Immunology

Pearls

- Raynaud's is strongly associated with scleroderma
- Reactive arthritis is arthritis which follows an infection, classically chlamydia → arthritis, urethritis, conjunctivitis = reactive arthritis
- Rheumatoid arthritis is polyarticular, symmetric, and deforming
- Patients with RA have atlantoaxial joint instability: DO NOT hyperextend neck with intubation
- Lupus leads to a prothrombotic state = higher incidence of ACS, PE

Raynaud's Disease

- Vasospasm of small arterioles or arteries
- Provoked by: cold, vibration, caffeine
- Women > men
- Presents with:
    - pain, pallor or cyanosis (usually < 60 min), paresthesia
- Rx: behavior modification, rewarming, Ca2+ blockers, nitrate creams
- Can get ulcerations, but mostly reversible
- a/w scleroderma/CREST syndrome

Reactive Arthritis

- Formerly known as Reiter Syndrome
- Arthritis that follows an infection
    - classically chlamydia, but many more
- Likely autoimmune reaction
- Physical Exam
    - Arthritis: upper extremity (varies)
    - Eye: conjunctivitis, uveitis, episcleritis
    - Nail changes
    - Genital lesions
    - Pericarditis
    - Rashes
    - Oral lesions
- Rx
    - treat infection, NSAIDs, immune suppression
- FOR EXAM: arthritis, urethritis, conjunctivitis

Systemic Rheumatic Diseases

Chronic, inflammatory, autoimmune disorders

- Antiphospholipid syndrome, Ankylosing spondylitis, Adult Still's disease, Behcet disease, Churg-Strauss disease, Dermatomyositis/Polymyositis, Giant cell arteritis, Henoch-Schonlein Purpura, Microscopic polyangitis, Polyarteritis nodosa, Relapsing polychondritis, Rheumatoid Arthritis, SLE, Sjogren syndrome, Systemic sclerosis, Takayasu arteritis, Wegener granulomatosis

Rheumatoid Arthritis

- Characteristics: polyarticular, symmetric, deforming
- IgG + in 85% (Rheumatoid factor)
- Classically affects: MCP, PIP, MP joints, wrist, elbows (but can affect any joint)
- Boutonniere deformity and swan neck deformities
- Rx
    - physical therapy, NSAID, Methotrexate, steroids
- ED Complications
    - immune suppression: from the disease and tx drugs
    - upper airway obstruction: cricoarytenoid joint arthritis, tracheomalacia
    - ** atlantoaxial joint instability: DO NOT hyperextend neck with intubation
- Increased ACS, pulmonary fibrosis, renal disease, GI bleeds, septic joints

Scleroderma

- Thickened, hardened skin
- Can be just local to skin or throughout the body and organs
- ED Implications
    - Difficult to intubate (unable to open mouth)
    - Can rapidly develop renal failure (scleroderma renal crisis)
    - Pericarditis
    - Conduction system fibrosis
    - Pulmonary fibrosis
    - Pulmonary failure/fibrosis
- Strong association with Raynauds

SLE (Lupus)

- Produces inflammation of every organ
- ED Implications: prothrombotic state
    - ACS increases 50 fold
    - increased incidence of PE

Vasculitides

- Presence of inflammatory leukocytes in vessel walls with reactive damage to mural structures
- Occurs throughout body (large and small vessels)
- Presentation: bleeding, ischemia and necrosis

- 2 Types
    - Primary: unknown etiology
    - Secondary: due to systemic disease (local or diffuse)

Large Vessel Vasculitides

- Giant Cell Arteritis
    - elderly patient, jaw claudication, difficulty rising from chair, temporal pain, blindness
    - Rx: high dose steroids
- Takayasu Arteritis (aorta and branches)

