HIV DILEMMAS

HIV -- Background
Mother-to-Child Transmission

- 25% risk of MTC transmission
- Triple antiretroviral therapy for woman + zidovudine* for the infant x 6 wks, reduces the risk to 1-2%
- What if the scenario is different?

*AZT, Retrovir®, ZDV

Case 1

- A 20 y/o woman is HIV (-) at 4 months gestation
- At delivery a rapid HIV antibody screening test is (+)
  - She will deliver before a confirmatory test (Western Blot) is available
- What needs to be done?

---

Case 1

- Is this a true positive (infected) or a false positive test?
  - Unknown without the confirmatory test
- Options:
  1. Do nothing — if the woman is infected, infant has 25% risk
  2. Treat the woman — with ARV and start the infant on zidovudine after delivery — reduces the risk to 5-10% (est.)
Case 1

- Side effects of short term zidovudine are minimal
- The emotional impact/anxiety on the family is going to be significant
  - It might be alleviated somewhat by beginning treatment

Case 1

- Once the Western Blot result is available:
  - If WB(−) — The woman is not infected — stop infant medication
  - If WB (+) — The woman is infected — continue medication and begin evaluation of the infant
  - If WB is indeterminate —
    - Continue medication, but do not begin testing the infant until mom’s status is determined
    - Consider a PCR on mother

Case 2

- As for Case 1, but ELISA on the woman is not back at time of delivery
- Shortly after delivery the lab calls and indicates that the ELISA is positive

Case 2

- Begin zidovudine — the earlier the better
  - Risk will be reduced to 10-15%
  - There is no benefit if medication is begun after 72 hours
  - Benefit begins to decline after 48 hours

Note:

- AZT is the original abbreviation for azidothymidine (Retrovir ®)
- It is more correctly called zidovudine (ZDV)
- Some EMRs will convert “AZT” to “azathioprine”
• Wound infections
• Rabies exposures
• Tetanus

History is everything:
• Type of bite/exposure
• Type of Animal
• Site of exposure
• Tissues penetrated

Dog Bites
• Dogs tend to tear when they bite

Cat Bites
• Cats cause deep puncture wounds (bones, joints, muscles, vessels, nerves)

Animal Bite Wound Infections
• Animal—type of bite
• Location
• Organisms
  — Animal’s oral flora
  — Skin flora
  — Environmental contaminants
• Assessment
• Initial treatment
• Follow-up

Rate of Infections — with good wound care
Bradley R, in Jenson and Baltimore, Pediatric Infectious Diseases 2nd edition 2002

• Animal
  — Dog bite - 4%
  — Cat bite - 50%
• Empiric Therapy
  — Dog bites typically do not require empiric Abx
  — Cat bites always need empiric Abx
Animal Bite Wound Infections

- Organisms
  - S. aureus: 40%
  - Pasteurella multocida: 40% (higher in cats)
  - Streptococci (various): 40%
  - Corynebacterium: 20%
  - Coag neg. staph: 20%
  - Aerobic GNR: 15%
  - Anaerobic streptococci: 40%
  - Bacteroides: 20%

Bradley JS, in Jenson and Baltimore; Pediatric Infectious Diseases; 2nd edition 2002

Other less common organisms
- Bartonella henselae
- Fusobacterium
- Pseudomonas
- Clostridium tetani
- Capnocytophaga canimors
- Herpes B virus

Bradley JS, in Jenson and Baltimore; Pediatric Infectious Diseases; 2nd edition 2002

Wound Care

- Irrigation
  - Difficult with penetrating wounds (cats)
- Debride if possible
- Suturing
  - Do not suture penetrating cat bite wounds
  - Debrided dog bite wounds can be sutured (unless extensive or devitalized tissue remains)

Bite Wound Complications

- Hands, face and genital wounds are especially dangerous
- Nerves, tendons, bones, joints, blood vessels can be penetrated and deep infections may occur

Prophylactic Management of Animal Bite Wounds to Prevent Infection

AAP Redbook online (2009)

Operative débridement and exploration
Yes if one of the following:
- Extensive wounds (devitalized tissue)
- Cranial bites by large animal

Wound closure
Yes for selected fresh, nonpuncture bite wounds

Assess tetanus immunization status
Yes

Assess risk of rabies from animal bites
Yes

Initiate antimicrobial therapy
For:
- Moderate or severe bite wounds, especially if edema or crush injury is present
- Puncture wounds, especially if penetration of bone, tendon sheath, or joint has occurred
- Facial bites
- Hand and foot bites
- Genital area bites
- Wounds in immunocompromised and asplenic people
- Wounds with signs of infection

