



Interventional Radiology

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Faculty/Presenter Disclosure

- Relationships with commercial interests:
 - None
- Other: Radiologist, Medical Imaging Consultants (MIC)

Objectives

- List the types of patients/conditions that can be referred for endovascular therapies
- Describe the referral pathways for radiologic interventions
- Recognize the role of the radiology clinician

RADIOLOGIST



What my family thinks I do



What society thinks I do



What the ER intern thinks I do



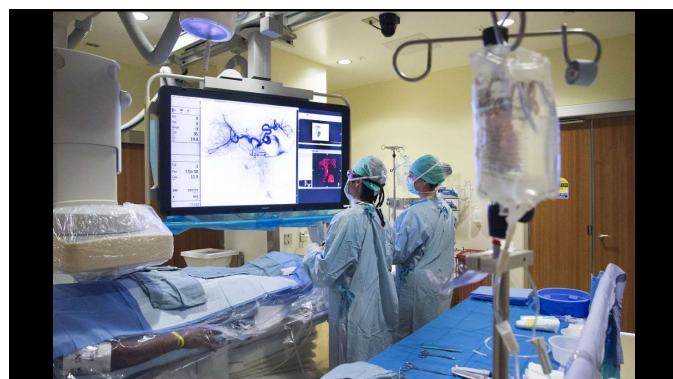
What the surgeons think I do



What I think I do



What I actually do



IR in Edmonton

- Body IR sites - UAH, RAH, GNH
 - 11 Body Interventionalists



- Neuro IR site - UAH
 - 3 Neuro Interventionalists



[illegible]

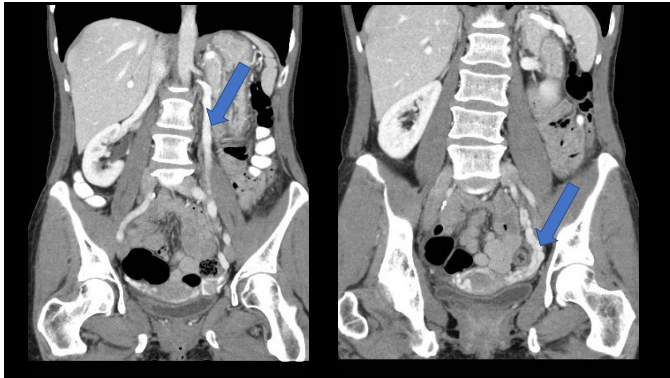
AVAILABLE PROCEDURES	
Arterial Intervention/PAD <ul style="list-style-type: none"> ○ Claudication ○ Chronic Critical Limb Ischemia <ul style="list-style-type: none"> ○ Ulcer ○ Rest Pain ○ Chronic Mesenteric Ischemia ○ Visceral/Peripheral Aneurysm 	Gynecologic/Genitourinary Intervention <ul style="list-style-type: none"> ○ Fallopian Tube Recanalization ○ Pelvic Congestion Syndrome ○ Prostate Artery Embolization ○ Symptomatic Uterine Fibroids ○ Varicocele Embolization
Spinal Intervention <ul style="list-style-type: none"> ○ Vertebroplasty/Kyphoplasty ○ Vertebral Body RFA (oncology) 	Neuro Consult/Intervention <ul style="list-style-type: none"> ○ Cerebral Aneurysm ○ Cerebral AVM/Dural Fistula ○ Carotid Stenosis ○ Subclavian Stenosis/Steal
	Venous Intervention <ul style="list-style-type: none"> ○ IVC Filter Removal/Insertion ○ Venous/Arterial Malformation
	Venous Access <ul style="list-style-type: none"> ○ PICC Line (No consult required, patient will be booked for procedure directly.) ○ Tunneled Central Venous Catheter (Biviaac/Rickman etc) ○ Subcutaneous Port
	Other <ul style="list-style-type: none"> ○

