Vesalius SCALpel™ : Infection/antibiotics

SIRS: df: two or more of: T < 36C, >38, P > 90, RR > 20 or PCO_2 < 32, WBC > 12 or < 4 or >10% bands
- systemic effects of locally released cytokines (TNF-> IL1, 2, 6)
- infection, injury triggers cytokine release
- TNF & IL1 pyrogens, increase vascular permeability, activate coagulation, diffuse endovascular injury -> organ failure
- IL6 related to macrophage, WBC increase

MODS (multiple organ dysfunction syndrome): Sirs + organ dysfunction
Sepsis df: SIRS in response to documented infection
Severe sepsis: sepsis + organ dysfunction, hypoperfusion (lactic acidosis, oliguria, change mental status), 40% mort
Septic shock: severe sepsis, hypotension despite adequate resuscitation, perfusion abnormalities including lactic acidosis, oliguria, acute change in mental status
(activated protein C/drotrecogin alpha can moderate SIRS response and MODS if given before episode, but can't predict. promotes fibrinolysis, inhibits thrombosis & inflammation. can cause severe bleeding. Future potential?)

Glucose control

- ideal range: 80-120
- counterregulatory hormones in stress elevate glucose
  - catechols, cortisol, glucagons, growth hormone (GH), cytokines (IL1, 2, 6, TNF)
  - insulin resistance, TPN also factors in hyperglycemia
- increased glucose decreases G6DP which decreases superoxide release from WBCs
  - resulting in decreaed bacteriocidal activity (does not affect T cells)

(no benefit to supernormal O2, may increase abd compart press)
cortisone if associated adrenal insufficiency

Risk factors for surgical site infections

- SENIC (& CDC NNIS) point scale includes co-morbidities on old system of clean, clean-contam etc. : abdominal op, >2h, contaminated or dirty, 3 or more medical Dx, ASA category III or higher, operation longer than the standard time (not going well), hypothermia, low O_2, hyperglycemia

Antibiotic prophylaxis

- (1h before, up to 24h post; after 24h therapeutic, not prophylactic)
- ID pts at risk or in whom infection carries a high risk
- give within 30min-1h before incision so peak at skin incision (2h prior, 1h after start no benefit)
- repeat at 1/2 typical dosing interval (IV dilution, fluid shifts, losses) (eg cephazolin Q8, redose @ 4)
- cephalosporin: most useful, skin flora, 1st gen

2nd generation: (cephotetan, cefoxitin): biliary, colorectal, GYN
beta lactam allergy use vanc (delivery over 1h), clinda
(selective gut decontamination not effective, radical peritoneal debridement not useful, immunoglobulin experimental)

Treatment principles

control source, drain only localized abscess, irrigate and fully drain (does not spread infect, but impedes WBC migration to infection site, decreases localized inflammatory response)
empiric coverage: extended spectrum cephalosporin & vanc
cephtriaxime, cefotaxime
imipenim & piperacillin/tobramycin: Gm- and anaerobic coverage
aminoglycocides: nephrotoxic, replaced by third generation cephalosporins
quinolones (cipro) broad Gm+: Achilles rupture, cartilage defect in child
MRSA: vanc, linezolid
left vent assist device common infection, most Gm+
endocarditis prophylaxis for: prosthetic valve, prior Hx, complex ht. disease
advanced HIV (CD4 < 100) prone to cerebral toxoplasmosis
progression of HIV: viral load > 30K; CD4 (normal 800-1200) decreasing from 600 to 200 (opportunistic infection level)
> 1 organism in urine sample probably contaminated specimen
open packing to prevent abdominal compartment syndrome
peritonitis: broad spectrum empiric antibiotic coverage before culture, including anaerobic (choice rarely needs to be changed after culture results)
mild-moderate: cephoxitin, cephotetan, ticarcillin/clavulinate, ertapenem, clindamycin + monobactam (aztreonam)
severe: broad spectrum carbapenem (imipenem, miripenem) or triple combo: penicillin (Gm+), aminoglycoside (Gm-), flagyl/clinda (anaerobic)
few STDs present with inguinal adenopathy: LGV, syph, granuloma inguinale, chancroid, herpes simplex
pneumonia most common infection after multiple trauma

duration:
prolonged duration often not necessary; after afebrile, normal WBC without shift, rare flare up after stopping regardless of day (80% still febrile and elevated WBC at end of course of antibiotic will develop further infection, 30% if only WBC is elevated)

tertiary peritonitis: after treatment of secondary peritonitis: unusual opportunistic pathogens: candida, enterococcus, s. epidermidis; poor response to Rx, marker for mortality

