Infection in the Transplant Recipient

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Factors that influence Outcomes

- There are five major areas that determine outcome of
- transplant:
- 1) Tissue typing and matching
- 2) procurement and preservation
- 3) Surgical technique which minimizes tissue injury
- and fluid collection
- 4) Immunosuppression
- 5) Prompt diagnosis and treatment of infection

Early Immunosuppression Models

- Immunosuppression
  - 1960's: Prednisone 1mg/kg/day
  - 60 mg/day at 6 months
  - For rejection: 320 mg/day for 7 D
  - Then 160 mg/day for 7 Days
  - Then taper to 40 mg /day

  - Imuran added as steroid sparer

- Infection Complications:
  - 50% of deaths
  - Bimodal peak:
    - Bacterial in first 2 months
    - Fungal after 2-3 months

Early Immunosuppression models

- Immunosuppression
  - 1970's
  - Trials of Cytoxan, Total lymphoid irradiation
  - For rejection use Anti-Thymocyte Globulin (ATG)
  - 1980's. Cyclosporine introduced
  - Use of OKT-3 (Murine monoclonal antibody for treatment of rejection)
- Infection
  - Increased incidence of CMV
  - Infection still the leading cause of death in transplant recipient
  - Up to 80% of patients infected in the first 12 months

Newer Immunosuppression models

- Immunosuppression
  - Current 2020:
  - Steroid sparing regimens
  - Cellcept (mycophenolate)
  - Calcineurin Inhibitor
    - Tacrolimus/ Prograf
    - Everolimus/ Zortress/Afinitor
  - Target of Rapamune (TOR) inhibitor
    - Sirolimus/ Rapamune
- Infection
  - Reduced new onset Diabetes after transplant
  - Improved blood sugar control in diabetic recipients
  - Less infection
  - Improved graft survival
  - Improved patient survival

Normal Immune System

- A. MACROPHAGE/Reticulo Endothelial System
- Presents antigen to both cellular and Humoral systems.

- B. CELL MEDIATED IMMUNITY (CMI)
  1. ANTIGENS
     usually virus, fungi, parasites, intracellular organisms.

  2. CYTOTOXIC/SUPRESSOR CELL T Lymphocytes

  3. HELPER/INDUCER CELL.
     releases IF-gamma, IL-2, IL-1.

Normal Immune System

- C. HUMORAL/NEUTROPHIL SYSTEM
- 1. ANTIGENS
- usually polysaccharide from capsule or membrane.
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- 2. ANTIBODY produced by B-LYMPHOCYTES
-

3. COMPLEMENT

- Activated by cross-linked antibody, directly by staph. epi., Candida.
- C3b serves as chemotactic factor for PMN's.
-
- 4. PMN’S release inflammatory mediators causing local tissue destruction and swelling.
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Types of Immune Deficiency

- A. Severe Combined Immuno Deficiency. SCID
- Both CMI and humoral deficiencies.
- Congenital x-linked or autosomal, or sporadic;
- usually die in first year.
- Swiss type autosomal recessive.

- B. CMI (T CELL DEFICIENCY)
- DI George's syndrome
- Nezelof's syndrome
- Adenosine deaminase def.
- Purine nucleoside phosphorylase def., which depletes
- T-cells
- Ataxia-telangectasia
- C. Acquired Immunodeficiency: HIV CMV SLE Steroids

ImmunoGlobulin Deficiencies

- D. IG Deficiencies

- Bruton's
- Transient hypogammaglobulinemia of infancy
- Isolated IgA def. or IgM def.
- X-Linked immunodeficiency with increased IgM
- Thymoma
- Wiskott-Aldrich syndrome
- Common variable (wastebasket group)
-
- E . COMPLEMENT Deficiency
- Neisserial infections, abnormal chemotaxis, C2 def.
- most commonly assoc. with infection.