<p>To schedule the following interventional procedures, please call Radiology at GNH, RAH or UAH directly.</p>		
<p>Dialysis Evaluation/Intervention Requires Nephrology consult Fistulogram Hemodialysis Catheter Placement</p>	<p>Hepatobiliary Intervention Requires GI/Surgical consult Percutaneous Biliary Drain/Stent Percutaneous Transhepatic Cholangiogram Transjugular Intrahepatic Portosystemic Shunt (TIPS)</p>	<p>Urology Intervention Requires Urology consult Ureteric Stent Insertion Percutaneous Nephrostomy Tube Suprapubic Urinary Catheter Placement</p>
<p>Gastrointestinal Intervention Requires GI consult G tube Placement G-J tube Placement</p>	<p>Interventional Oncology Referral from Urology Renal RFA Referral from Hepatology/ Hepatobiliary Liver RFA TACE/TARE</p>	<p>Venous Procedures DVT Thrombolysis</p>

CASES

Case 1

- 46 year old female with multi-year history of recurrent pelvic pain
- Prior appendectomy
- Multiple prior investigations without a definitive diagnosis



Pelvic Congestion Syndrome

- Noncyclic, intermittent or constant pelvic pain for >6 months due to reflux in the ovarian vein and congestion of pelvic veins.
- Usually dull/heavy aching pain that may be exacerbated by prolonged standing, walking, coitus, and menstruation
- Occurs in approximately 15% of premenopausal women; symptoms typically resolve after menopause

(Pelvic Congestion syndrome, StatDx)

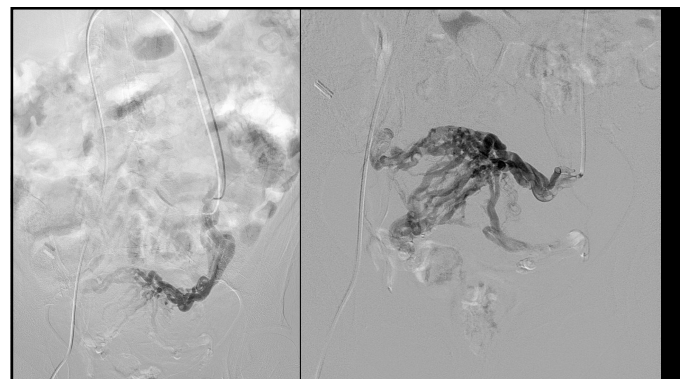
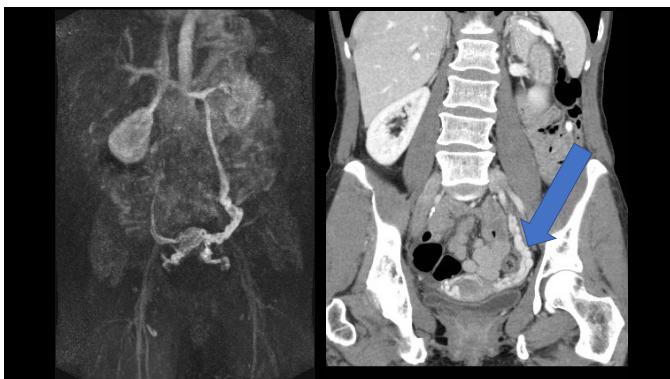
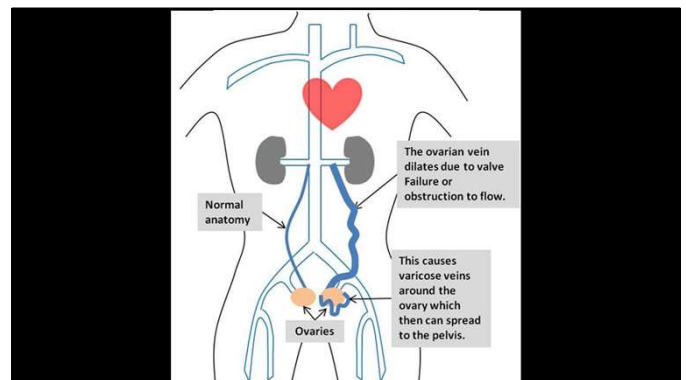
Etiologies

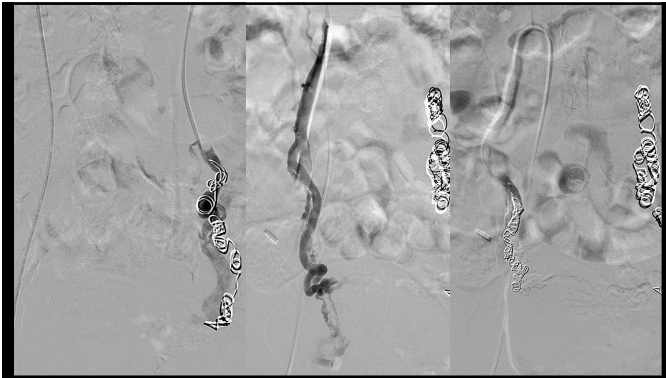
Primary

- Valvular incompetence
- Acquired
- Hormonal

Secondary

- Obstructive
- May-Thurner
- Nutcracker





Results

- Most patients (50-80%) have significant decrease in pain without notable impact on menstrual cycle
- 60% report complete resolution of symptoms
- If incidental on imaging with no symptoms, no treatment is required.

