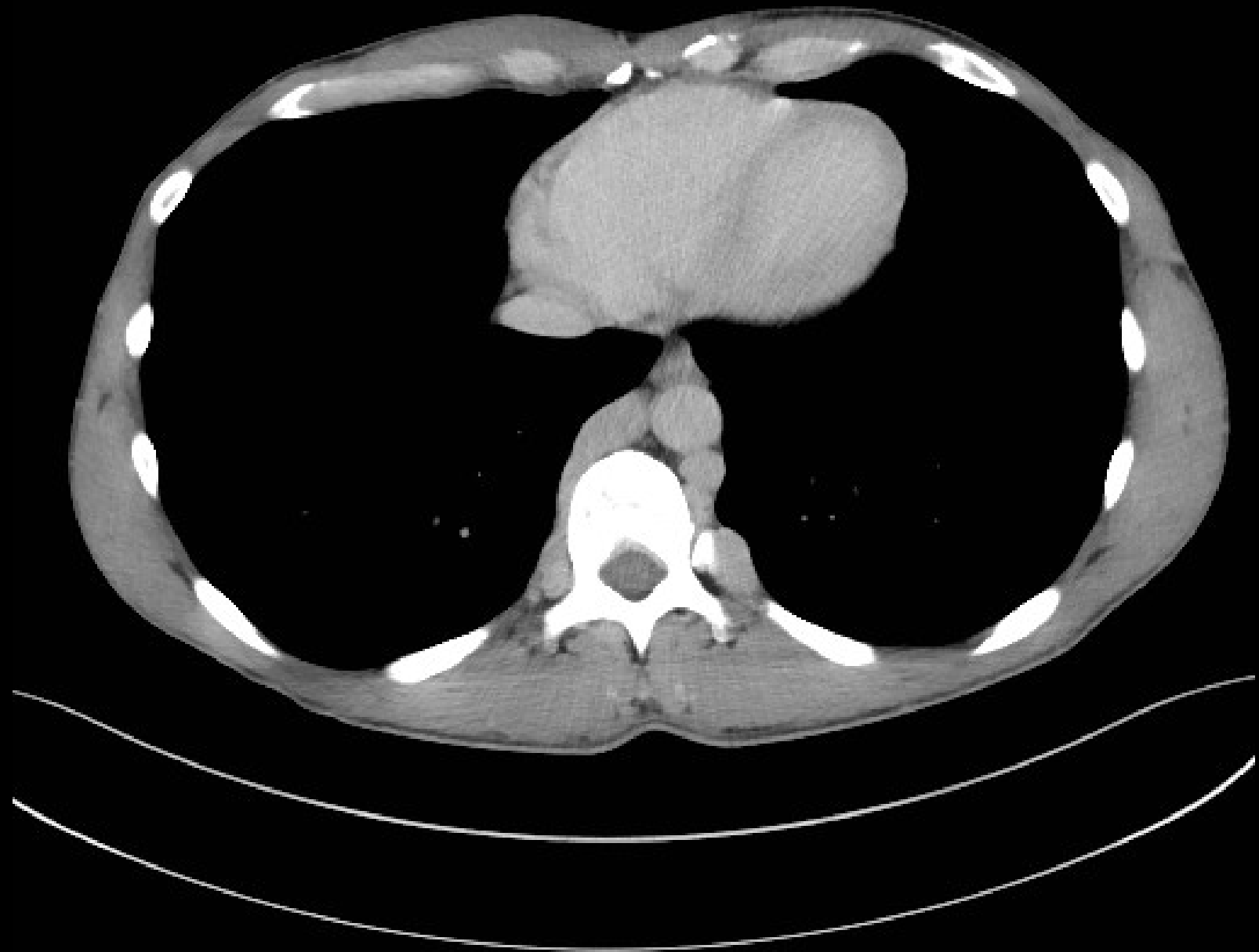
MRV

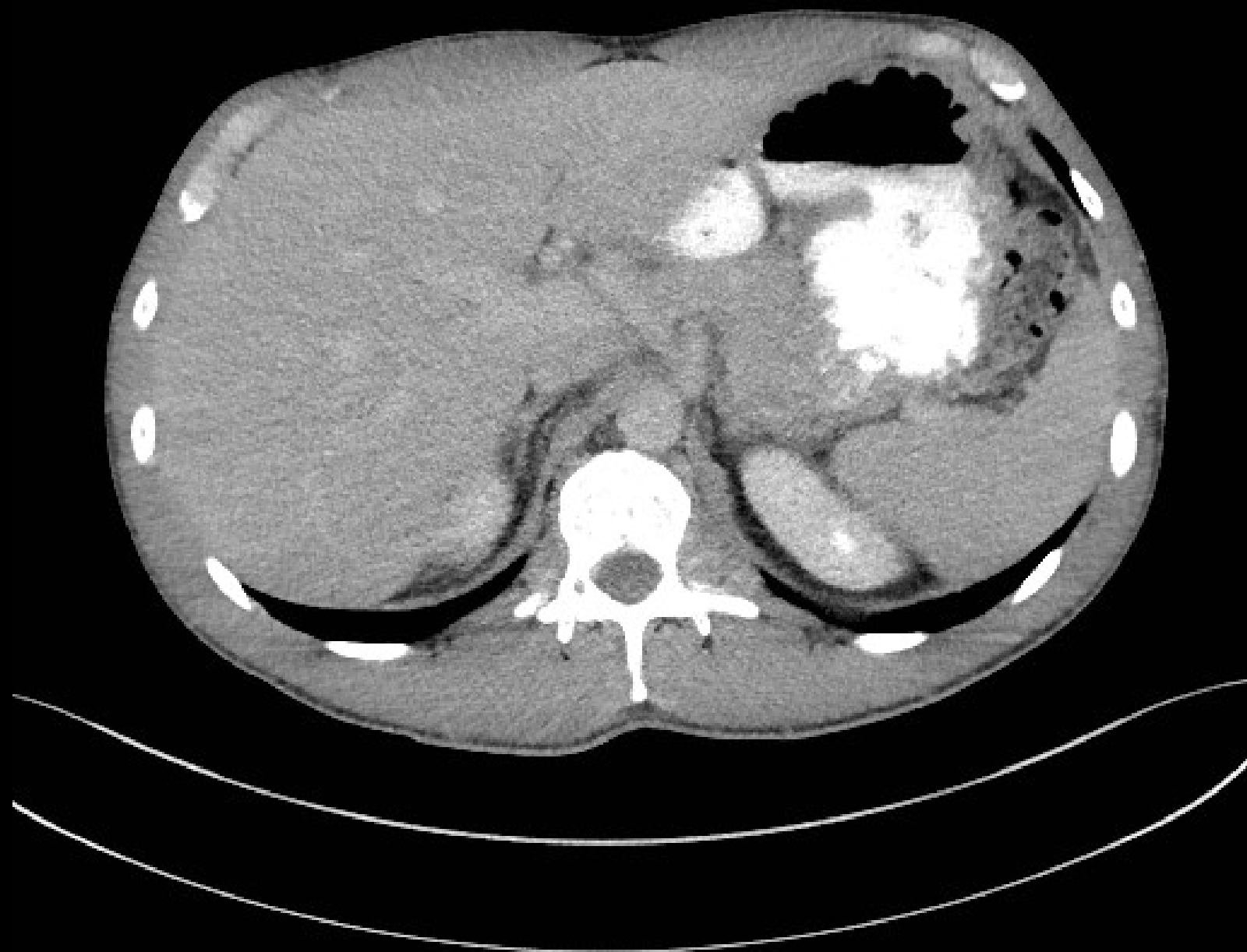
MRI Findings

- ▣ Left thigh soft tissue edema
- ▣ No evidence of septic joint
- ▣ Extensive thrombus involving left femoral, bilateral common iliac and paraspinal collateral veins
- ▣ IR consulted
 - ▣ Suggested CT Chest, abdominal, pelvis
 - ▣ Clotting Investigations: Fibrinogen, Anti-thrombin, Protein C, Protein S, LAC ratio, Anti-Cardiolipin
 - ▣ Type and Screen
 - ▣ Maintain Foley catheter
 - ▣ Analgesia
 - ▣ Will discuss case at IR working rounds in the am
 - ▣ Patient admitted to internal medicine overnight