Medium Vessel Vasculitides

- Polyarteritis nodosa
- Kawasaki disease

Small Vessel Vasculitides

- Churg-Strauss
- Wegener's (resp tract and kidney)
- HSP (rash of palpable purpura)
- Hypersensitivity vasculitis
- Presentation
- Classic BIG Three:
    - Mononeuritis multiplex
    - Palpable purpura
    - Pulmonary-renal involvement (hemoptysis and hematuria/decreasing renal function)

Pearls

- Acute retroviral syndrome is the initial presentation in 75% of new HIV cases → it is usually missed
- A CD4 < 200 = dramatic increase in opportunistic infections (AIDS)
- CNS disease occurs in 90% of patients with AIDS → as CD4 < 200: very low threshold to CT/LP for vague complaints
- Non-con CT scan showing "multiple subcortical lesions, especially in basal ganglia" indicates toxoplasmosis
- crypto antigen testing is nearly 100% sensitive and specific for detecting cryptococcosis (LP)
- "fluffy white perivascular lesions with areas of hemorrhage" (cotton wool spots) are found with CMV retinitis
- HIV patients with PCP should receive steroids if PaO2 < 70mmHg or A-a >35
- Kaposi Sarcoma (common in HIV pts) are painless, raised, brown-black lesions classically on face, chest, oral cavity but can have widespread dissemination
- If source of non-occupational exposure is known HIV (+) and it is < 72 hours post

exposure to blood, genital, other secretions then HAART for 28 days

HIV

- Basics
    - Retrovirus that kills infected cells
    - Selectively infects CD4+ cells → deficiency in cell mediated immunity →
    - Opportunistic infections take over!
- Initial Infection
    - From blood, saliva, intercourse, etc
    - ACUTE RETROVIRAL SYNDROME in 75%
        - flu-like illness, 2-4 weeks after infection, lasts < 14 days
        - usually missed
- HIV Timeline
    - T 0: infection
    - T 3-38 weeks: seroconversion (detect HIV via ELISA or equivalent test)
    - T 8 years (without tx): AIDS (2 years in kids < 5yo)
    - T 1.3 years from AIDS to death without treatment
- Initial manifestation
    - More susceptible to “common infections”
- Labs
    - CD4 > 500: mostly normal
    - CD4 < 200: dramatic increase in opportunistic infections (AIDS)
    - Absolute Lymphocyte Count < 1000 suggests CD4 <200
    - ELISA: sensitive (to screen; delayed positive for weeks to months)
    - Western Blot: very sensitive and specific (to confirm)
    - Rapid HIV tests pretty accurate
        - DNA/RNA tests become positive very early
- Many AIDS defining illnesses
    - esophageal candidiasis, cryptococcosis, CMV, Kaposi, PCP, brain toxoplasmosis
- Concept: HIV patients get all the usual infections PLUS opportunistic infections as the CD4 dips below 500, especially when < 200 (magic cut off # for exam!)
    - the lower the CD4, the more you work them up!

MAC (mycobacterium avium complex)

- Disseminated form when CD4 < 100
- Immune reconstitution illness when HAART started
    - i.e. get inflammatory reactions etc. when immune system picks up d/t tx
- Steroids may help

CMV

- Disseminated: GI, pulmonary, eye

Neurological Complications of HIV

- CNS disease occurs in 90% of patients with AIDS
- HIV dementia, Toxoplasma gondii, C. neoformans, Lymphoma
- As CD4 < 200: very low threshold to CT/LP for vague complaints

Specific HIV Infections

- Toxoplasmosis
    - most common cause of focal encephalitis in AIDS
    - focal findings, headache, fever, seizures, AMS
    - Dx
        - non-con CT scan: “multiple subcortical lesions, especially in basal ganglia”
        - Contrast CT scan: “ring lesions enhancing with surrounding edema”
    - Rx: admission, Pyrimethamine, Sulfadiazine, folic acid +/- steroids
- Cryptococcosis
    - Focal disease or diffuse meningoencephalitis
    - Presentation can be subtle/vague
        - fever, HA, nausea, AMS, focal findings
    - Dx: CT, if negative then LP
        - crypto antigen testing nearly 100% sensitive and specific (India ink only 60-80%)
        - CSF pressure > 25 mmHG = drain until less than 20
    - Rx: Admit, Amphotericin B