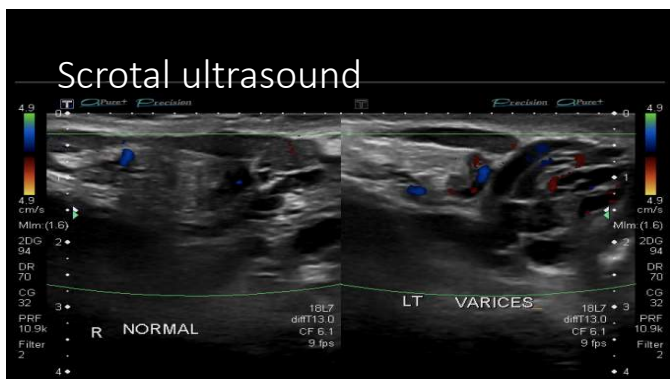
(Pelvic Congestion syndrome, StatDx)

Pearls

- When to refer to VIRNA:
 - Chronic pelvic pain >6 months AND
 - Imaging findings suggesting possible pelvic congestion

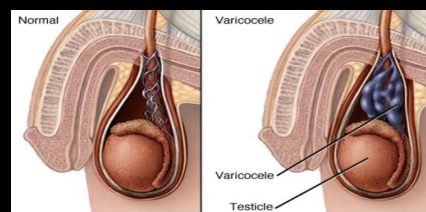
Case 2

- 23 yo male student
- Pain and swelling which is worse standing and with weight lifting

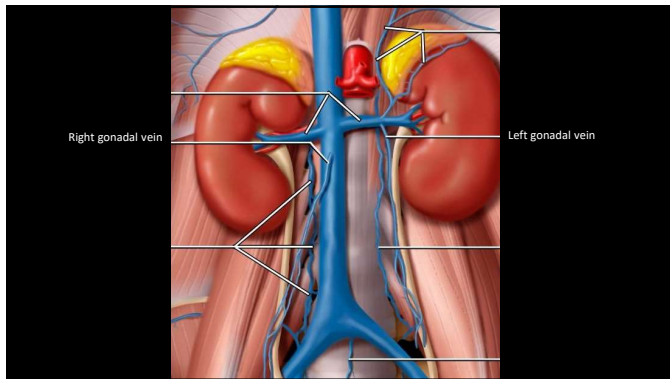


Varicocele

- Dilatation of veins of pampiniform plexus secondary to retrograde flow in testicular vein



(Mayo clinic website)



Etiologies

Primary

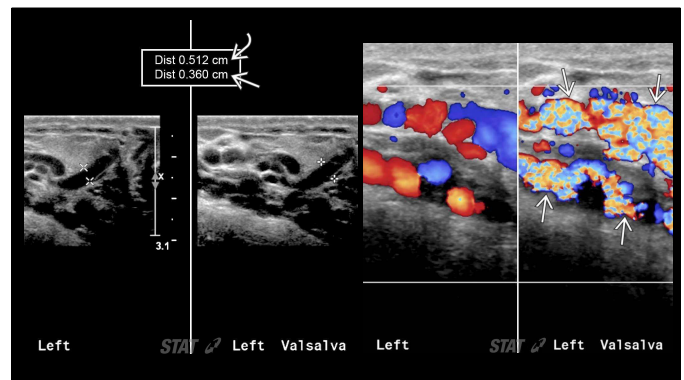
- Idiopathic/Valvular incompetence

Secondary

- Obstructive
- Nutcracker
- Retroperitoneal mass

Symptoms

- Dull ache, or swelling localized to scrotum or inguinal region
- Patients may report that symptoms are aggravated in standing or with physical activity/straining
- Testicular atrophy
- Most commonly identified and correctable cause of male factor infertility.