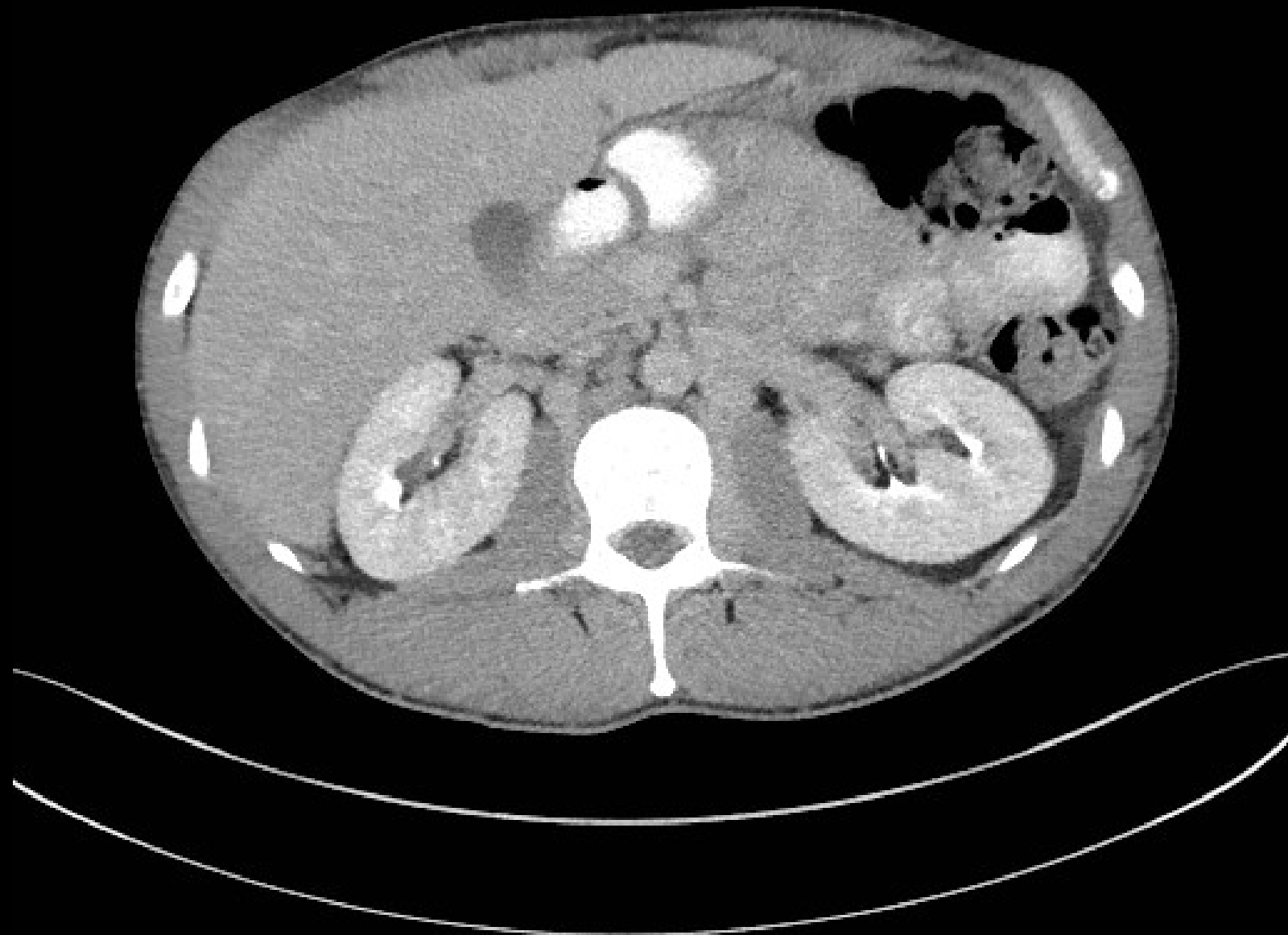
CT Abdomen Pelvis

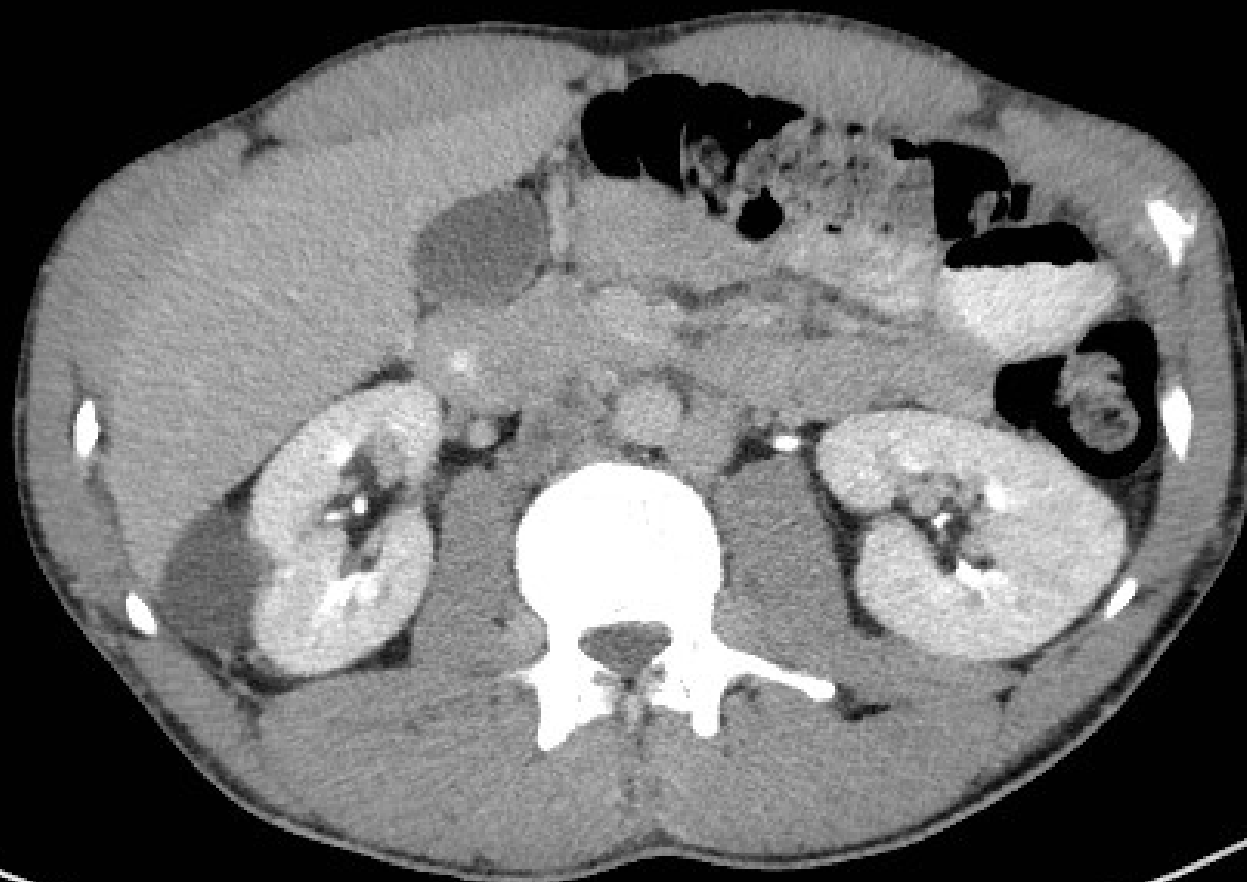


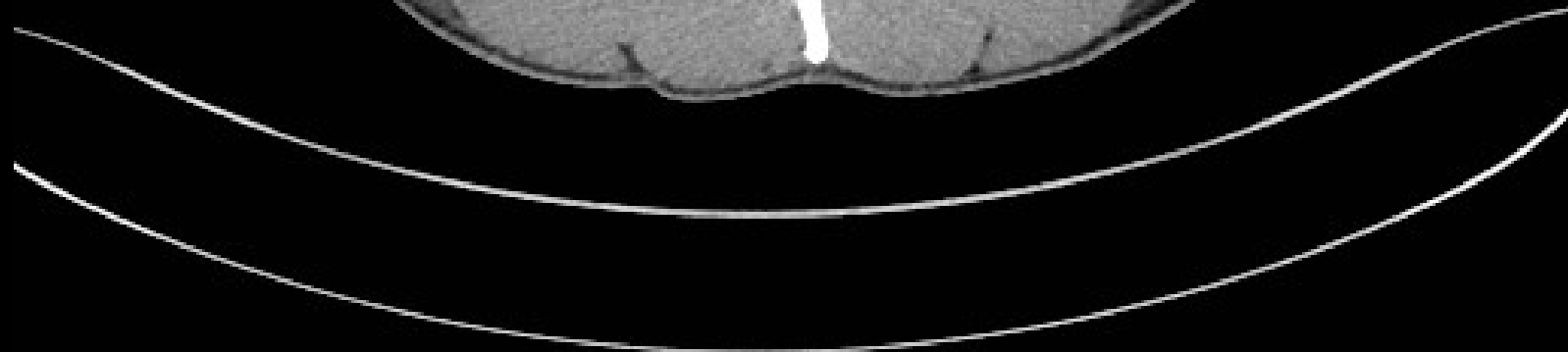


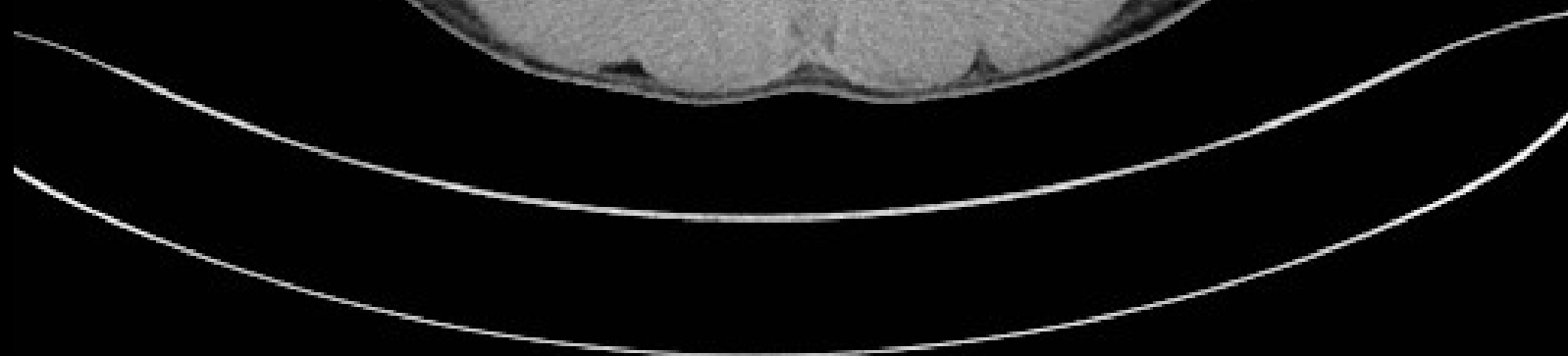










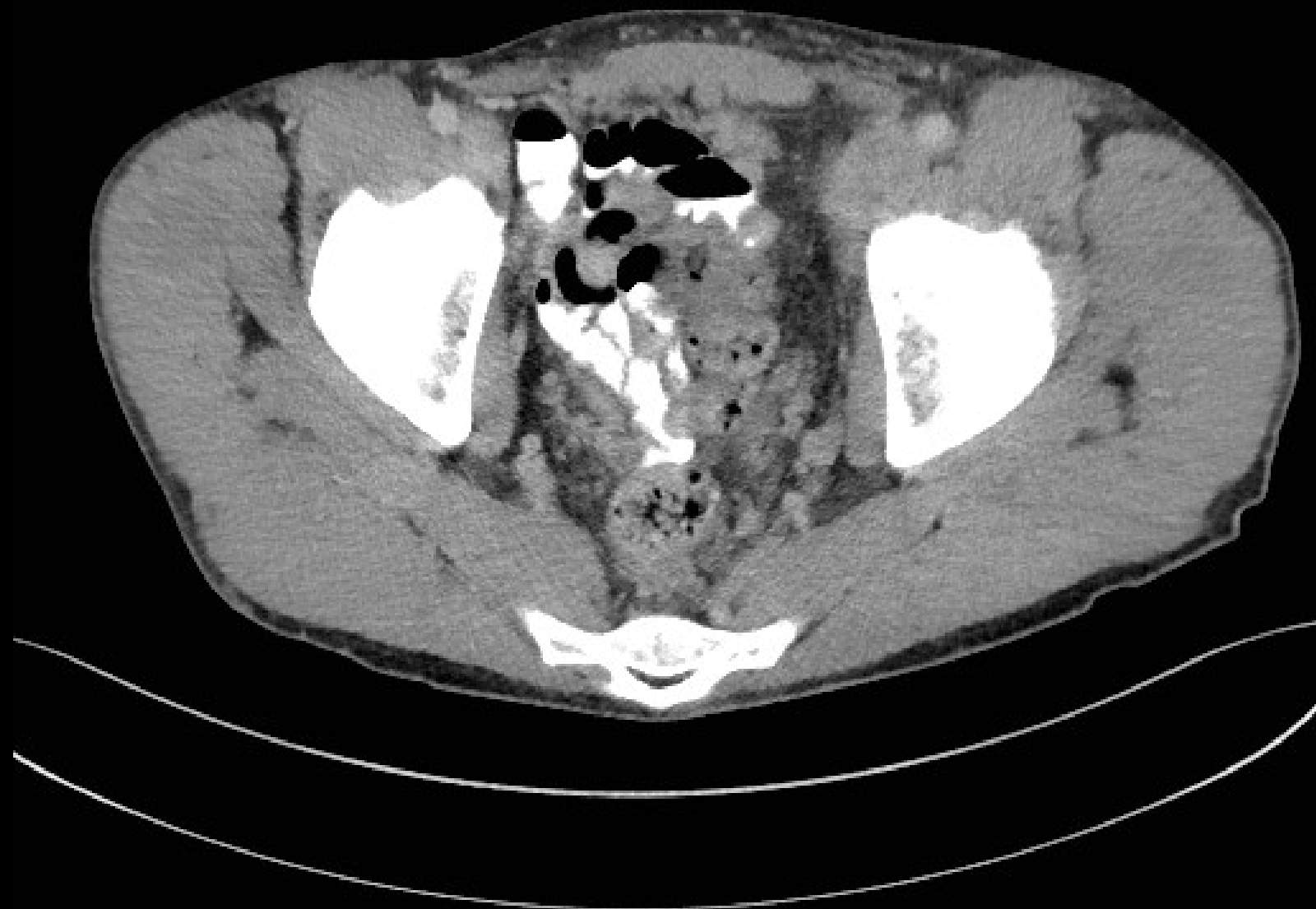














What is the venous anatomy?