Follow-up
- Inspect wound for signs of infection within 48 h

AAP Redbook online (2009)
AAP Redbook online (2009)

<table>
<thead>
<tr>
<th>Source of Bite</th>
<th>Organism(s) Likely to Cause Infection</th>
<th>Oral Route</th>
<th>Intravenous Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dog, cat, or other mammal</td>
<td>Pasteurella spp.</td>
<td>Amoxicillin-clavulanate (Augmentin®)</td>
<td>Extended-spectrum cephalosporin or trimethoprim-sulfamethoxazole</td>
</tr>
<tr>
<td></td>
<td>Staphylococcus aureus</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anaerobes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Capnocytophaga species</td>
<td>Amoxicillin-sulbactam (Unasyn®)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moraxella species</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Corynebacterium spp.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neisseria spp.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PLS Clindamycin
OR Ceftazolin or meropenem

UC Davis Children’s Hospital patient becomes third person in U.S. to survive rabies 6/12/2011

RABIES

Rabere (lat.)—to rage

Austin American Statesman April 16, 2011

At first, Paul Lefforge, 63, thought he felt his dog breathing down the back of his neck as he was lying on the ground to work on his trailer in northeastern Williamson County. But when he turned his head, he saw it was a skunk. "It bit me on the back of my head, just underneath my ear," he said........

Rabies virus (a rhabdovirus)

- Bullet shaped RNA virus
- Mammals
- Central nervous system
  - Found in neural tissue
  - Found in saliva
  - Not in blood
Rabies Exposure

- Did an exposure occur?
- The animal
  - Domestic
  - Wild
    - Bat exposures—a special situation
- The Situation

The animals

- Domestic
  - Cats
  - Dogs
  - Cattle
  - Horses
  - Goats/Sheep
- Wild
  - Bats*
  - Skunks
  - Raccoons
  - Wolves/coyotes
  - Foxes
  - other

Exposure

- Bite
- Saliva into open wound or mucosa
- Contact with neural tissue

- Exposure solely to blood or fur is not considered contact

Situation

- Wild animal
  - Unprovoked attack
  - Abnormal behavior
- Domestic animal—
  - known to be immunized?
  - provoked by child?
  - Unprovoked?
  - Available for observation?

Bats — Special Situation

- Rabies postexposure prophylaxis is recommended for all persons with bite, scratch, or mucous membrane exposure by a bat, unless the bat is available for testing and is negative for evidence of rabies.

http://www.cdc.gov/rabies/exposure/animals/bats.html
• Postexposure prophylaxis should be considered when direct contact between a human and a bat has occurred, unless the exposed person can be certain a bite, scratch, or mucous membrane exposure did not occur.

http://www.cdc.gov/rabies/exposure/animals/bats.html

Table 3.57. Rabies Postexposure Prophylaxis Guide (AAP Redbook)

<table>
<thead>
<tr>
<th>Animal Type</th>
<th>Evaluation and Disposition of Animal</th>
<th>Postexposure Prophylaxis Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dogs, cats, and ferrets</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Healthy and available for 10 days of observation</td>
<td>1. Prophylaxis only if animal develops signs of rabies*</td>
</tr>
<tr>
<td></td>
<td>2. Rabid or suspected of being rabid b</td>
<td>2. Immediate immunization and RIG c</td>
</tr>
<tr>
<td></td>
<td>3. Unknown (escaped)</td>
<td>3. Consult public health officials for advice</td>
</tr>
<tr>
<td>Bats, skunks, raccoons, foxes, and most other carnivores; woodchucks</td>
<td>Regarded as rabid unless geographic area is known to be free of rabies or until animal proven negative by laboratory tests b</td>
<td>Immediate immunization and RIG c</td>
</tr>
<tr>
<td>Livestock, rodents, and lagomorphs (rabbits, hares, and pikas)</td>
<td>Consider individually</td>
<td>Consult public health officials. Bites of squirrels, hamsters, guinea pigs, gerbils, chipmunks, rats, mice and other rodents, rabbits, hares, and pikas almost never require antirabies treatment.</td>
</tr>
</tbody>
</table>

Prophylaxis (Passive immunization)