Treatment

Conservative

Surgical

Interventional



Outcome

- Clinical success
 - Symptomatic improvement (pain, swelling, etc.): 95%
 - Semen parameter improvement: 27-75%
- Overall complication rate is between 3 and 9 percent.

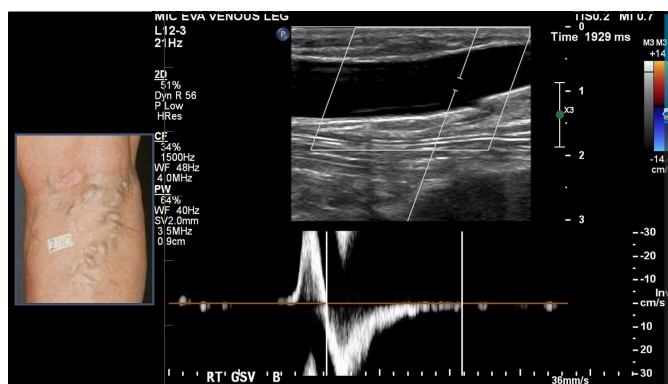
(Pelvic Venous Disorders, StatDx)

Pearls

- When to refer:
 - Symptomatic patient (pain, mass effect or appearance)
 - Infertility (all 3 criteria below should be met) **usually referred by urologist working in infertility clinic.
 - Palpable varicocele
 - Abnormal semen parameters (count, morphology, motility)
 - Female partner has normal fertility
 - Testicular atrophy (in adolescent/pediatric patient only)
- Be aware
 - Unilateral RIGHT sided varicocele and other risk factors (old age, no change in venous caliber with Valsalva) can be worked up with cross sectional imaging for secondary causes of venous obstruction.
 - Exception is in children < 9 years; look for tumor

Case 3

44 year old multiparous female with right leg pain, swelling and visible varicose veins.



Superficial venous insufficiency

- 60% of Americans suffer from venous disease and its sequelae
- Incidence increases with age and is more common in women with over 40% of women in their 50's suffering from some sort of venous disorder

National Heart Lung and Blood Institute (NHLBI) <http://www.nhlbi.nih.gov/>

(American College of Phlebology, Fundamentals of phlebology)

THE SPECTRUM OF CHRONIC VENOUS DISEASE



(American College of Phlebology, Fundamentals of phlebology)

Risk Factors

Modifiable

- Weight
- Physical Activity
- Cigarette smoking

Non Modifiable

- Age
- Family history
- Genetic
- Pregnancy

Anatomy of the venous system

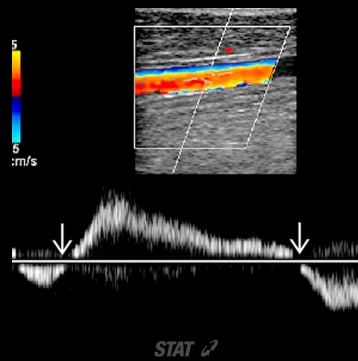
- **Deep venous system**
 - Channels 90% of blood out of the legs
- **Superficial System**
 - Collecting system of veins
- **Perforating veins**
 - Connect the superficial and deep systems
- **Musculo-venous pump**
 - Pumps blood through one way valves up and out of veins.



(American College of Phlebology, Fundamentals of phlebology)

Illustration by Linda S. Nye

Imaging



Treatment

Conservative

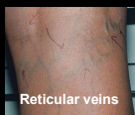
Surgical

Interventional

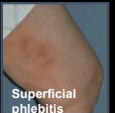
Dermatologic



telangiectasias



Reticular veins



Superficial phlebitis

Surgical/Interventional



varicose veins

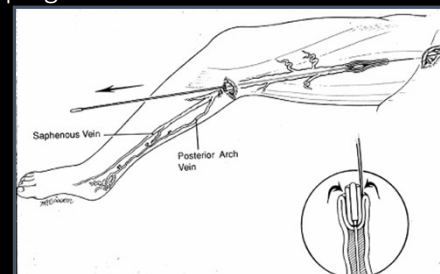


Pigmentation (C4a)



venous ulceration

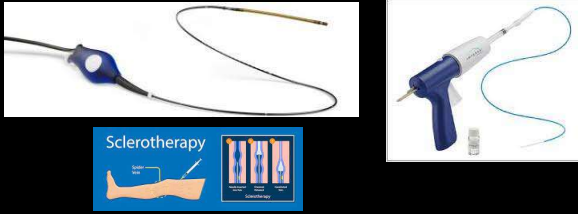
Surgical Treatment of Varicose Veins: Vein Stripping