Types of Immune Deficiencies

- F. NEUTROPENIA/NEUTROPHIL DYSFUNCTION
- Drug induced - Schultz syndrome
- Nutritional deficiency: B-12, folate, copper
- Aplastic anemia
- Splenomegaly
- Neutrophil dysfunction:
- 1) chemotaxis: Kartagener's, Job's
- 2) microbicidal function: Chediak-Higashi
- 3) phagocytosis/opsonization:
- Diabetes, SLE, cirrhosis, Steroids, Sickle Cell Disease

Where the Drugs Hit

- A. PREDNISONE
- inhibits antigen driven T-cell proliferation by
- preventing monocyte release of IL-1 and IL-2
- also inhibits chemotaxis
-
- B. CYCLOSPORIN A
- inhibits m-RNA producing IL-2 as well as
- gamma-interferon, inhibiting T-helper but sparing
- T-suppressor function. Negligible effect on
- presensitized cells.
-
- C. AZOTHIOPRINE
- metabolized to 6-MP in liver and functions as
- anti-metabolite; disrrupts purine metabolism and
- therefore cell proliferation. Nonspecific.
-
- D. ALG/ATG
- act mainly by opsonization (coat lymphocytes with
- antibody and they get sequestered in spleen).

Where the Drugs Hit

- E. OKT-3
- monoclonal Ab to T3 receptor; believed to work via
- opsonization and/or modulation of T-cell activity.

- F. Sirolimus/ Rapamune
  - Similar structure to CNI's but novel receptor.
  - Target of Rapamune

Pattern of Infectious Complications

- A. FIRST MONTH
-
- 1. PRE-EXISTING INFECTION IN THE RECIPIENT
- Deep wound infections: Staph, TB, other bacteria
- Strongyloides stercoralis can persist for years after
- leaving endemic area.
- Infection is held in check by CMI. Presents in two
- ways:
- a) Hyperinfection syndrome - exaggerated life cycle
- with hemorrhagic pneumonia and or colitis.
- b) Dissemination - bacteremia or meningitis, can be
- included in lung/brain syndromes.
- c) Problems - hard to detect as sx nonspecific,
- eosinophilia absent, stool often negative.
- hard to treat responding to thiabendazole
- about 50% of cases at dose of 25 mg/kg/d BID for 3 days.

Pattern of Infectious Complications

- A. FIRST MONTH
- 2. INFECTION FROM DONOR
-
- donors at risk: bugs:
- - sepsis in last year CMV, HEP.B, HIV, rare cases
- of histo, crypto, TB
- - drowning victims
- - burns
- - in ICU or on vent over 1 week
-
-
- 3. WOUND INFECTION
- Incidence 1.8 - 5.6 %
- Usually related to hematoma, uroma, lymphocele.
- Increased risk if incidental appendectomy or other surgery done at
- time of transplant.
-

Pattern of Infectious Complications

4. First Month - OTHER

a. Infections

Pneumonia prevent by early mobilization
UTI " sterile manipulation
Line sepsis early removal.

Note that in candidal line infection, in normal host, need for systemic therapy is about 5%, in ICH it approaches 50 %.

b. Other causes of fever

Rejection
Allergic reaction to ATG, ALG, OKT-3, Ampho-B or other antibiotics
Pulmonary embolism.

Pattern of Infectious Complications

- B. 1 - 6 MONTHS POST-TRANSPLANT

  For details see below: specific Agents, Syndromes.

  1. VIRUSES
  2. RESISTANT BACTERIA
  3. FUNGI
  4. PROTOZOA

Pattern of Infectious Complications

- C. GREATER THAN 6 MONTHS
-
- 1. UNCOMPLICATED COURSE
- most pts with creat < 2.0, minimal immunosuppression,
- no recent anti-rejection therapy,
- no chronic viral infections:

- Infections / cause of fever will be Similar to general population with
- Influenza, UTI's, community acquired
- (particularly pneumococcal) pneumonia, and
- rare instances of the typical ICH infections.