- A) Normal
- B) Double IVC with Retroaortic Right Renal Vein and Hemiazygos Continuation of the IVC
- C) Azygos Continuation of the IVC
- D) Absent Infrarenal IVC with Preservation of the Suprarenal Segment

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These options were felt the most likely

How would you treat this patient?

- A) Anticoagulate alone
- B) Catheter-directed thrombolysis
- C) Pharmacomechanical thrombolysis
- D) Systemic thrombolysis

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First intervention

- ▣ US guided micropuncture left popliteal



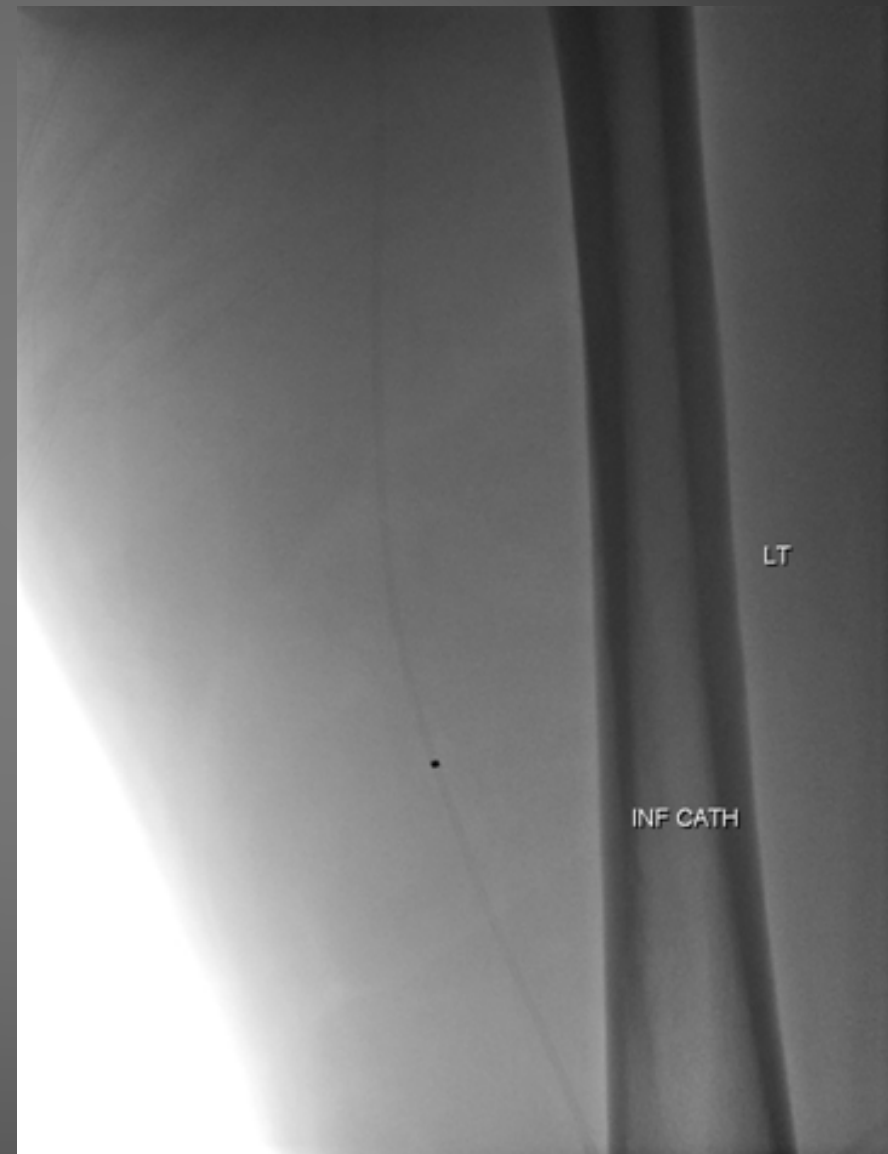
First intervention

- ▣ Selective 4F Kumpe catheter + Glidewire were used to pass clot and access proximal common iliac vein



First intervention

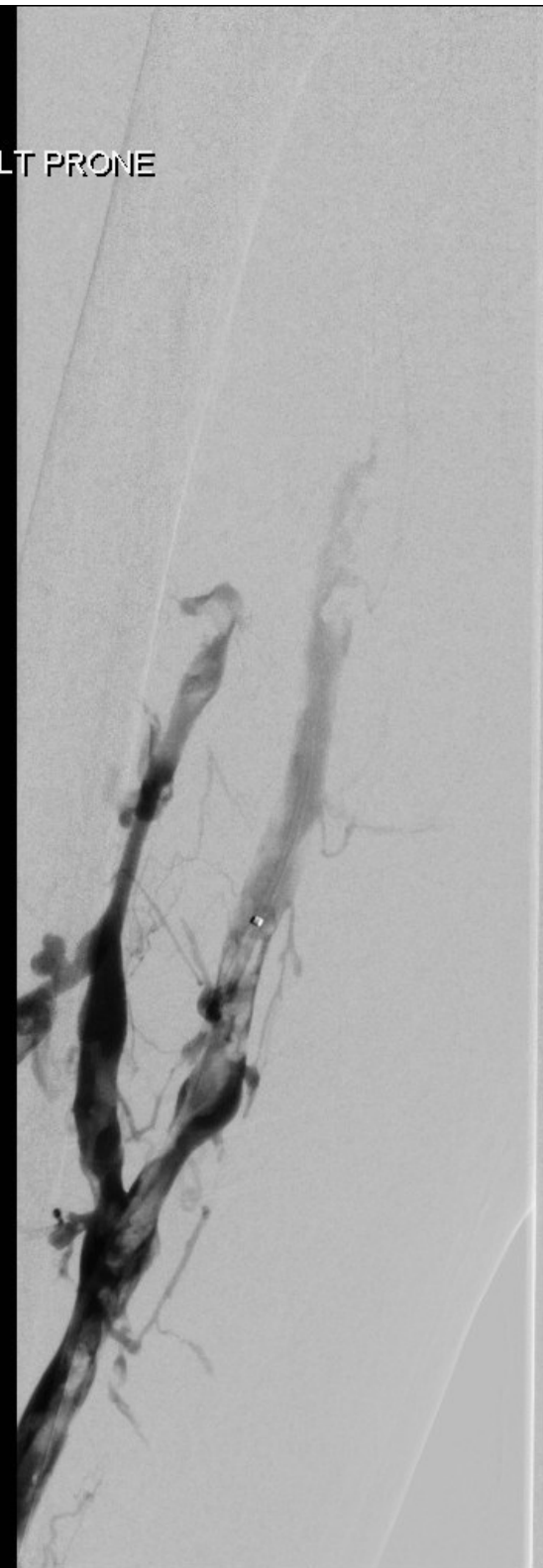
- ▣ 50 cm infusion catheter, r-TPA 1mg/hr, heparin 400 IU/hr (don't use monogram)



24 hrs

- ▣ Little improvement

LT PRONE



24 hrs

What PMT device would you use?

- A) Sinusoidal dispersion wires (Trellis)
- B) Pulsatile saline jets (AngioJet)
- C) Low energy high frequency ultrasound
- D) Balloon
- E) No PMT continue thrombolysis

24 hrs

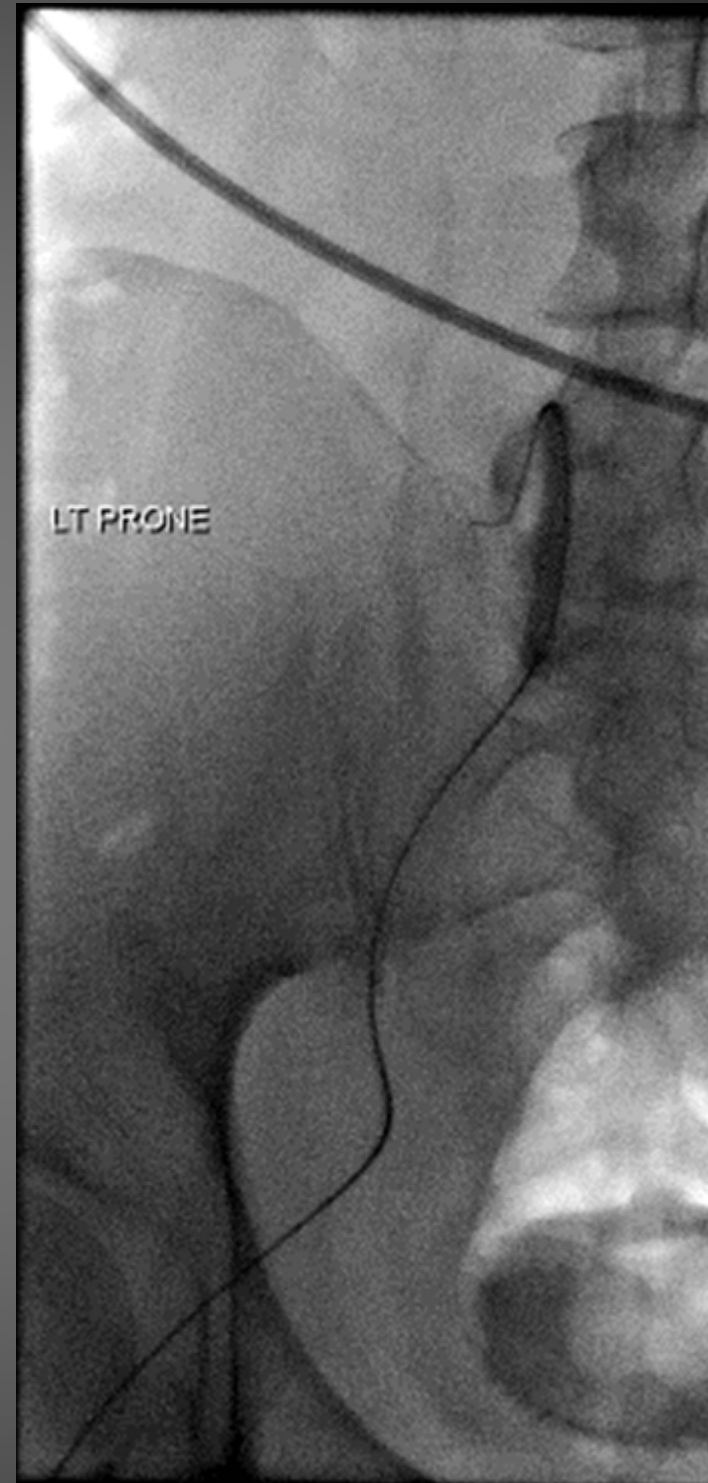
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- B) Pulsatile saline jets
- C) Low energy high frequency ultrasound
- D) Balloon

All above could be helpful and dependent on operator preference. Should take into account the extent of thrombus.