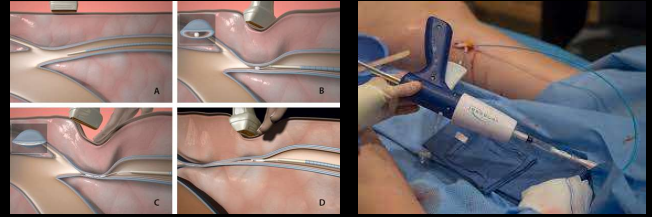
(American College of Phlebology, Fundamentals of phlebology)

Interventional

- Concept is to treat the axial vein (GSV or SSV) then treat the remaining varicose veins with sclerotherapy

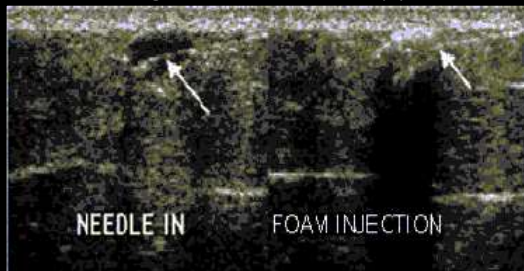


VenaSeal



- Outpatient procedure
- Glue embolize the GSV or LSV

Ultrasound-guided Sclerotherapy



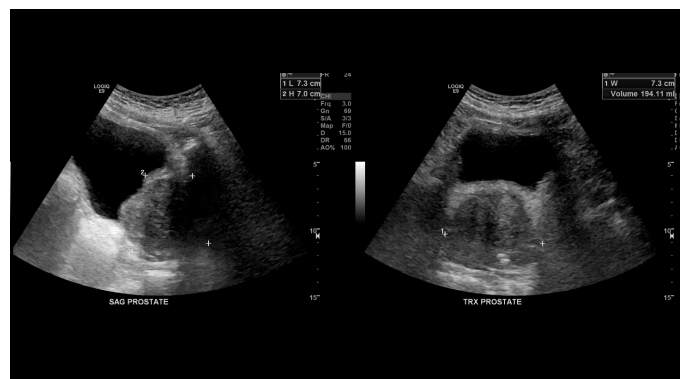
(American College of Phlebology, Fundamentals of phlebology)

Pearls

- When to refer:
 - Spider veins and telangiectasias – send to dermatology for treatment
 - Larger varicose veins, venous hyperpigmentation, ulceration – send to a vein clinic or vascular surgery
 - To refer to MIC vein clinic, send in a request for venous reflux ultrasound with standard MIC requisition.
 - Surgical vein procedures – covered by AHS
 - Interventional vein procedures – Private pay

Case 4

74 year old male with lower urinary tract symptoms



Benign Prostatic Hypertrophy

- Most common benign neoplasm in men (affects > 50% of men 60-69yo)
- Present with LUTS
 - Incomplete bladder emptying
 - Frequency
 - Intermittency
 - Urgency
 - Weak stream
 - Straining
 - Nocturia
- Chronic urinary retention with indwelling foley catheter

Treatment options

Conservative

Surgical

Interventional

Ideal patients for PAE

As per the urologist:

- Poor surgical candidates
- Urinary retention
- Refractory hematuria
- Large prostates (>80cc)

As per the patients:

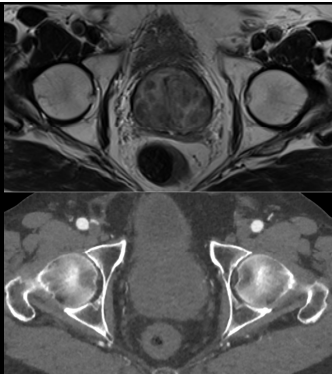
- Men who want to avoid medications due to ineffectiveness or significant side effects
- Men who want to avoid surgical complications including:
 - Retrograde ejaculation, impotence and urinary incontinence
- Men who wish to preserve fertility.