Ophthalmologic Complications

- 75% of AIDS patients get optho complications
- Retinal microvasculopathy (most common)
    - looks like diabetic retinopathy
- CMV Retinitis
    - most serious and common infection of eye
    - field cuts, progressive blindness
    - buzz words: “fluffy white perivascular lesions with areas of hemorrhage” (cotton wool spots)
    - Rx: Ganciclovir (ocular and oral)
- Herpes Zoster Ophthalmicus
    - Hutchinson’s sign (involvement of tip of nose)

Pulmonary Complications

- Most common pneumonia is Strep pneumoniae
- PCP (Pneumocystis jiroveci)
    - 70% get it

    - Presentation: fever, SOB, cough, fatigue, **hypoxia (esp on exertion)
    - CXR: fluffy infiltrates or negative (bat wing patterns)
    - High LDH
    - Rx: TMP/Sulfa IV or PO
        - **steroids if PaO2 < 70mmHg or A-a >35
- TB
    - 200-500x incidence than general population
    - Atypical presentations and CXR
    - In ED: if patient coughing assume TB
    - PPD + at 5mm
    - Prophylaxis for 9 months

GI Complications

- Oral Candidiasis (very common)
    - Oral lesion predicts AIDS
    - Rx: Clotrimazole or Nystatin
- Esophageal Candidiasis
    - c/o difficult, painful swallowing
    - CD4 < 100
    - Rx: oral fluconazole, IV if cannot tolerate PO
- Other oral lesions
    - Kaposi sarcoma, HSV, hairy leukoplakia
- Diarrhea
    - Common; often severe and chronic; wasting syndrome
    - All the usual players PLUS:
        - Cryptosporidium and Isospora (profuse, watery)
        - CMV and M. avium in late stage disease
    - Agent often not found
    - Treat symptoms if no cause found (IV hydration, electrolytes
- Other GI
    - Anorectal CA common
    - Proctitis: GC and chlamydia

Cutaneous Complications

- Generalized: dry skin (xerosis), seborrheic dermatitis, pseudomonas, syphilis, MRSA
- **Kaposi Sarcoma
    - painless, raised, brown-black lesions
    - classically on face, chest, oral cavity but can have widespread dissemination
    - Rx: Cryo or radiation
- Others: HSV, Varicella-Zoster, Scabies, Papillomavirus

HIV Post-Exposure Prophylaxis

- Occupational Risk Factors that increase risk for seroconversion
    - deep injury
    - visible blood on device
    - needle from vein or artery
    - late stage disease
    - hollow bore needle
- Non-occupational Exposure
    - If source known HIV +
        - < 72 hours post exposure to blood, genital, other secretions HAART for 28 days
    - If low risk and > 72 hours
        - None
    - Other cases: clinical judgement
- Fast treatment with multiple drugs probably decreases seroconversion by 80%

Pearls

- Add glucagon for patients on beta blocker therapy with anaphylaxis/anaphylactoid reaction
- Epinephrine for anaphylaxis should be administered IM or IV, but NOT SQ
- Erythema multiforme presents with classic target lesions
- ACE-inhibitor induced angioedema does not usually affect the airway, but hereditary angioedema often does and advanced airway should be ready
- FFP is effective in the treatment of hereditary angioedema
- Elevated ACE levels and hypercalcemia are usually found in sarcoidosis

Allergy and Such

Anaphylaxis/Anaphylactoid - look same and treated same

- Hypersensitivity is an inappropriate response to a harmless agent
- Anaphylaxis = IgE dependent
- Anaphylactoid = NOT IgE dependent
- Sudden degranulation of mast cells and basophils
- Clinical Presentation
    - bronchospasm, hypotension, urticaria, GI bleed
    - usually within 60 min of exposure
- Rx
    - IV, O2, monitor, advanced airway equipment at bedside
    - Epinephrine IM 0.3ml of 1:1,000 (IV can be used but NOT SQ)
        - 0.1ml for peds
    - H1 and H2 blockers, steroids