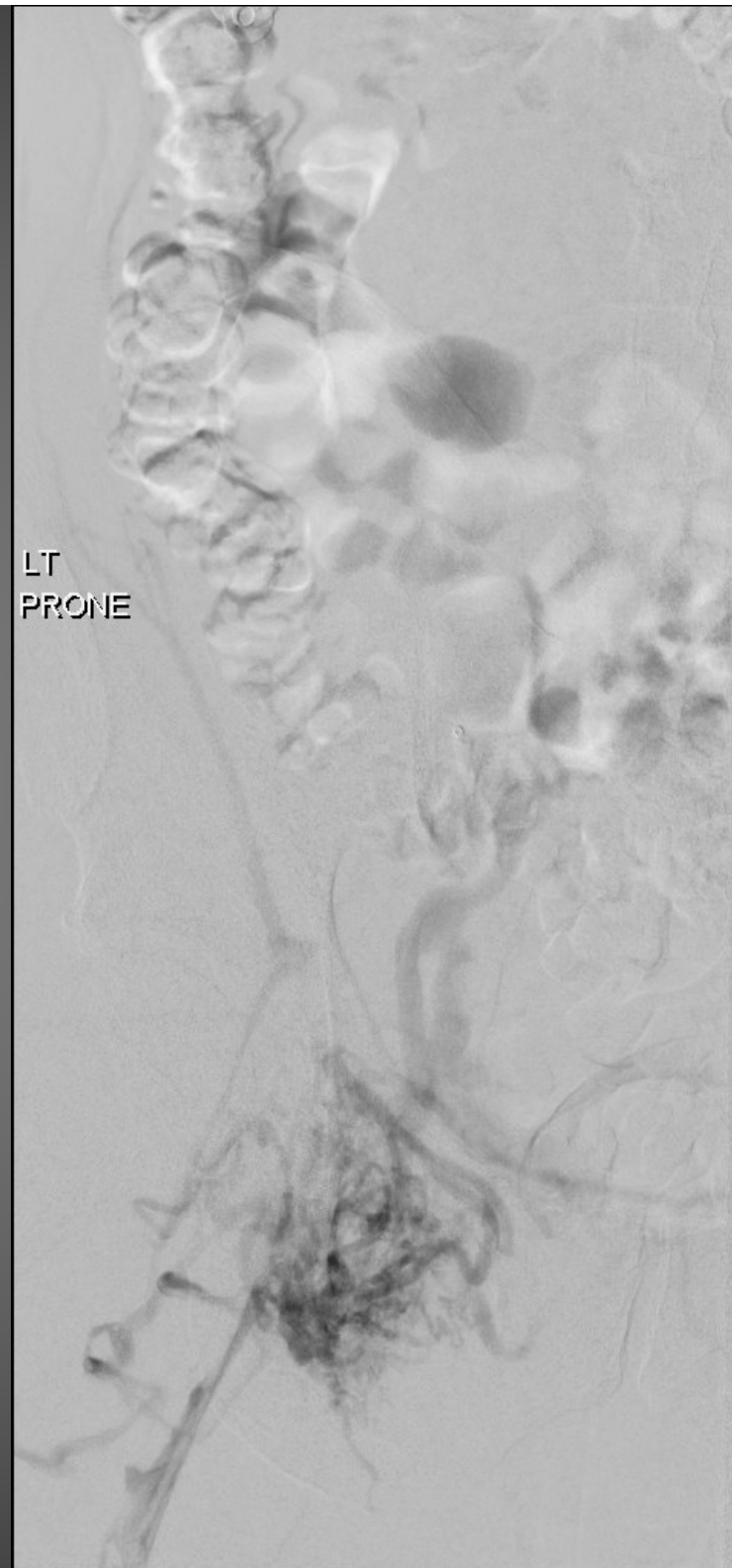
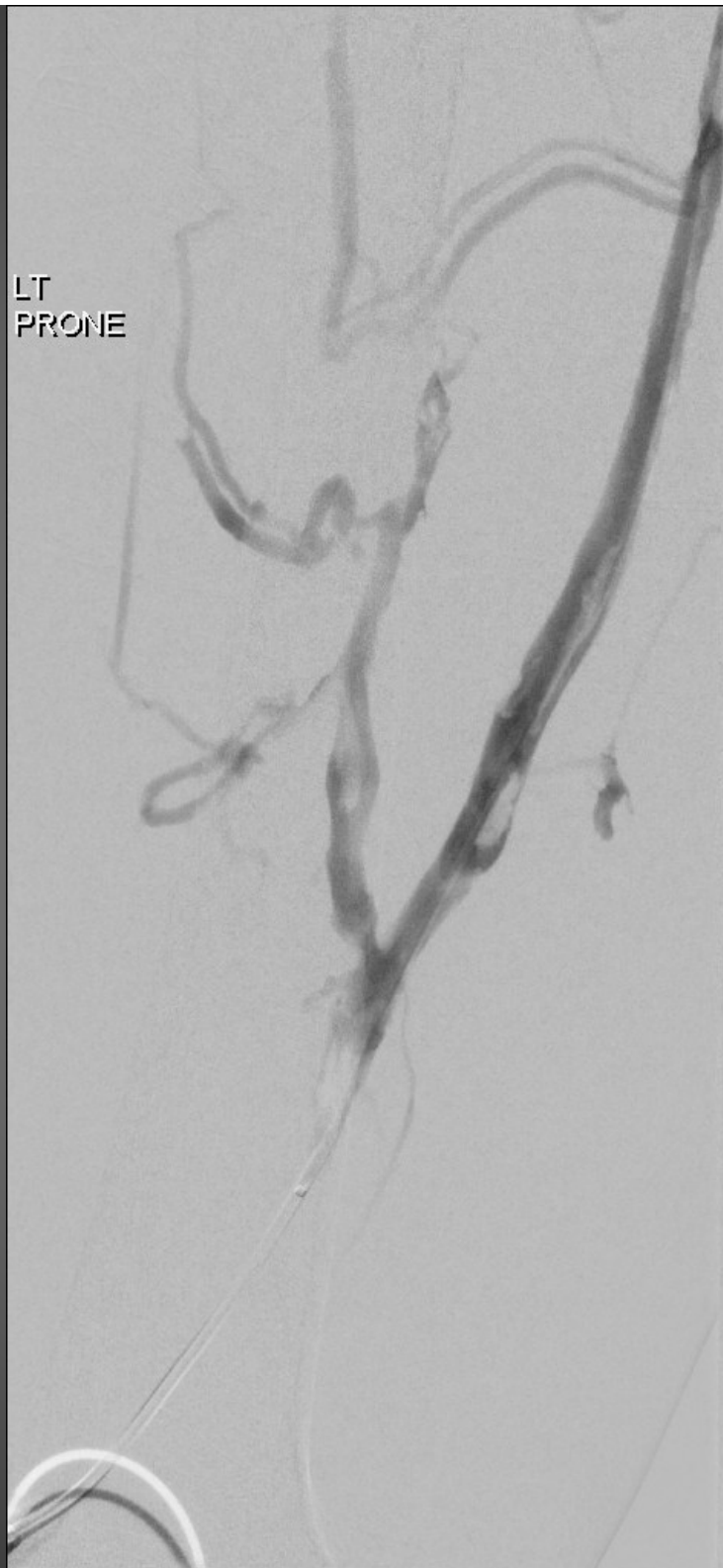
24 hrs

- ▣ Little improvement
- ▣ Balloon maceration
 - (ran out of dedicated PMT devices)
- ▣ Clot laced with 10 mg r-TPA
 - (controversial)
- ▣ 50 cm infusion catheter