(Merrit, Physician reference guide, THINK PAE course)

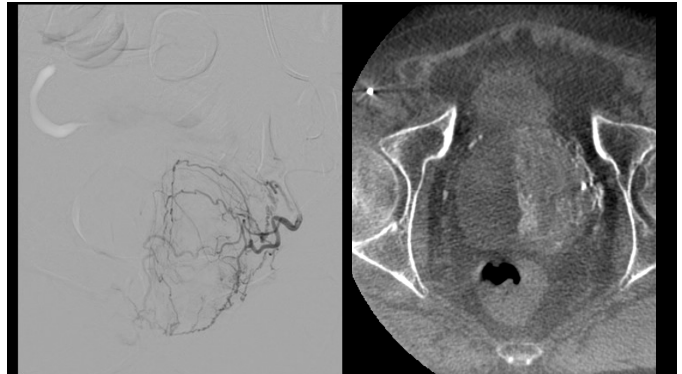
Family Medicine

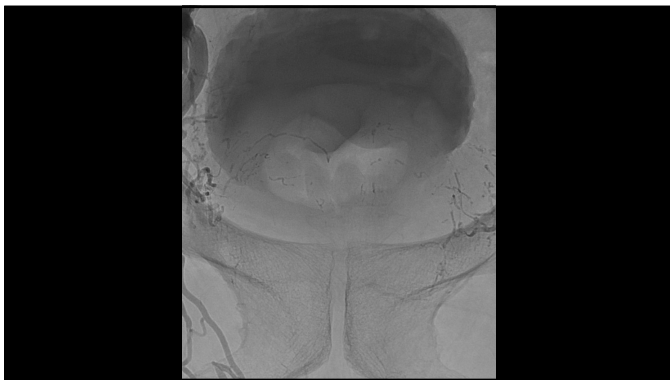
Urologist

Interventional Radiologist if deemed a candidate for PAE



(Merrit, Physician reference guide, THINK PAE course)





Prostate artery embolization

- Risks:
 - Post embolization syndrome, infection, acute retention (temporary), bleeding, non target embolization (penile, rectal or bladder ischemia).
- Results
 - Equivalent results to TURP.

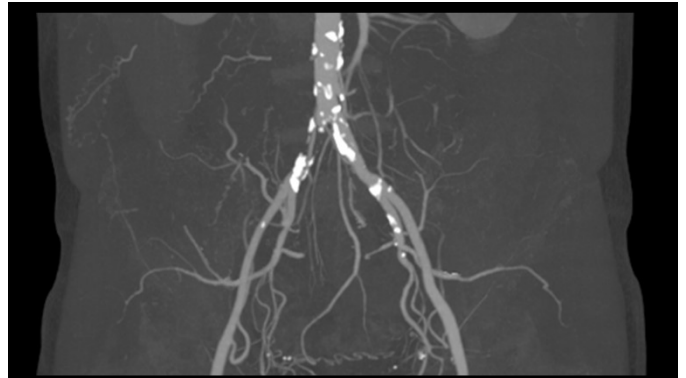
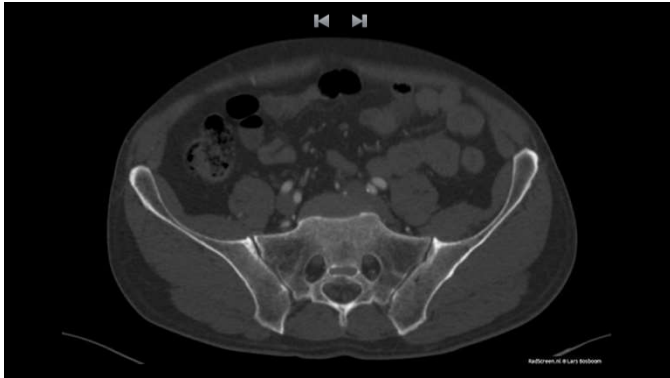
(Merrit, Physician reference guide, THINK PAE course)

Pearls:

- Patients with symptomatic LUTS or chronic retention requiring catheterization should be referred to urology.
- Urology refers patients who are candidates for embolization to IR.
- PAE is a good option for patients with large prostates who want to avoid the complications of surgery.