Pattern of Infectious Complications

- C. GREATER THAN 6 MONTHS
-
- 2. THOSE WITH EXCESSIVE RISK OF INFECTION
  - Here There be Monsters
- - chronic rejection
- - prednisone dose > 20 mg/day
- - multiple courses of antirejection therapy
- - high incidence of CMV, BK virus
- - high incidence of other typical ICH infections.
-
- 3. THOSE WITH LINGERING INFECTIONS
- -CMV chorioretinitis
- -Chronic hepatitis
- -Viral associated tumors (lymphomas)

Specific Infectious Agents

- A. CMV
- 1. General
- Virtually all cases present within 1-4 months, except rare cases of primary infection up to 2 years out.
- 3 factors increasing virulence:
- a) Latency/reactivation
- b) Cell to cell contact needed for transmission, so antibody is inefficient.
- c) Oncogenicity
- 2. Epidemiology: 3 Types
- a) Primary: 80-90% due to kidney, rest from
- transfusion; no difference in morbidity or mortality.
- b) Reactivation: Statistically less serious, but
- cannot predict in individual pt.
- c) Superinfection by different isolates of CMV:
- occurs in up to 50% of pos-recipient/pos-donor cases.
- These pts do worse than pos-recipient/neg-donor cases.
- Rates vary between centers. Interesting to note that spread to and from dialysis/transplant staff does not appear to occur.
- Increased rate of expression, increased severity expected with higher degree of immunosuppression, especially OKT-3. Since CsA is assoc. with decreased rejection episodes and less need for lymphocytotoxic drugs, CsA may be assoc. with lower incidence of symptomatic infection for a given rate of allograft survival.

Specific Infectious Agents: CMV

Clinical Syndromes

a. Prolonged fevers

assoc with malaise, anorexia, arthralgias. Can look like Mono but no lymphadenopathy or hepatosplenomegally.

b. Pneumonia

Spectrum from dry cough to hypoxia, tachypnea and frank resp. distress. CXR shows interstitial pattern bilat. most commonly, occasional infiltrates, rare solitary nodule. Usual course is subacute, evolving over days - rapid deterioration should alert to possibility of acute bacterial superinfection, also PCP.

c. Hematologic Abnormalities

Leukopenia, thrombocytopenia, Mononucleosis.

d. Hepatitis

Increased LFT's classic but may be difficult to separate from NANB in transfused pt.

e. Gastroenteritis

Lethal CMV Syndrome assoc. with R colon hemorrhage.
Stomach, small intestine also may be infected.

f. Encephalitis/Myelitis

g. Cutaneous Vasculitis

h. Chorioretinitis

Major late manifestation: sx of blurring, scotoma, decreased acuity. May be unilateral or bilateral.

Fundi show white dots or patches with perivascular sheathing. Reports of retinal detachment or glaucoma.

Specific Agents: CMV

- 4. Effect on net state of immunosuppression
- - neutropenia
- - superinfection with PCP, Aspergillus,
- Listeria, less commonly GNR or Candida.
- - lymphocytotoxic IgM has been demonstrated
- in CMV pts (a rheumatoid factor)
- - Cell mediated immunity impaired with
- Anergy, suppressed monocyte, NK cell
- function.
-
- 5. Allograft dysfunction due to CMV
- 2 large studies looked at this:
- Univ. Minnesota - CMV assoc. with worse allograft fxn.
- Multicenter trial had similar results
- Rare case reports of CMV induced interstitial nephritis.
- Unique EM/IF findings not seen in other
- immunosuppressed pts. with CMV.
-
- 6. Malignancy associated with CMV
- Prostate, Colon, Kaposi's sarcoma(75-100% of cases CMV+).

Specific Agents: CMV

- Management of CMV
-
- PREVENTATIVE
- 1)decrease risk of acquisition
- match kidneys to +donors
- Living related Tx.
- 2)immunologic manipulation
- Vaccines ineffective
- Anti-CMV globulin not proven

THERAPEUTIC
Decrease drugs
Stop OKT-3
Gancyclovir
Anti-CMV globulin
TMP/SMX to prevent superinfection with PCP.

- 3)anti-viral prophylaxis
- Acyclovir
- Interferon alpha may be effective but patients feel terrible and
- increases graft loss.
-

BK virus

- Named after the patient from whom the virus was isolated
- BK Polyomavirus is a small virus that establishes infection in the renal tubular and uroepithelial cells
- When it reactivates in the recipient, it can lead to AKI and premature graft loss
- Pathology: tubular injury, EM shows intranuclear viral inclusions
  - (CMV is cytoplasmic inclusions)
  - (HSV has both cytoplasmic and Intranuclear inclusions)
- Reduction of immunosuppression is the only treatment, no antiviral agent is effective.