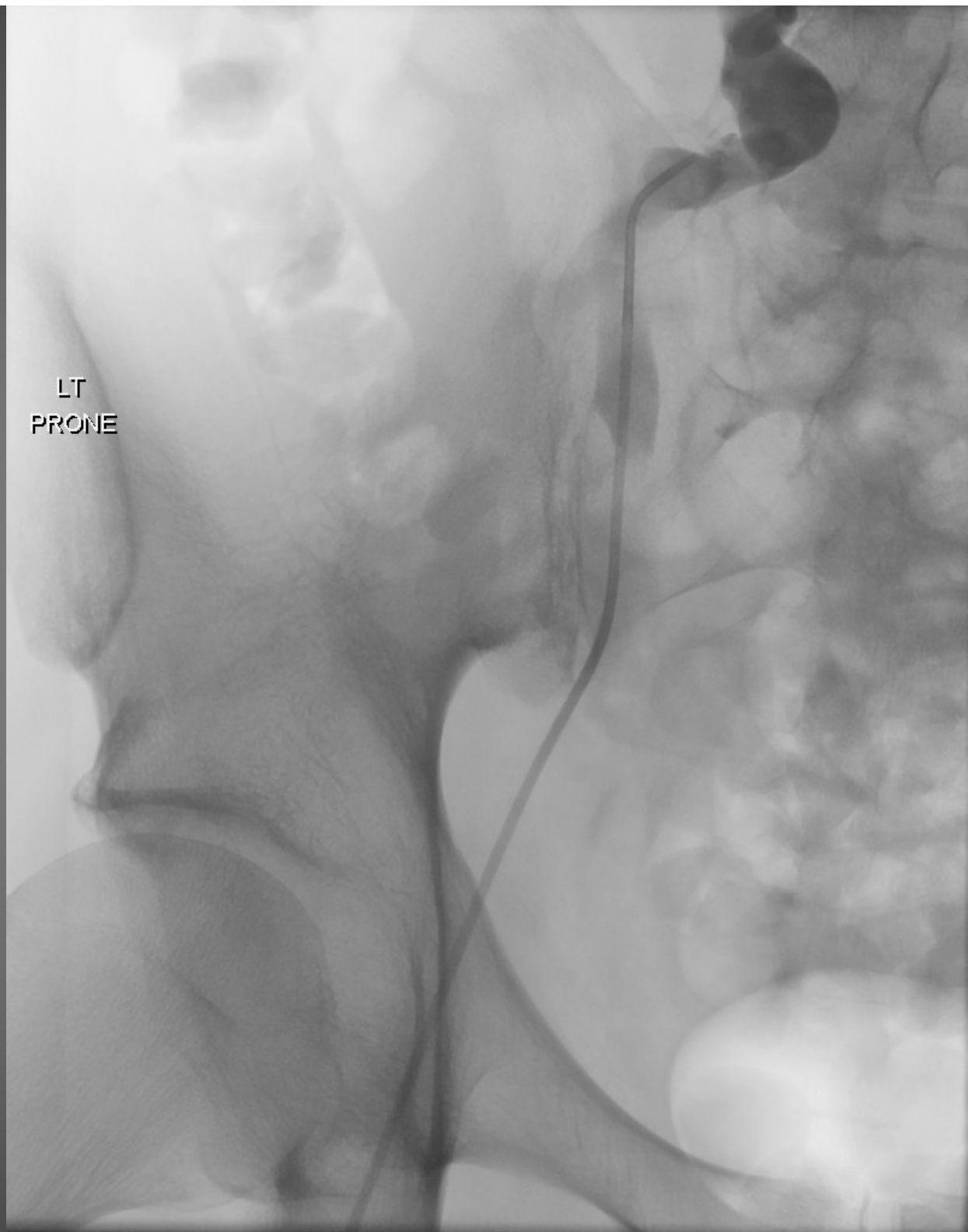
48 hrs

- ▣ Little improvement



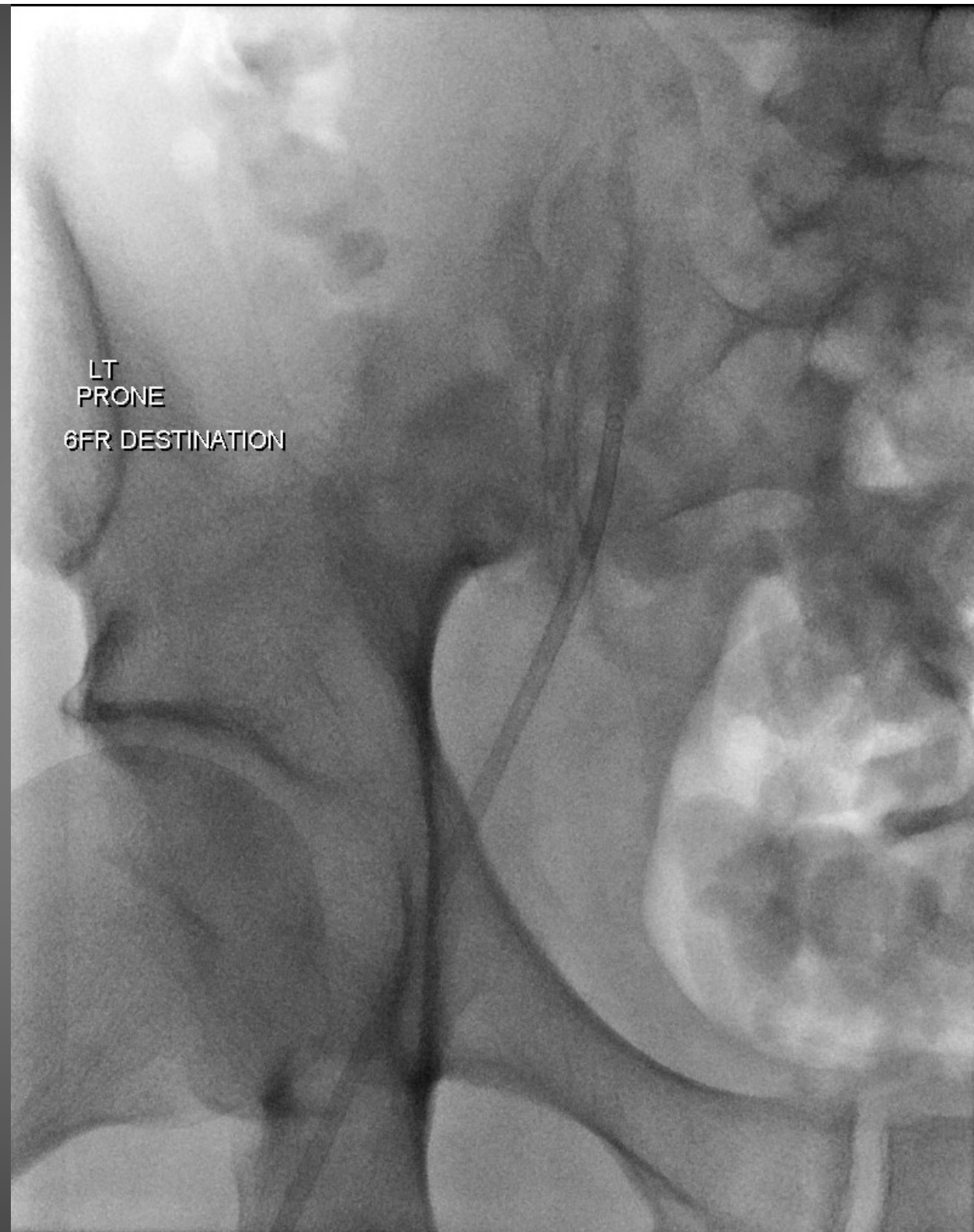
48 hrs

- ▣ Kumpe catheter and Bentson wire to paraspinal collateral



48 hrs

- ▣ 45 cm, 6F
Terumo sheath
to common iliac
for suction
thrombectomy



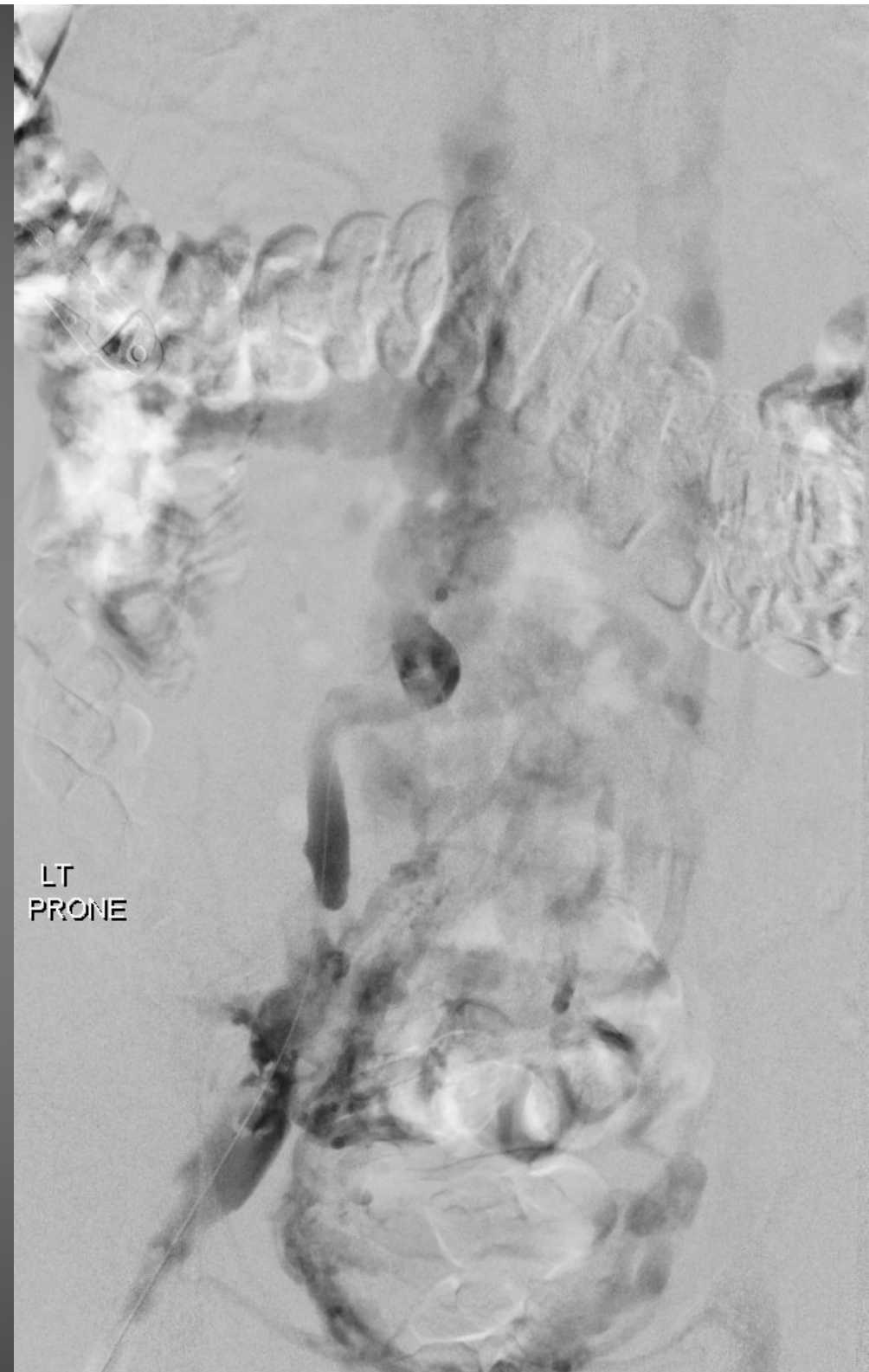
72 hrs

- ▣ Significant improvement



72 hrs

- ▣ Inline flow to paraspinal collateral



72 hrs

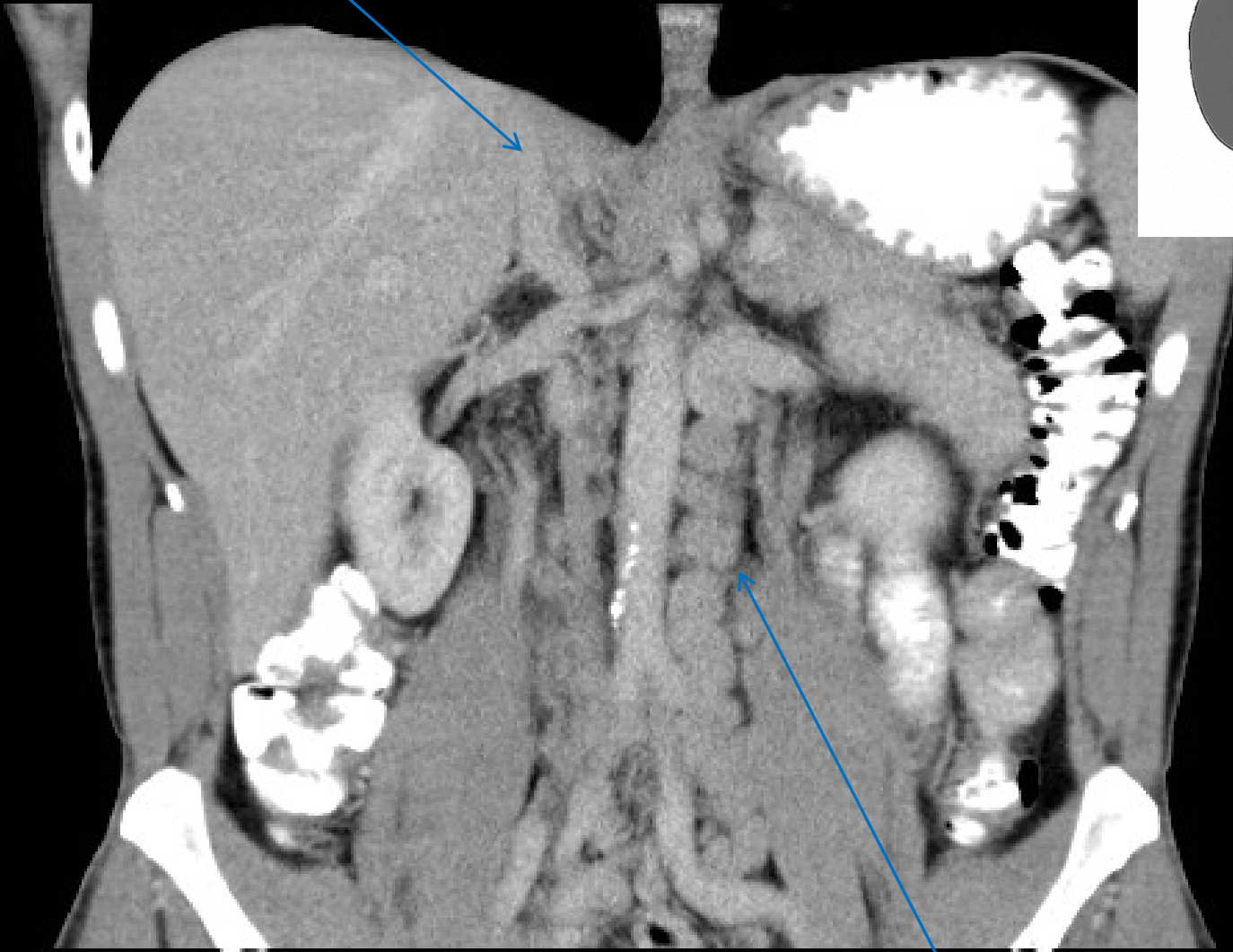
- ▣ Venoplasty proximal common iliac stenosis
- ▣ r-tPA infusion discontinued