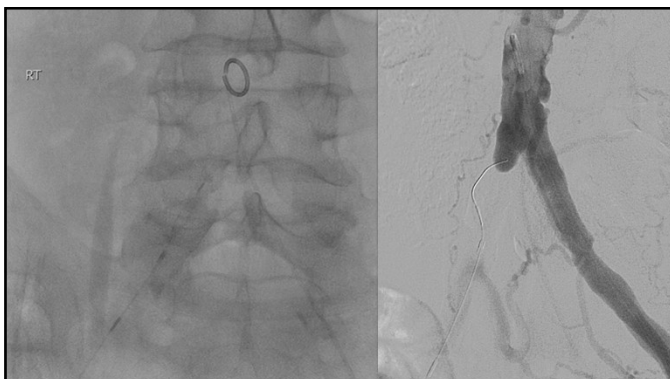
Case 6

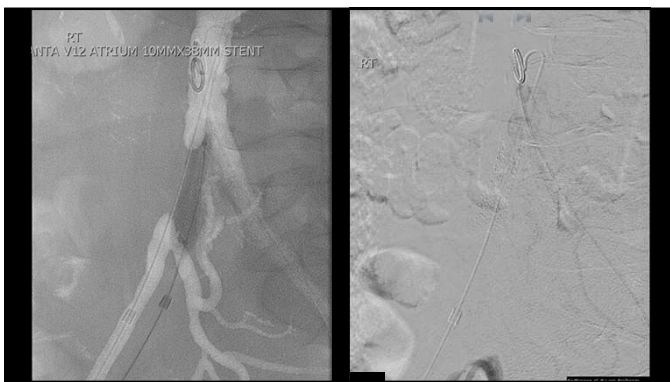
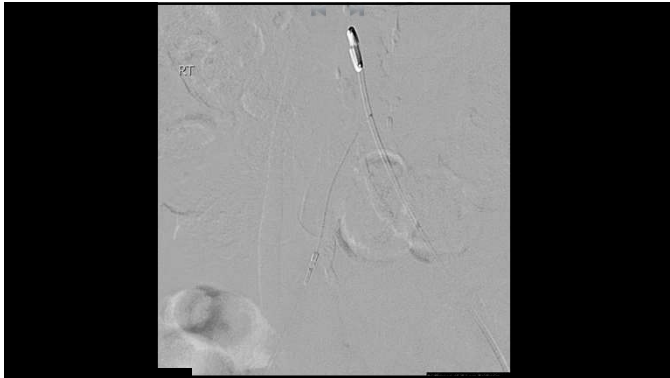
64 year old male with long standing lifestyle limiting exercise refractory claudication



Chronic Limb Ischemia

- Medical management of risk factors is key
 - Smoking cessation is key
- Duration of symptoms is key to differentiate between acute and chronic limb ischemia
- Differentiate between claudication and chronic critical limb ischemia
 - Claudication – Pain with activity that resolves with rest.
 - Critical limb ischemia – rest pain, night pain or arterial wounds.
- Patients with claudication are best treated with exercise therapy
 - Two hours of supervised exercise per week for a three month period.
 - If fails, lifestyle limiting exercise refractory claudication can be treated with revascularization.
- Patients with critical limb ischemia need revascularization.





Pearls

- Medical management of risk factors is key, especially smoking cessation.
- ABI is a good modality to screen for peripheral vascular disease

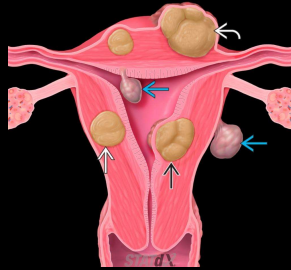
Case 7

39 year old female with menorrhagia and urinary frequency.

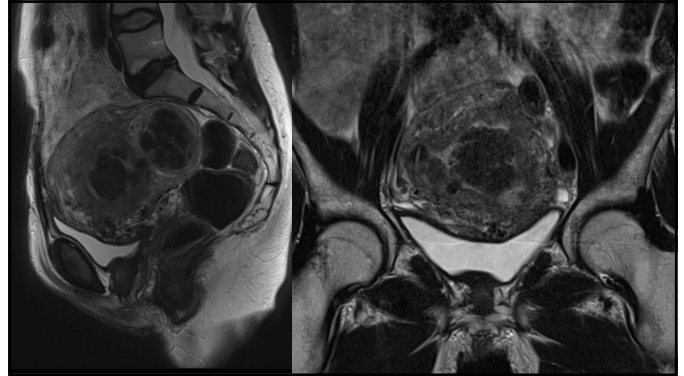


Fibroids

- Benign neoplasm of smooth muscle and connective tissue.
- Symptoms:
 - Menorrhagia
 - Bulk symptoms – urinary frequency, urinary urgency, bloating
 - Pain
- Intramural and submucosal fibroids typically cause menorrhagia. Any fibroid can cause bulk symptoms.