• Rabies Immune Globulin (RIG)
  – 20 IU/Kg
    • Infiltrate wound (as much as feasible)
    • Remainder is given IM
  – Begin as soon as possible after injury
    • Ideally within 24 hours
    • If unavailable give active vaccine first and RIG later (if within 7 days)

Active Immunization

• Begin active rabies vaccine concomitantly with RIG (separate site)
• IM – deltoid
  – Anterior thigh for young children
• 4 Doses* -- days 0, 3, 7, 14

* Advisory Committee on Immunization Practices June 24, 2009

Guide to Tetanus Prophylaxis in Routine Wound Management in Children 7 Years of Age and Older

<table>
<thead>
<tr>
<th>History of Absorbed</th>
<th>Clean, Minor Wounds</th>
<th>All Other Wounds*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetanus Toxoid (Doses)</td>
<td>Td or Tdap b</td>
<td>TIG c</td>
</tr>
<tr>
<td>&lt;3 or unknown</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>3 or more a</td>
<td>No a</td>
<td>No</td>
</tr>
</tbody>
</table>

Guide to Tetanus Prophylaxis in Routine Wound Management in Children 7 Years of Age and Older
Fever of Unknown Origin

- FUO is a term that is often misused
- It has a specific definition(s):

Fever Without Localizing Signs (FWLS)

- The duration does not yet meet the criteria for FUO (< 8 days)
- or the w/u is not yet complete
Practical Tips

- Fever ≠ Infection
- Antibiotics ≠ Antipyretics
- Significant Infections will usually declare themselves in a short time
- Most common viral infections resolve in 5-7 days

Fever for a few days every week or month is not typical for infections – Periodic fevers often have an immunologic (genetic) origin

FUO--What to Do

- Take a thorough history, including:
  - Has fever been truly documented?
  - “100 and 4” (100.4° or 104°?)
  - What type of thermometer (if any)?
    - Axillary, oral, rectal?
  - Thorough Physical examination

FUO-Basic Workup

- CBC
- UA
- Liver enzymes
- Chemistry
- ESR or CRP?
- PPD
- CXR?
- Blood cultures
- Urine culture
- Throat culture
- Stool culture
- CSF cultures (cell count & chemistry)
- Serologic tests based on known exposures; travel history, etc.

If the appropriate length of time has passed and fever persists
&
Preliminary tests are not revealing
&
The patient remains without localizing signs

Diagnosis of FUO is reasonable

**Etiology**

<table>
<thead>
<tr>
<th>Category</th>
<th>McClung (1972)</th>
<th>Steele et al. (1992)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infection</td>
<td>29%</td>
<td>20%</td>
</tr>
<tr>
<td>Bacterial/Fungal</td>
<td>28%</td>
<td>11%</td>
</tr>
<tr>
<td>Viral</td>
<td>1%</td>
<td>9%</td>
</tr>
<tr>
<td>Collagen Vascular Disease</td>
<td>11%</td>
<td>8%</td>
</tr>
<tr>
<td>JRA</td>
<td>6%</td>
<td>3%</td>
</tr>
<tr>
<td>SLE</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>ARF</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Other</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>Malignancy</td>
<td>8%</td>
<td>2%</td>
</tr>
<tr>
<td>Leukemia/Lymphoma</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>Sarcoma</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>10%</td>
<td>2%</td>
</tr>
<tr>
<td>Factitious</td>
<td>-</td>
<td>1%</td>
</tr>
<tr>
<td>No Etiology</td>
<td>41%</td>
<td>67%</td>
</tr>
</tbody>
</table>
Next steps ($$)

- ANA
- RF
- C3, C4, CH50
- Serologic tests
  - Fungi
  - Viruses (CMV, EBV, HIV)
- Bone Marrow
  - Cultures (Viruses, bacteria, fungi)
  - Stains
  - Cytology
- MRI, CT, Bone scan, etc.