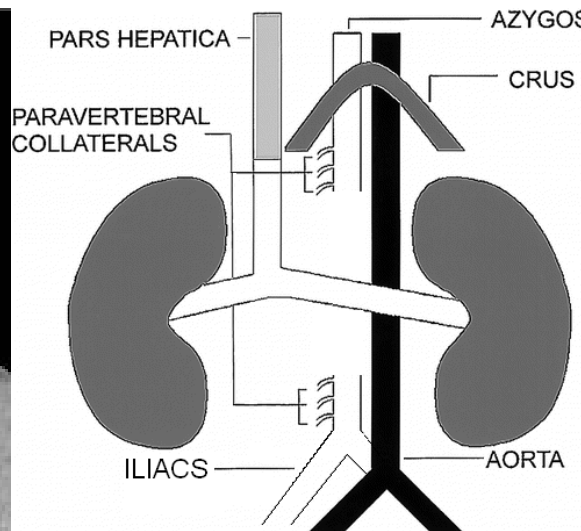
Successful PMT

- ▣ Transferred from ICU to Hematology floor PAD 4
- ▣ PAD 7 heparin discontinued and dalteparin started
- ▣ Discharged PAD 8, follow up Hematology 2 weeks
- ▣ Follow up imaging a year after thrombolysis demonstrated absence of the infrarenal IVC with preservation of the suprarenal segment

Pars Hepatica



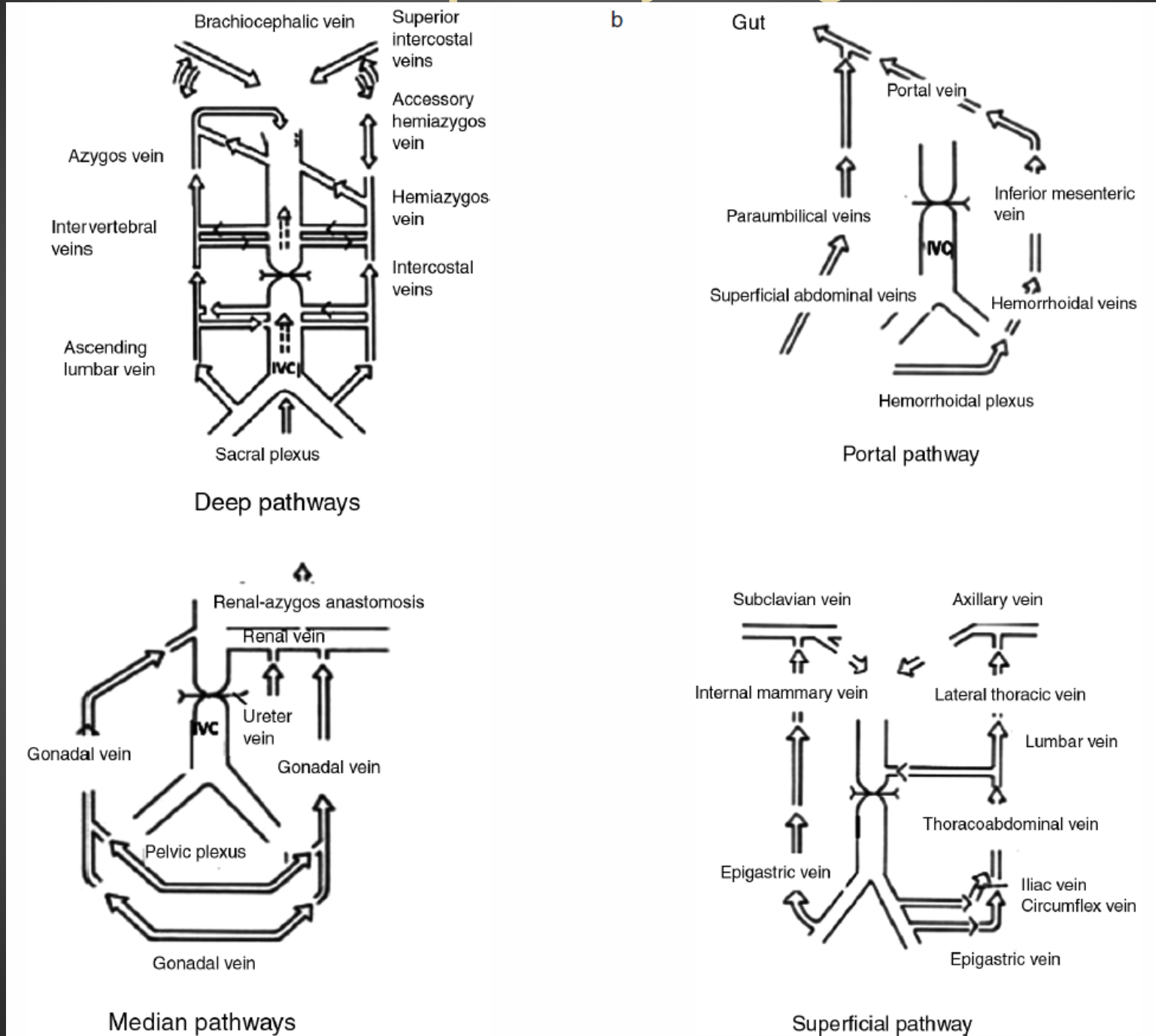
Paravertebral collaterals



IVC Anomalies

- ❑ Incidence: 0.0005-8.7%⁴
- ❑ Absence of IVC, etiology controversial
 - ❑ Intrauterine insult
 - ❑ Dysembryogenesis
- ❑ Can be associated with cardiac and visceral abnormalities⁵
 - ❑ Dextrocardia
 - ❑ ASD
 - ❑ Asplenia
 - ❑ Renal and lung abnormalities
- ❑ Acquired: large abdominal wall collaterals
- ❑ Congenital: Usually robust collaterals
 - ❑ Lumbar, paravertebral, +/- continuation of azygos/ hemiazygos