Specific Infectious Agents HSV

- 1.HSV 1 AND 2
- All disease is reactivation - HSV-1 oral/esophageal
- HSV-2 anogenital
- Present in 2nd to 6th week, predispose to bacteremia,
- meningoencephalitis.
- Will see increased titers and increased viral shedding in all pts post-transplant.
- Acyclovir 200 mg BID assoc. with decreased time of viral shedding, decreased incidence of symptomatic disease.

Specific Infectious Agents VZV

- . Varicella Zoster Virus
- 7-9% incidence in transplant population, usually occurs 2 months to 3 years post-op.
- Primary - treat with Zoster immune globulin and Acyclovir.
- Shingles - do not automatically need to change immunosuppression.
- Disseminated - pneumonia, hepatitis, DIC, encephalitis.
- may need to stop immunosuppression.
-

Specific Infectious Agents EBV

- EBV
- Incidence: 15-20% in normal population, increased to 50-60% of transplant pts.
- Spectrum from Mono-like syndrome to death.
- No known direct graft effect, but does increase net state of immunosuppression.
- May be assoc. with late development of lymphoma.
- Diagnosis - VCA (viral capsid antigen), EBNA (Epstein-Barr Nuclear antigen) positive in all pts. Increased EA (early antigen) in pts post- ALG or OKT-3.
- Treatment is supportive.

Specific Infectious Agents: HIV

- No longer a barrier to transplant as Immunosuppressive regimens and HIV treatment have advanced.

Specific Infectious Agents: Other Viral syndromes

- PAPOVAVIRUS
- Approximately 7% of transplant pts. culture positive from urine.
- Spectrum of disease: diabetes, arterial occlusive disease, ureteral strictures, assoc. with PML, probably oncogenic.
-
- ADENOVIRUS
- Associated with hemorrhagic cystitis and upper respiratory tract infections.
-
- Parvovirus
  - Associated with acute Mono-Oligo articular arthritis (ankle, knee)

Specific Infectious Agents: Hepatitis B

- Hep B:
  - Goal is to prevent infection or reactivation in the recipient
  - If HepBsAg is positive, check HepBeag, HBV DNA level, and liver biopsy for cirrhosis
  - If vaccinated and has antibody titer over 10 mIU/ml, they are immune
    - Otherwise needs booster
    - Will still need antiviral therapy for at least 1 year
  - If recipient has no immunity (titer undetectable/ less than 10) may give HepB Immune globulin and then antiviral therapy for at least 1 year
  - If recipient has prior infection, can proceed with transplant and retroviral therapy for 3/6 or 12 months.
  - If recipient has chronic hepatitis, plan antiviral therapy lifelong to prevent reactivation.

Specific Infectious Agents: Hepatitis B

- Hep B with chronic infection or prior infection:
  - Goal is to prevent infection or reactivation in the recipient
  - If HepBsAg is positive, check HepBeAg, HBV DNA level, and liver biopsy for cirrhosis
  - If vaccinated and has antibody titer over 10 mIU/ml, they are immune
    - Otherwise needs booster
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  - If recipient has no immunity (titer undetectable/ less than 10) may give HepB Immune globulin and then antiviral therapy for at least 1 year
  - If recipient has prior infection, can proceed with transplant and retroviral therapy for 3/6 or 12 months.
  - If recipient has chronic hepatitis, plan antiviral therapy lifelong to prevent reactivation.

Specific Infectious Agents: Hepatitis B

- Hep B with no evidence of prior infection:
  - Recipient can proceed without antiviral therapy and monitor
  - If the recipient has immunity, no therapy
  - If recipient has prior Hep B infection, can proceed with antiviral therapy for 6-12 months
  - If recipient has chronic HepB infection anticipate lifelong therapy

  - Treatment:
    - Hep B Immunoglobulin for Hep Negative recipient of Hep + donor
    - Entecavir and Tenofovir – not nephrotoxic but need dose adjustment based on renal function.