    - **Add glucagon if on beta-blockers

Angioedema

- Spectrum of disease
- Urticaria: cutaneous reaction
- Erythema multiforme: more pronounced, target lesions
- Angioedema: edema of the dermis
    - face, neck, lips, tongue, distal extremities
- Two Groups for ED purposes
    - ACE induced
        - usually mild, not IgE mediated, standard drugs used but don't work well, doesn't usually affect the airway (but it can)
    - Hereditary
        - Autosomal dominant (runs in families); low C1 esterase
        - Often precipitated with minor trauma
        - Can be severe!
        - Standard therapy often ineffective
        - ***FFP works
        - Recombinant C1 esterase works but is expensive

Drug Allergies

- Penicillin allergy is the most common drug reaction
- Type I: Immediate in onset (IgE mediated)
    - i.e. PCN allergy
    - really sick on re-exposure to same drug
- Type II: Delayed onset (IgG cell destruction)
    - hemolytic-like reaction
- Type III: Delayed onset IgG (drug immune complex)
    - i.e. serum sickness and vasculitis
- Type IV: Delayed onset (cell mediated)
    - i.e. Stevens Johnson

Sarcoidosis

- A multisystem *granulomatous disorder*
- Unknown etiology
- Affects individuals worldwide (blacks > whites)
- Noncaseating granulomas in involved organs
- Can involve all organs, commonly in eyes and chest
- Common presentation
    - cough, SOB, chest pain, eye lesions, skin lesions
- Labs: ***Elevated ACE levels and hypercalcemia

Pearls

- Renal transplant patients commonly get CMV infections
- Solid organ rejection (graft v host) presents like infection → assume rejection and treat for both infection and rejection → call transplant team
- High dose steroids are key to treatment of graft v host disease
- Avoid NSAID and ASA in treatment of suspected graft v host
- Serum creatinine is best prognostic marker of graft function at all times after transplant

The Transplant Patient

- Most commonly transplanted organs: kidney, liver, heart, lung, pancreas
- Transplant = lifelong immunosuppression
    - Have similar diseases to HIV patients
    - ***Renal transplant patients commonly get CMV infection
- Present with infection, noninfectious GI/GU, dehydration/lytes, rejection
- Key ED concept: solid organ rejection (graft v host) looks like infection = assume both and treat for both
- Infections common
    - UTI and pulmonary > 50%
    - Fever can occur in less than 50% with SBI
    - CNS: subacute presentations common
        - Listeria, monocytogenes, Cryptococcus neoformans, A. Fumigatus
    - Invasive Pneumococcal Infections
        - Common in lung, kidney, heart
        - Can occur despite vaccine and PCN
    - CMV infections can present like the HIV patient

Acute Graft vs Host

- Acute if < 100 days from transplant
- General: fever, fatigue, etc
- Specific: to the organ involved; inflammation and organ failure
- High dose steroids KEY to treatment
- Rx
    - IV, O2, monitor, blood cultures
    - Low threshold for stress dose steroids
    - Antibiotics
    - Admit, call transplant team
    - ***Avoid NSAID and ASA

The Renal Transplant Patient

- Serum creatinine is best prognostic marker of graft function at all times after transplant
- GFR calculation essential

- Usual renal diseases PLUS graft failure for many reasons
- Imaging
    - US - no contrast, non-invasive
    - MRI - great for fluids collections but Gadolinium is a problem b/c cannot excrete it well

ED Approach to the Sick Transplant Patient

- Blood, urine and other cultures, CHEM 20
- Antibiotics
    - If hypotensive add stress dose steroids
    - Call transplant team
    - Give high dose steroids