(Uterine Artery Embolization, StatDx)



Uterine artery embolization

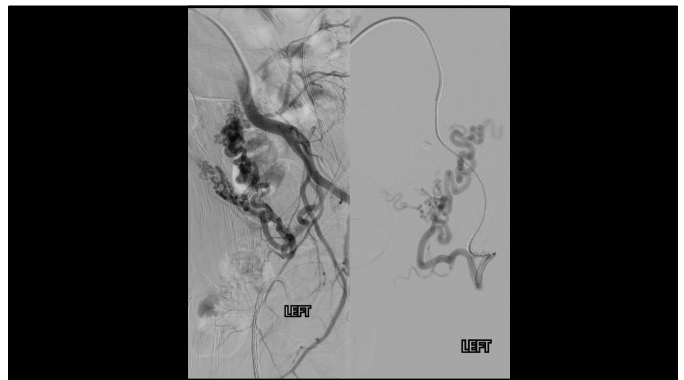
Fibroids

- Menorrhagia control (81-96%), pelvic pain (70-100%), bulk symptoms – variable results (46-100%)
- Fibroids decrease in size at maximum by 50-70%
- Goal is to keep symptoms at bay until menopause

Adenomyosis

- Overall symptomatic improvement is variable.
- We usually quote a 50/50 chance of long term symptomatic relief.
- Some series state that long term symptomatic relief can be seen in up to 65-82% of patients.

(Uterine Artery Embolization, StatDx)



Risks

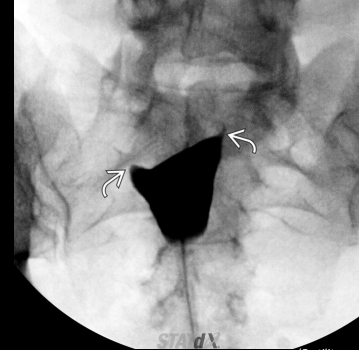
- Early menopause (1-5% depending on age)
- Myometrial ischemia – unrelenting pain requiring hysterectomy (rare)
- Pulmonary embolism (rare)
- Non target embolization (1 in 1000)
- Infection
- Vaginal discharge
- Fibroid expulsion (if submucosal)
- Fibroid detachment (if pedunculated subserosal)
- 1 in 1000 risk of stroke with radial access

(Kandarpa, 2016)

Case 8

34 year old female with history of PID and infertility

HSG

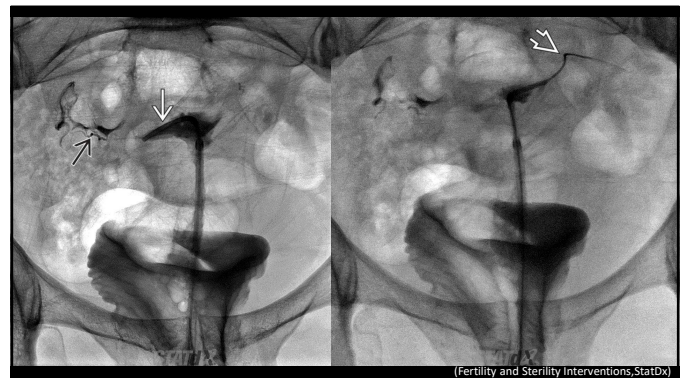


(Fertility and Sterility Interventions, StatDx)

Tubal occlusion

- Fallopian tube disease can be seen in up to 35% of infertility cases
- Etiology
 - Infection – chlamydia
 - Salpingitis isthmica nodosa
 - Peritubal adhesions
 - Mucus plug/inflammatory debris, spasm

(Fertility and Sterility Interventions, StatDx)



(Fertility and Sterility Interventions, StatDx)

Risks

- Infection (<1%)
- Tubal perforation
- Slightly higher chance of tubal ectopic (up to 3%)

(Fertility and Sterility Interventions, StatDx)

Results

- Improved tubal diagnosis in 90% of cases
- Restoration of tubal patency in 40% of cases

(Fertility and Sterility Interventions, StatDx)