- Avoid antibiotics when possible
- Avoid antipyretics when the diagnosis is unclear
  - Antipyretics can mask symptoms that may be useful in the diagnosis

TUBERCULOSIS

TB Disease

- LTBI
  - Latent tuberculosis infection - asymptomatic state in persons who are infected with *M. tuberculosis*
  - detected by skin testing
  - risk of developing symptomatic TB disease is 10% over a lifetime
    - half of that risk occurring during first 2 years
- Pulmonary
- Extrapulmonary

Pulmonary

- Pulmonary
  - Fever, growth delay, weight loss, cough, night sweats, fever, chills
  - Pulmonary Infections account for 85% of all initial presentations
Extrapulmonary
- Meninges
- Lymph nodes
- Bones, joints
- Skin
- mastoids
- Renal (rare)

TB Prevention

- BCG
  - Reduces severe complications
    • 80% reduction in meningitis and miliary TB in children
  - Less impact on disease acquisition?
    • 50% reduction in one 60 yr follow-up
  - Used in >100 countries
- Close f/u of contacts

BCG --Bacille Calmette Guèrin

- Most widely used vaccination in the world.
- A live, attenuated strain of *Mycobacterium bovis*
- Developed in early 1900s
- first used in 1921
- it remains the only vaccine available against TB
TB Prevention (continued)

- Aggressive f/u of contacts
  - Family members
  - School contacts
- Treatment of those with + LTBI and disease
- Decrease overcrowding
- Isolate infected persons

Case

- A 15 month old child who was born in Guatemala has a + TST (10mm)
- What next? What things need to be considered?

- History and PE
- CXR
- Need to consider:
  - Country of origin
  - Family members (potential sources)
  - BCG
  - Other: travel to and from home country; exposures to anyone who has been incarcerated

Q: Since the child received the BCG vaccine—how do we interpret a + skin test

A: Generally, interpretation of TST results in BCG recipients is the same as for people who have not received BCG*

* AAP Redbook 2009

Is Quantiferon-TB Gold® --It is not recommended for children < 5 years old*

- For children (>5 yrs) and adults, it can distinguish between BCG- and MTb-related immunity

* AAP Redbook 2009
Intravascular Device Infections

Types of catheter infections

• Catheter colonization
• Exit Site infection
• Tunnel infection
• Pocket infection
• Bloodstream infection
  – Infusate-related
  – Catheter-related

Catheter Types

• Short term
  – Peripheral IV
  – Percutaneously placed catheters in large central vein
    • e.g. PICC line
• Long term
  – Broviac or Hickman
  – Inserted into large central vein with subcutaneous tunnel
• Totally implantable
  – Port-a-cath
  – Infuse-a-port

Factors Which Increase Risk of Infection

• Location
  – Femoral vs. Subclavian
• Number of lumens
• Home care
• Underlying illness
• Tunneled vs. non-tunneled
• Characteristics of infusate
Presentations, Signs and Symptoms

- Fever
- Sepsis
- Redness, pus, cellulitis at insertion site
- Hot, tender cord (phlebitis)
- Disseminated infection
  - (osteomyelitis, endocarditis)

Organisms

- **Common**
  - Coag negative staph*
  - *S. aureus**
  - *Together approximately 50%*
  - *Candida albicans*
  - *Enterococcus*

- **Less common**
  - Non-albicans Candida
  - Other yeasts
  - GNR
    - E. coli
    - K. pneumoniae
    - Enterobacter
    - Pseudomonas

Laboratory Diagnosis

- Blood cultures
  - Catheter
  - Peripheral—*When possible*

IDS Guidelines for Intravascular Catheter-Related Infection • CID 2009:49 (1 July) • 1

CLINICAL PRACTICE GUIDELINES FOR THE DIAGNOSIS AND MANAGEMENT OF INTRAVASCULAR CATHETER-RELATED INFECTION: 2009 UPDATE BY THE INFECTIOUS DISEASES SOCIETY OF AMERICA

“Out, damn’d line! out, I say!”*

*Apologies to Wm. Shakespeare
• If both peripheral BC and line culture are positive—bacteremia is confirmed
  – Quantitative cultures are rarely done, but if catheter has 5-10x more organisms than peripheral culture, it is likely to be a catheter source

Antibiotics—Initial Therapy

• Vancomycin (or Clindamycin)
• +/- 3rd generation cephalosporin
• Repeat Peripheral and line cultures 24-48 hours after start of abx

Indications for Line Removal

– Sepsis
– Clinical worsening despite appropriate ABx
– Persistently positive BC after 48-72 hours of ABx
– Septic thrombophlebitis
– Embolic lesions
– Fungal infection
– Tunnel infections or pocket infections usually require removal

Duration

• Usually based on organism
  – Typically 7-14 days after sterilization of blood cultures
• For Disseminated infections
  – 2-6 (occasionally longer) weeks depending on organism and organ system
Other Treatment Options

• Antibiotic lock technique
• Ethanol lock technique