Specific Infectious Agents: Hepatitis C

- Hep C
  - Recipient with HCV infection has worse patient and allograft survival after Transplant compared to recipient without infection
  - Transplant of Hep C positive Donor requires treatment
    - Delay in treatment may be associated with increased incidence of CMV and BK virus

  - Treatment:
    - Epclusa / Sofosbuvir-Velpatasvir for 12 weeks in all HCV Genotypes
    - OR Ledipasvir-Sofosbuvir for 12 weeks in Genotypes 1, 4,5,6
    - OR combo of Sofosbuvir-Velpatasvir-Voxilaprevir for 12 weeks in all genotypes
      - As long as they do not have decompensated Cirrhosis.

Specific Infectious Agents:Fungi

- Look for skin breaks/ rashes , lines, pulmonary infection, and lung-brain syndromes.
- More common after take back to surgery within 7-10 days

Specific Infectious Agents: Protozoa

- PCP and toxo in usual spectrum of disease

Specific Infectious Agents: legionella

- Variable incidence with risk dependent on contamination of facility, increased with increased dose of steroids, need for dialysis. Reservoir originally thought to be air-conditioning cooling towers, but now known to be endemic to water supply; proliferate in hot water heaters.
- Mode of transmission still unknown but continues to present with epidemics, especially in transplant pts.
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- 2. Clinical syndromes
-
- a) Pneumonia- fever, cough, variable sputum production with blood tinge. Pleuritic pain common, diarrhea not significantly increased. Also assoc. with encephalopathy not solely due to hypoxia.
- b) Extra-pulmonary manifestations:
- Wounds, Endocarditis, Hyponatremia.
-
- 3. Diagnosis
- Culture on special medium - notify lab when specimen delivered.
- DFA
- Serologies, although these may not turn positive in the immunosupressed.
-
- 4. Treatment
- Erythromycin 1 Gm q6h for 21 days, TCN alternate.

Specific Infectious Agents: legionella

- 5. Prevention
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- Protocols are available for decontamination of water systems.
- Need active surveillance program.
- In contaminated environment or ongoing epidemic,
- prophylaxis with Erythromycin 1.5-3.0 Gms/day has been shown effective (Vereerstaeten, 1986.)
- Or azithromycin.
- There is 1 study of successful prophylaxis with TMP/SMX (CMAJ May, 1989.)
-

UTI in transplant

- SCOPE
- -most common infection, occurring in 35-75 % of
- cases.
- -source of up to 60 % of bacteremias.
-
- PATHOGENESIS
- -3 main predisposing factors:
- technical complications related to surgery
- catheterization
- immunosuppression
- - as well as trauma to kidney, smoldering infection
- in native kidneys.
-
- IMPACT
- 1) Direct morbidity of infection
- - in first 3 months, likely to be invasive and
- assoc. with bacteremias or abscess.
- - after 6 months less invasive

UTI in transplant

- A. UTI IMPACT continued
- 2) Nonspecific stimulation of immune system
- - anti-kidney antibodies have been shown to
- develop in pyelonephritis.
- 3) Antibody coated bacteria may be assoc. with
- higher relapse rate.
-
- MANAGEMENT OF UTI'S
- 1) native Nephrectomy in pts. with documented UTI's in past
- 2) TMP/SMX or other prophylaxis can reduce rate to <4%.
- 3) Cath. tip culture may be predictive of organism in later
- UTI.
- 4) All UTI's contracted in 1st 3 months should receive
- prolonged tx.
- 5) If pt. has poor renal fxn. (creat. > 2) consider following
- treatment by chronic suppressive antibiotics.
- 6) In nonbacteremic UTI > 4 months post-transplant, routine
- therapy for 14 days is sufficient.
- 7) Nystatin prophylaxis whenever on abx.usually every 2-3 days
-

Gastro-intestinal syndromes

- 1. ANTIBIOTIC ASSOCIATED DIARRHEA
- 2. CMV ENTEROCOLITIS - see CMV
-
- 3. HEPATITIS
- - LFT increase occurs in 7 - 60 %
- - true chronic hepatitis occurs 6 - 16 %
- - Most recipients acquire Hep B while on dialysis,
- rare to acquire from allograft.
- - Hepatitis B is assoc. with high mortality if
- presents in 1st 2 years.
- - Vaccines work poorly, biopsy early on not
- predictive of outcome.
- - ETIOLOGIES:
- Hepatitis B, Hep C , CMV,
- rarely HSV, VZV, EBV.
- Drug-induced: CsA and Imuran dose-related.
- Idiosyncratic cases from Aldomet, INH,
- Phenothiazines.