Fungal infection

colonization common in ICU, infection less common
25% if cath-related UTIs fungal; remove Foley, reculture, asymptomatic -> 40% resolution
risks: severity of injury (APACHE score 20 or higher)

age, DM, female, immunosupressed
intensity of colonization
prior exposure to broad spectrum antibiotics
high index of suspicion: failure to respond or relapse after treatment
culture blood, urine, sputum, drain
examine eye grounds: candida retinopathy in 40% of systemic candida infections, 100% diagnostic regardless of blood culture (often false negative)
Rx: amphoteracin B 0.5 mg/kg/d IV 7-10 days or azol (fluconazole) 400mg/d IV 3-4d
increase cell wall permeability or interfere w cell wall synthesis
liposomal amphoteracin B decreased nephrotoxicity, increased delivery
until response, then PO additional 7d
candida cruzi resistant, glabrata relatively resistant
remove central catheter, Foley, most common sources
hepatic/splenic candidiasis 2w Rx, repeat CT

Diabetic foot infection

usually polymicrobial
risks: neuropathy, vascular, altered response to infection
neuropathy -> insensitivity, abnormal wt bearing, callus formation, tissue breakdown
mild: no bone involvement, minimal cellulitis, no significant ischemia, no systemic toxicity, reliable pt
treat as outpatient: relieve stress (podiatry), debride, dressing changes, culture tiss, broad spectrum antibiotics (semi-synthetic penicillin with beta lactamase inhibition [ampicillin/clavulinate])
severe: deep ulcer, bone involvement, cellulitis, systemic toxicity
admit, C&S, early aggressive surgical debridement; revascularize as soon as possible if ischemic
adjunctive antibiotics: 90% Gm+, 50% Gm-, 50% anaerobes, cover all

Hand infection

common in ER, 60% trauma, 30% human bite, 10% animal bite
most infections from neglected injury, early antibiotics prevent most complications
35% s. aur, 35% anaerobic (50% of human bite infections predominantly anaerobic)
I&D compartments, culture, Rx broad spectrum (semi-synthetic penicillin with beta lactamase inhibition [ampicillin/clavulinate])(penn allergy: erythromycin, flagyl)
immobilize, splint, rest, elevation

Invasive Gm+

most commonly strep, occasionally staph, increasing frequency and virulence
puerperal sepsis, scarlatina maligna, septic scarlet fever, bacteremia, erysipelas, necrotizing soft tissue infection/fasciitis, gangrene, myositis
necrotizing soft tissue infection/fasciitis
80% following minor trauma, 20% post op

initial mild erythema progressing rapidly to swelling, erythema, fever (24h) to systemic toxicity (48h)
group A hemolytic strep most common, occasionally staph, enteric including clostridia
aggressive surgical debridement, initial empiric antibiotic coverage likely orgs, cult
50% mort (more than earlier eras, ?increased virulence, decr specif immune)

C. diff diarrhea

most common nosocomial infection on surgical units, 13% mort
presentation variable: asymptomatic (carrier), mild to severe diarrhea with pseudomembranes, peritonitis, toxic megacolon, perforation, death
clinical criteria for Dx: 3 or > loose stools/d > 2d without obvious cause
prior antibiotics or antineoplastic agent within 6w, response to oral vancomycin or flagyl (3-5d)
lab: stool culture most sensitive (false positives with carriers, not specific), identify toxin A or B, not all test (80%) positive (clinical Dx + cult adequate to confirm Dx even without toxin ID)
endoscopy: if culture and toxin negative and high index of suspicion, scope (rigid/flex) -> 60-80% diagnostic: most patients with severe symptoms have pseudomembranes; lack does not R/O, may need full colonoscopy
prior exposure confers no immunity, 20% relapse
severe rare but need aggressive Rx, 100% mort without surgery
peritonitis, organ failure, worsening CT, toxic megacolon do total abdominal colectomy/ileostomy (36-50% mort, 2X w less than tot colectomy)

Tetanus

wound care,, passive immunization with tetanus immune globulin if uncovered
if 2 or more immunizations, booster Q 10y, if > 5y since last and serious injury give booster

Risks to surgeon

HIV: 0.1-0.3, no case of surgeon to patient transmission
post-exposure prophylaxis: if documented exposure start <1-2h 2 drug Rx, 3 for hi risk (hollow core needle/hi inoculum): zidovidine, lamuvodine, indinavir
hepatitis:
more serious risk than HIV, shift toward C predominance > B
antigen/ab pattern after acute xposure to B: early antigens, then antibodies, decrease over years
chronic active B different pattern: elevation hepatitis surface B antigen and remains up long periods; antibody to the core antigen remains up; hep E elevated and persists; antibody to E very late in course, highly infectious with reasonable innoculum during this time
antibody to B surface antigen (not core) indicates appropriate immunization
if core antibody also positive, had virus and developed immunity
unvaccinated pt. needs immune globulin and to begin immunization

vaccinated: test Ab level, if good, no Rx, if not IG and booster
hep B most likely to be transmitted in OR, 62% > hollow needle stick
80% chronic hep C after acute illness; most common indication for liver TP
hep. B is DNA virus, hep. C RNA