Venous collateral pathways in agenesis of IVC

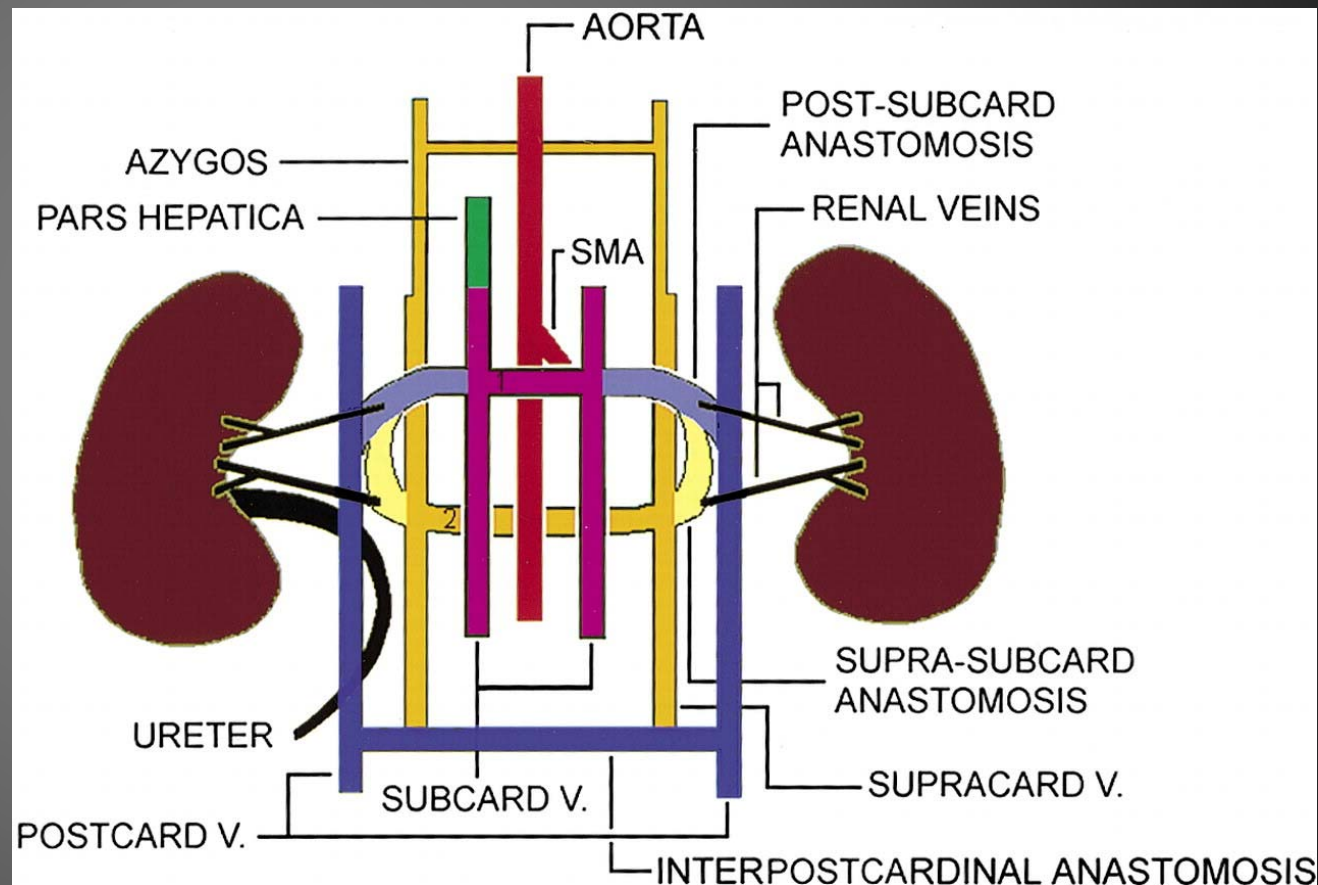


Embryogenesis of the IVC

▣ Infrahepatic IVC, 6th - 8th week

▣ Composite of

1. Posterior cardinal veins
2. Subcardinal veins
3. Supracardinal veins



IVC components

- Hepatic

- Vitaline veins

- Suprarenal

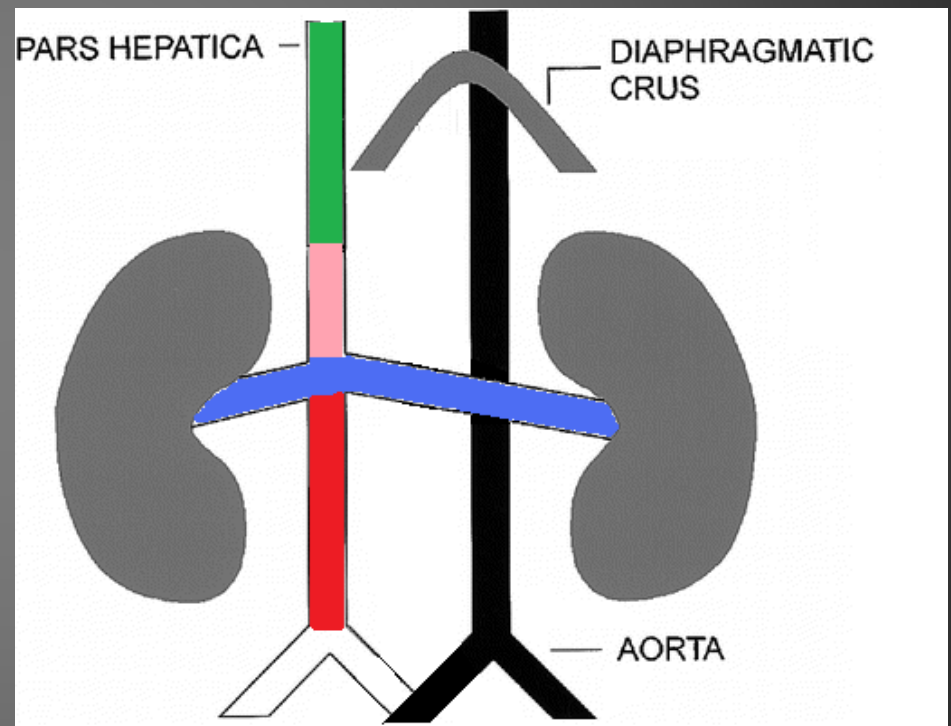
- Right suprasubcardinal

- Renal

- Right suprasubcardinal and postsubcardinal anastomosis

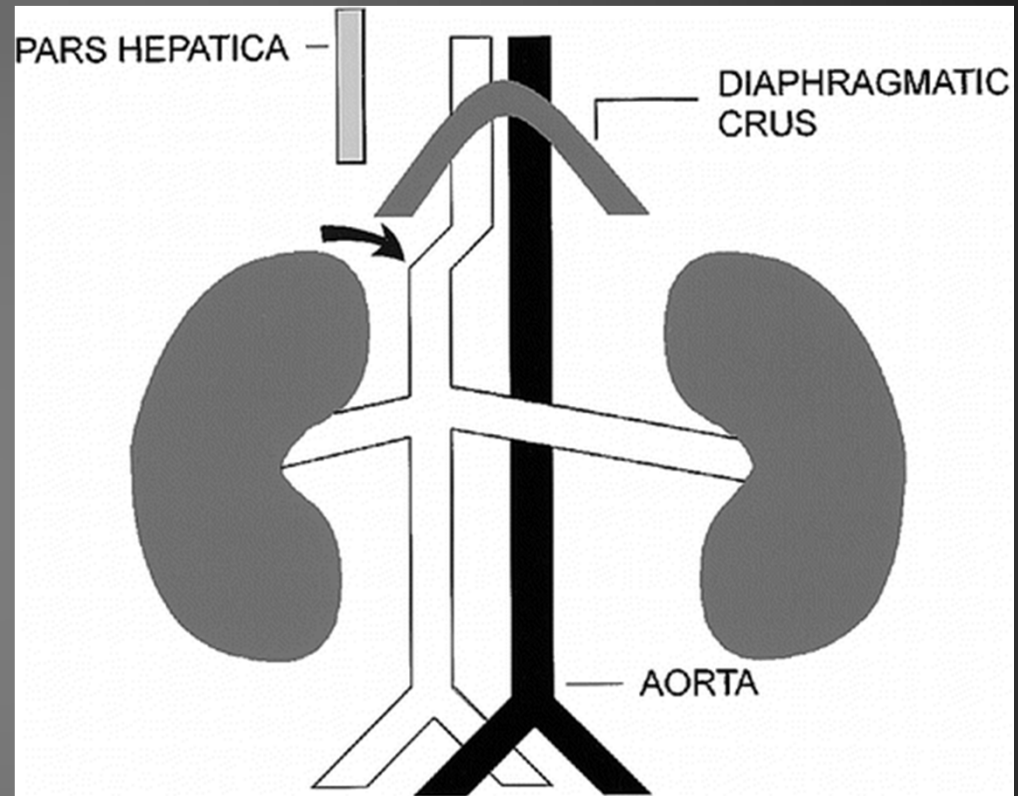
- Infrarenal

- Right supracardinal vein
 - (controversial)



Azygous continuation of the IVC

- ❑ Failure to form the right subcardinal–hepatic anastomosis, with resulting atrophy of the right subcardinal vein
- ❑ Blood is shunted from the suprasubcardinal anastomosis through the retrocrural azygos vein

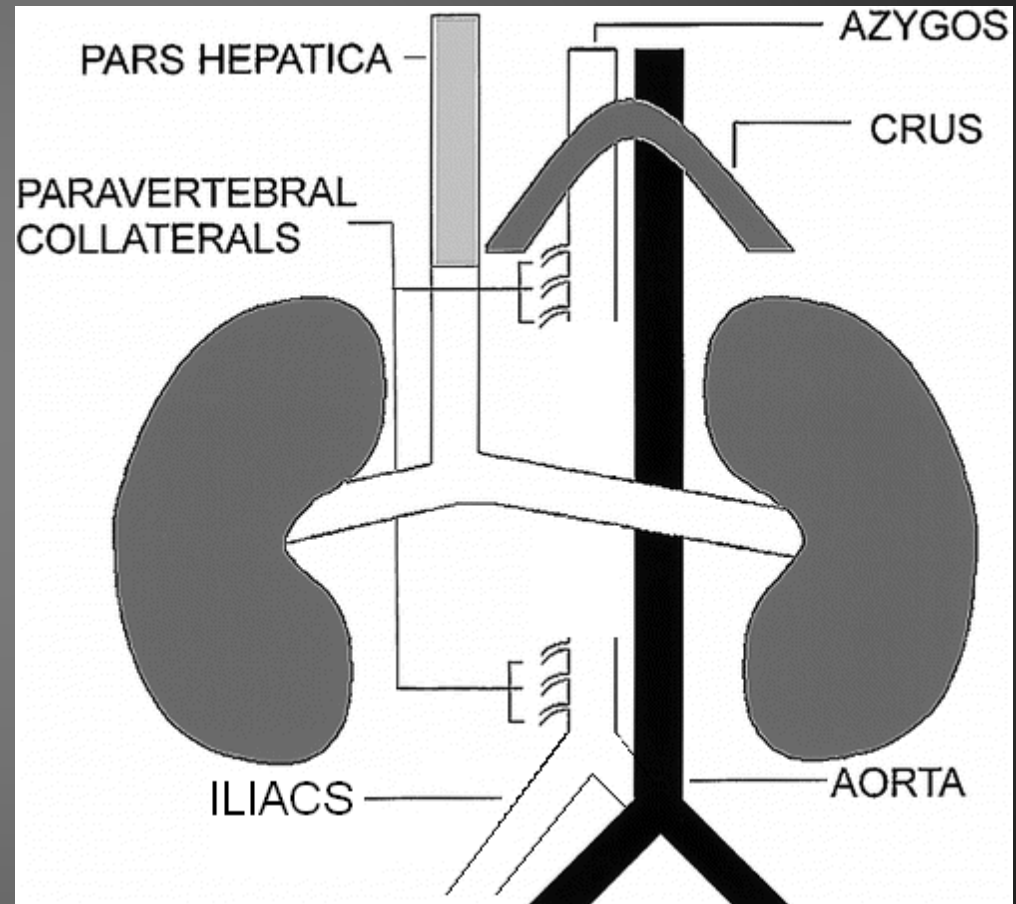


- ❑ Renal portion of the IVC passes posterior crura to enter thorax as azygos
- ❑ Azygos and SVC anastomosis normal

- ❑ Prevalence 0.6%
- ❑ Historically associated with severe congenital heart disease and asplenia or polysplenia syndromes
- ❑ Procedural consideration IVC filter, cardiac bypass

Absence of the infrarenal IVC with preservation of the suprarenal segment

- ▣ Failure of development of the posterior cardinal and supracardinal veins
- ▣ Our case: common iliac veins join to form enlarged ascending lumbar veins which drain the lower extremities to the azygos and hemiazygos veins via anterior paravertebral collateral veins
- ▣ Normal suprarenal IVC is formed by confluence of the renal veins
- ▣ May present with symptoms of lower-extremity venous insufficiency or idiopathic deep venous thrombosis.
- ▣ The collateral circulation may simulate a paraspinal mass
- ▣ Prevalence 0.005 – 1%⁶



Background

- DVT #3 cardiovascular pathology
- Incidence 1/1000 (likely ↑ future)
- 80% of symptomatic DVT are above the knee
- Incidence of post thrombotic syndrome (PTS) ~ 50% at 2 years post-DVT
- Leg ulceration up to 10% of patients
- Mean patient age 56 (lost opportunity cost)
- Cost of managing venous ulcers in U.K. estimated at £400 million / year.
- AIVC present ~5% of cases of unprovoked lower extremity DVT in patients < 30 years of age.¹¹
- **Rational for thrombolysis for DVT**
 - Prevent late complications of PTS and ulceration

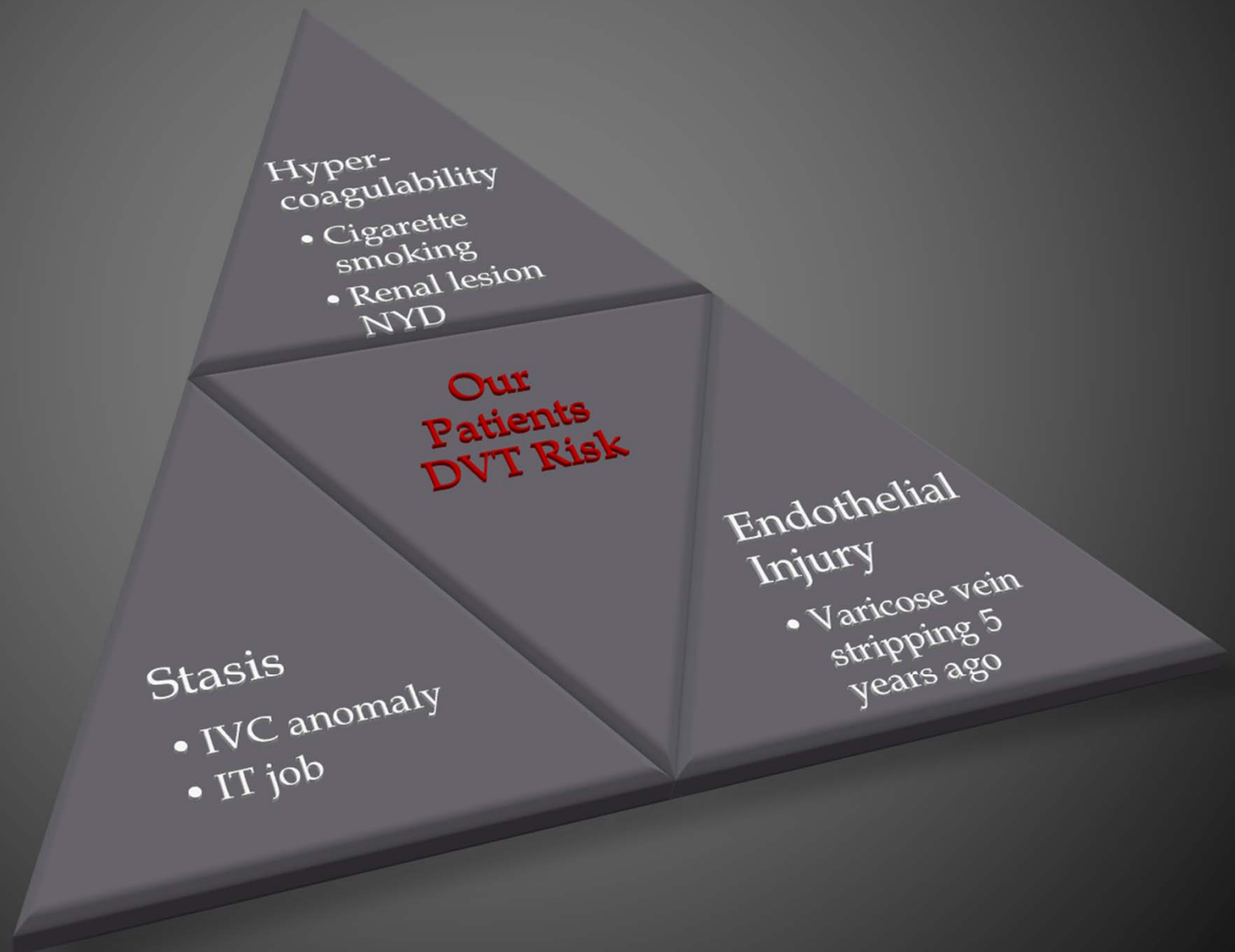
Post thrombotic syndrome (PTS)