Pneumonia/ Pneumonitis

- 1. Keep in mind that not all infiltrates are infection:
- also may be due to PE, drugs or transfusion, hemorrhage, pulmonary edema, aspiration, oxygen toxicity, or new neoplasm.
- Hopefully there is an associated symptom or sign which will help differentiate and narrow the list of likely agents. Consider history of exposure, timing after transplant, association with drug infusion or transfusion, volume overload.
- 2. -Look for: a. rashes or skin lesions; b. diarrhea
- scaley- fungal legionella
- vesicles- HSV, VZV cryptosporidium
- necrosis- MAI CMV
- abscess- Staph A., Nocardia
- Ecthyma gangrenosum- P. aeruginosa, also
- Aeromonas, enterobacter, Vibrio.
-
- c. "lung-brain" syndrome d. Hypoxia- PCP with high LDH
-
- e. Increased LFT's: CMV most common, Nocardia,
- Hepatic abcess
- Hepatitis C, legionella, mycobacteria,
- Histo, Toxo

Pneumonia Syndromes in Transplant continued.

- 3. Superinfection should be considered in any pt. who
- responds initially then deteriorates: major organisms include GNR's, Aspergillus, Nocardia, and Pneumocystis.
-
- 4. Diagnostic Approach
- simple and basic: sputums, culture;
- consider bronchoscopy vs open lung biopsy vs fine needle aspiration/biopsy.
- Serologies may not be helpful as
- many pts will not have serologic response.
-
- 5. TREATMENT depends on results, clinical suspicion
- based on history, timing, any ongoing trends in the
- individual unit, and what, if any, prophylaxis the
- pt. has been receiving.

Lung –Brain Syndromes

- 1. Fungal
- a. Cryptococcus Neoformans
- Most common cause of meningitis late post-
- transplant.
- Approx. 30% will also have cough
- Lung primary portal of entry, also can enter via
- skin, UTI.
- Tx: Ampho-B, 5-fluorocytosine / Flucytosine, fluconazole .
-
- b. Aspergillus fumigatus
- 2nd most common.
- primary site always lung, usually follows viral
- or bacterial infection but may be "sentinel".
- Tx: Ampho-B started early; wedge resection.
- Bone or brain scans may be useful in early
- dx.
-
- c. Nocardia asteroides (actually filamentous
- bacteria)
- Tx: high dose PCN.
-
- d. Phycomycetes
- e. Usual fungi- Histo, Blasto, Cocci/paracocci.
-

Lung –Brain Syndromes

- 2. Viral
- Rare cases of HSV, CMV, VZV; usually obvious
- etiology by this stage.
-
-
- 3. Mycobacteria
- Incidence about 1 %; fatal in 4/10000 cases.
- Spectrum of disease: cavitary to miliary, skin to
- bone, primary or transmitted with allograft.
- Atypical mycobacteria: M. kansasii spectrum same as
- above;
- skin involvement main feature of M. marinum,
- haemophilum, chelonei.
- Management:
- - INH prophylaxis for 6-9 months prior to transplant
- - PPD during pre-tx workup, recognizing high false neg.
- rate in dialysis pts.
- - close surveillance
- ** - Note anti-TB drugs increase metabolism of steroids
- ** - Rifampin increases metabolism of Cyclosporin

CNS syndromes

- SCOPE: up to 10 % of all transplant pts.
- PATTERNS: 1) Acute to subacute- Listeria by far most common.
- 2) Subacute to chronic- Cryptococcus Neoformans,
- T.B., Coccidioides immitis.
- 3) Abscess with focal deficits- Aspergillus fumigatus
- is most common. Also seen with Listeria, Toxo,
- Nocardia.
- 4) Progressive dementia- Papovirus, JCV.