- ▣ A result of chronic venous hypertension
 - Venous reflux
 - Venous obstruction
 - Venous valve dysfunction

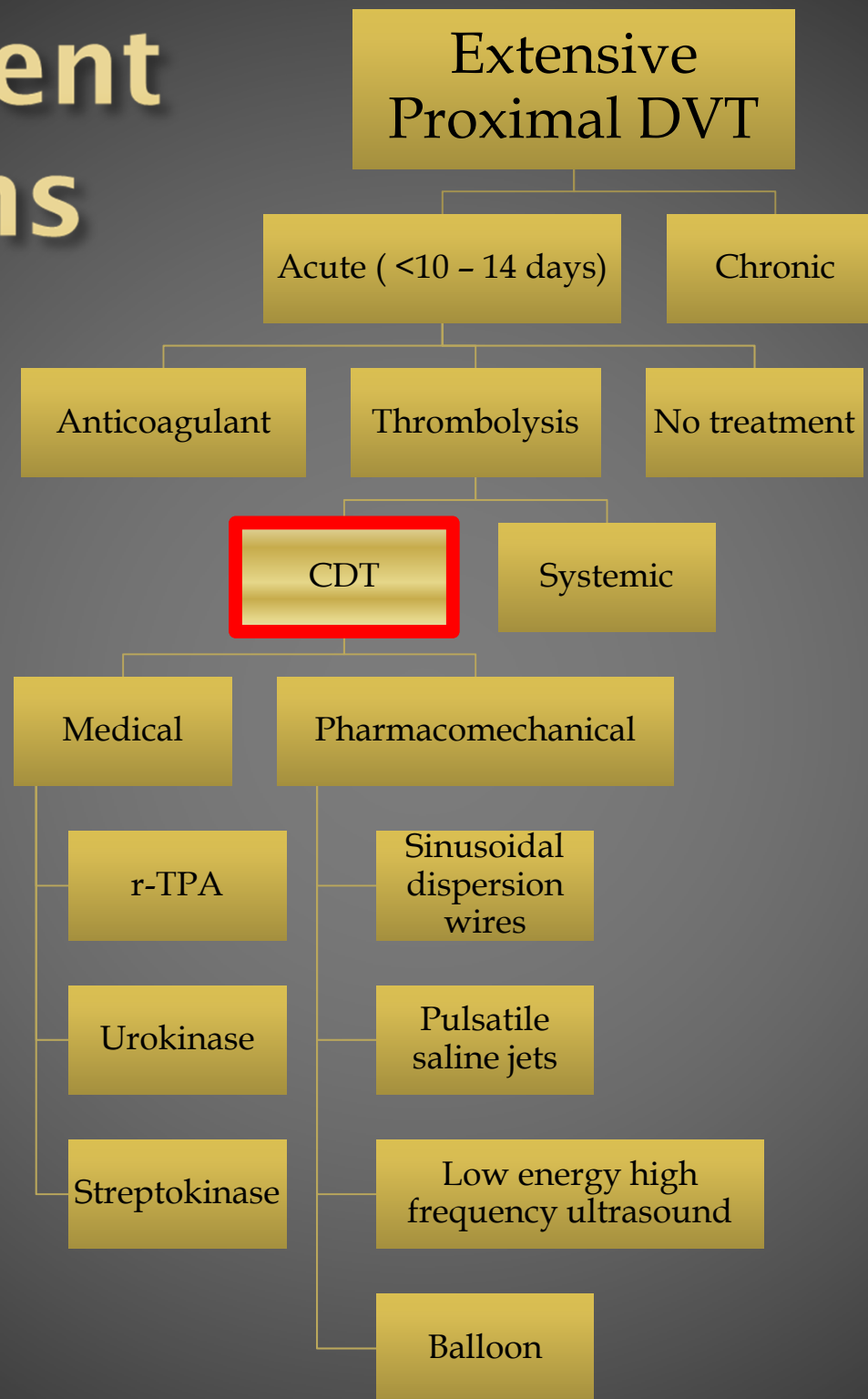
Villalta Score	PTS severity
<5	no PTS
5-14	mild-mod
>14	severe

- ▣ **Villalta Score**
 - **5 symptoms:**
 - ▣ heaviness, pain (spontaneous or during deambulation), cramps, pruritus, and paresthesia.
 - **Six signs:**
 - ▣ pretibial edema, induration of the skin, hyperpigmentation, new venous ectasia, redness, pain during calf
 - **Graded**
 - ▣ 0 [none] – 3 [severe]

Virchow's Triad



Treatment options



Who is a candidate for CDT

Possible Indications

- ▣ Extensive thrombosis with high risk of pulmonary embolism
- ▣ Proximal DVT (iliofemoral or femoral vein)
- ▣ Threatened limb viability
- ▣ Underlying predisposing anatomic anomaly
- ▣ Good physiological reserve (18–75 years old)
- ▣ Life expectancy over 6 months
- ▣ Recent onset of symptoms (14 days)
- ▣ Absence of contraindications to thrombolysis

Our case in green

Contraindications

- ▣ Bleeding diathesis/thrombocytopenia
- ▣ Organ specific bleeding risk (eg recent myocardial infarction, CVA, GI bleed, surgery, or trauma)
- ▣ Renal or hepatic failure
- ▣ Malignancy (ie brain metastases)
- ▣ Pregnancy

Review of AIVC DVT Literature

- Lack of long term follow up (1996-2012)⁵⁻⁸
- Total: 80
- Male 58, Female 22
- Mean age: 29
- Bilateral: 32
- Risk factors present:
 - 5 OCP,
 - 3 >3 hours travel,
 - 1 Bed rest >2 days,
 - 2 Trauma / immobilization,
 - 1 minor trauma
- Lack of data on hypercoagulation disorder

Vascular Medicine

<http://vmj.sagepub.com/>

Inferior vena cava agenesis and deep vein thrombosis: 10 patients and review of the literature
Marc Lambert, Philippe Marboeuf, Marco Midulla, Nathalie Trillot, Jean-Paul Beregi, Claire Mounier-Vehier, Pierre-Yves Hatron and Brigitte Jude
Vasc Med 2010 15: 451
DOI: 10.1177/1358863X10391355

Several errors in reporting;
However, fairly comprehensive
catalogue of AIVC DVT
cases

Review of AIVC DVT Literature

- Treatment:
 - 13 Thrombolysis
 - Systemic 4 cases
 - CDT 9 cases
 - 56 prolonged VKA
 - 7 VKA < 3 years
 - 1 LMWH (6 mo)
 - 1 bypass
 - 2 N/A
- Outcomes
 - Reported 2 failures in systemic thrombolysis
 - Limited follow-up

Evidence for CDT/PMT

Thrombolysis for acute deep vein thrombosis (Review)

Watson L, Broderick C, Armon MP



THE COCHRANE
COLLABORATION®



- ▣ NIH, Phase III, multicenter, randomized,
- ▣ 692 patients
- ▣ PCDT + standard therapy versus standard therapy alone
- Evidence supports CDT
- Waiting on ATTRACT study for PMT data

CaVent Study
N = 209

Enden et al, Lancet

Anticoagulation Duration

- No consensus regarding AIVC patient with DVT
- 3 schools of thought
 - Life long anticoagulation
 - Anticoagulant for predetermined interval
 - If no additional risk factor stop anticoagulation once D-dimer normalizes ⁷

Compression Stockings

THE LANCET

Compression stockings to prevent post-thrombotic syndrome: a randomised placebo-controlled trial

Dr [Susan R Kahn MD](#) ^a , [Stan Shapiro PhD](#) ^{a b}, [Philip S Wells MD](#) ^{c d}, [Marc A Rodger MD](#) ^{d e}, [Michael J Kovacs MD](#) ^f, [David R Anderson MD](#) ^{g h}, [Vicky Tagalakis MD](#) ^a, [Adrielle H Houweling MSc](#) ^a, [Thierry Ducruet MSc](#) ^a, [Christina Holcroft ScD](#) ^{i j}, [Mira Johri PhD](#) ^{k l}, [Susan Solymoss MD](#) ^{m n}, [Marie-José Miron MD](#) ^a, [Erik Yeo MD](#) ^l, [Reginald Smith PharmD](#) ^z, [Sam Schulman MD](#) ^{t u v}, [Jeannine Kassis MD](#) ^w, [Clive Kearon MB](#) ^t, [Isabelle Chagnon MD](#) ^m, [Turnly Wong MD](#) ^x, [Christine Demers MD](#) ^y, [Rajendar Hanmiah MD](#) ^z, [Scott Kaatz DO](#) ^{aa}, [Rita Selby MBBS](#) ^{ab}, [Suman Rathbun MD](#) ^{ac}, [Sylvie Desmarais MD](#) ^{ad}, [Lucie Opatrny MD](#) ^e, [Thomas L Ortel MD](#) ^{ae}, [Jeffrey S Ginsberg MD](#) ^t, for the SOX trial investigators

- Multicenter Canada and US
- ECS = 410, Placebo = 396
- ECS with PTS 14.2%, Placebo with PTS 12.7

Published Online: 06 December 2013, in print March 2014

Summary

- No documented consensus on treatment of Iliofemoral DVT in AIVC.
- No evidence for greater periprocedural risk in AIVC patients
- Young patient population with risk of prolonged morbidity secondary to PTS
- Consider CT/MR in young patients presenting with unprovoked DVT
- We would suggest re-establishing patients baseline venous drainage
 - PCDT + systemic anticoagulation, +/- compression stockings
- Life long anticoagulation controversial

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