- TIME COURSE 1st month relatively free,
- 1 - 4 months > 4 months
- Listeria Listeria
- Toxo Cryptococcus
- Aspergillus
- Nocardia

- Note meningismus may be absent due to steroids, CNI inhibitors

Line Infections/ Bacteremia

- Line infections: Staph Aureus as pts colonized even before surgery,
- also staph epi., and importantly Corynebacterium JK.
- Opportunistic fungi including C. albicans, Aspergillus, Torulopsis glabrata.
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- Bacteremia: majority assoc. with UTI
- GNR sepsis usually due to GI tract complication as a result of neutropenia, translocation, or perforation. Typical organisms Listeria, Salmonella; if splenectomized, also consider H. Influenza and Pneumococcus.
- Special note: Identification of Listeria bacteremia warrants LP

Dermatologic Infections

- 1. Infection originating in skin and typical of
- general population:
- Strep/staph cellulitis
- Crypto, Candida.
-
- 2. Extensive involvement with what normally is
- localized:
- Disseminated HSV, Varricella,
- Papillomavirus, Nonvirulent fungi.
-
- 3. Opportunistic
- Fungal - Paecilomyces
- Mycobacterium marinum
- Algae - Protheca wickerhamii
- Aspergillus, Candida, Rhyzopus
- Usually associated with skin trauma, i.e. wound or tape burn

Dermatologic Infections

- 4. Dissemination to skin from another source.
- Pseudomonas aeruginosa
- TB, Histo, Cocci, Blasto
- Nocardia, Crypto, Aspergillus, Mucor,
- Candida.
- All obviously Very bad prognostically.
-

Transplanted Infections from Donor

- A. VIRUSES
- HIV- including case of pseudo-negative donor after
- massive transfusion (Bowen, Annals 1988, vol 108)
- CMV
- HSV
- EBV
- Hepatitis B and D
- Adenovirus
- B.BACTERIA
- All types as well as Mycobacteria, Incidence of
- atypicals 2-23 %.
- C. FUNGI
- Candida, others. present in 0.2 - 2.5 % of perfusate cultures, represents about 2-10 % of all positive cultures.
- D. PARASITES
- Malaria Strongyloidiasis
- Toxo Trypanosomiasis

Infectious problems specific to Liver transplant

- Differ from renal transplants mainly in first month, due to technical problems of liver transplant:
- 1) Related to vascular anastomotic problems:
- 4 anastomoses required, plus fem-ax bypass
- sepsis results from thrombosis or hematoma
- multiple organism sepsis suggests biliary
- anastomotic damage
- - frequently due to ischemic biliary ducts.
- 2) Related to biliary anastomosis:
- a) choledochocholedocostomy
- leaves sphincter of Odi intact, less
- bacterial reflux
- stenosis can lead to secondary infection
- b) choledochojejunostomy
- reflux - usually colonized but only infected
- if liver or duct traumatized.
- c) Management: Cefazolin pre-op continued 5 days
- post-op, then TMP/SMX for 4-6 months; this
- usually results in colonization with staph.
- epi. or enterococcus, therefore
- pre treat with Vanc. for any manipulation of
- biliary tree.

Infectious problems specific to Liver transplant

- 3) Wound infection:
- significant increase with each reoperation,
- including Candida
- 4) Pulmonary:
- obvious predisposition, increased if on vent > 4 days or if preop aspiration.
- 5) Line infection:
- same as renal transplant: Candida,staph. epi.,
- Corynebacterium JK
- Infection after 1 month same as renal, particularly CMV due to greater immunosuppression.

Summary for Infection in the Transplant patient/ immunocompromised Host

- - concepts of Sentinel infection and net state of
- Immunosuppression.
- - Nystatin s/s whenever on antibiotics
- - TMP/SMX post-op through about 6 months
- - Erythromycin prophylaxis for high risk Legionella
- environment
- - Fortaz or other intraop. antibiotics prophylaxis for
- wound/UTI infection
- - Acyclovir 200 BID in all for HSV prophylaxis
- - Acyclovir 200 5x/day prophylaxis in CMV neg recipients of
- CMV pos organ.
- - Gammimmune prophylaxis likewise.
- - VZIg for Varicella neg pts exposed to Chickenpox or
- shingles.
- - consider nephrectomy in pts with prior hx UTI's
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