Mammalian Bites

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Tatiana is best known for?

1. she has been more productive of Siberian tiger progeny than any other cat in captivity
2. she is a genetically perfect Siberian tiger whose dna has been harvested and stored
3. a few specific and expected reactions
4. she was rescued from Siberia by a Norwegian mountaineering expedition
Reported Animal Bites

- Dog 60-90%
- Cats 5-15%
- Human .03-23%
- Rodent 2-5%
- Others <1% each

Dog Bites

- Low infection rate
  - 5-10%
- Hand wounds higher risk
  - 13-30%
- Head and neck lower
  - 1.4%
- Superficial cellulitis
  - Easily treated as outpatient
- 1% hospitalized
Cat Bites

- High infection rate
  - 30-50%
- Greater morbidity
- Hospitalizations: 6%
  - (vs. 1% dog bites)

Microbiology of Infected Bites

*Talan et al NEJM, 1999*

- Over 150 isolates from 107 wounds
- All wounds polymicrobial
- Purulent wounds: Median
  - 5 isolates per wound in dog bites
  - 6.5 isolates/wound in cat
Microbiology of Cat Bite Wounds

- *Pasteurella* more commonly isolated
- When isolated, usually found alone


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**Pasteurellla Septicemia**

- Usually *P. multocida*, not always a bite
- Patients at risk
  - Cirrhosis (33% mortality in older series)
  - Immunocompromised: Malignancy, HIV, renal failure
  - Elderly
- Sources: Cats (approx 80%), dogs, swine, rabbit, no known exposure
- Focal infection in 80-90%: peritonitis, meningitis, endocarditis, arthritis, pneumonia (elderly w/lung disease), pericardial tamponade

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**P. multocida**

*In vitro* sensitivities

<table>
<thead>
<tr>
<th>Sensitive</th>
<th>Resistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillin</td>
<td>Dicloxacillin</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>Erythromycin</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>Clindamycin</td>
</tr>
<tr>
<td>Azithro/clarithro</td>
<td>Oral 1st gen cephs</td>
</tr>
<tr>
<td>Quinolones</td>
<td>2nd, 3rd gen cephs</td>
</tr>
</tbody>
</table>
However

- In several series, cat bite infections were successfully treated with erythromycin
- One study on prophylaxis, used oxacillin

Capnocytophaga canimorsus (DF-2)

- Fastidious, slow-growing gram-negative rod
- Associated with dog contact; rarely cats
- 75% of victims have underlying disease
  - Asplenic, lung disease, steroids, alcoholics
- Mortality 28%
  - 75% of deaths in immunocompromised

Capnocytophaga canimorsus Sepsis

- Incubation 1-4 d, then rapid onset of sepsis
  - Purpura, petechiae, gangrene
  - Pneumonia, meningitis, endocarditis, arthritis
  - Renal failure, adrenal hemorrhage, DIC
- Cultures positive in 3-11 days
- Early diagnosis: organism in blood smear
**Capnocytophaga canimorsus**

**Sensitivities**

- Penicillins (including dicloxacillin)
- Erythromycin
- Cephalosporins (preferably 3rd gen)
- Clindamycin
- Tetracycline

**MONKEY BITES**

WHERE DO THEY OCCUR MOST?

1. DOCTORS WITHOUT BORDERS
2. INDIA’S ASHRAM PHYSICIANS
3. PET STORES IN MAJOR CITIES
4. UNIVERSITY MEDICAL CENTERS
Monkey Bites

- Risk for B-virus (Cercopithicine Herpesvirus 1)
- Mostly an issue in lab settings, but also some pets
- Old World, Macaque monkeys
- Exposures require immediate treatment on scene (soap and water x15 minutes for all exposures)
- Or: http://haz-map.com/Macaque.htm

Monkey Bite Prophylaxis

- Skin break or mucosal exposure from a high-risk source: macaque that is ill, immunocompromised, known to be shedding virus or has visible lesions compatible with B virus
- Inadequately cleaned skin or mucosal exposure
- Laceration of head, neck or torso
- Deep puncture bite
- Needlestick associated with tissue or fluid from a source such as the above.

Human Bites

- Two very different entities
  - SIMPLE BITE
  - CLENCHED FIST INJURY (CFI)
- Bad reputation of human bites due to CFI's.
Clenched Fist Injury
High Infection Rate

- Location
  - On the hand, over a joint (MCPJ)
- Mechanism
  - Blow inoculates oral flora deep into wound
  - Opening hand creates closed space
- Fractures, tendon lacerations, joint violation
- Epidemiology
  - Age (15-25) + Alcohol = Delay

Morbidity of CFI’s

- 20-50% present (late) with infection
- Associated injuries in 25% of cases
- Long-term complications: 50%
  - Septic arthritis, osteomyelitis, extensor tendon necrosis, residual joint stiffness
- Complications occur in those presenting with infection

Infection Rate Simple Bites

- Bardsley, 1983
  - Ear bites
  - Sutured/grafted primarily
  - Infection: 10%
Microbiology of Human Bites

- Data comes from CFI's
  - Staph and Strep most common
  - *Eikenella corrodens* in 25%
  - Klebsiella, Enterobacter
  - Pasteurella, Pseudomonas rare
  - Anaerobes always in mixed culture

**Eikenella Corrodens**

- Found in 60% of dental plaque
- Slow-growing, gram-negative facultatively anaerobic rod
- Synergistic with aerobic organisms (strep)
- Osteomyelitis, endocarditis, meningitis
- Worse prognosis

### Sensitive

- Ampicillin
- 2nd and 3rd gen ceph
- Trimethoprim/sulfa
- Tetracycline
- Ciprofloxacin

### Resistant

- 1st gen. cephalosporins
- Dicloxacillin
- Aminoglycosides
- Clindamycin
- Controversial
- Erythromycin
- Parenteral 1st gen. Ceph
- Azithromycin

Suturing

- One randomized, controlled study
- Dog Bites only
- No significant difference in infection rate if sutured or left open (8%)
- Increased rate of hand wound infections in both groups (12%)

Maimaris, 1988
Prophylactic Antibiotics in Dog Bites
Controlled Studies

<table>
<thead>
<tr>
<th></th>
<th>N. Wounds</th>
<th>Placebo</th>
<th>Treated</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Callaham, 1980</td>
<td>107</td>
<td>17%</td>
<td>7%</td>
<td>NS</td>
</tr>
<tr>
<td>Elenbass, 1982</td>
<td>115</td>
<td>0%</td>
<td>3%</td>
<td>NS</td>
</tr>
<tr>
<td>Boemning, 1983</td>
<td>55</td>
<td>3.0%</td>
<td>4%</td>
<td>NS</td>
</tr>
<tr>
<td>Rosen, 1985</td>
<td>66</td>
<td>10%</td>
<td>6%</td>
<td>NS</td>
</tr>
<tr>
<td>Ordog, 1986</td>
<td>420</td>
<td>0.8%</td>
<td>3.6%</td>
<td>NS</td>
</tr>
</tbody>
</table>

Dog Bite Meta-Analysis
*Ann Emerg Med, 1994*

- Antibiotics decrease infection by 50%
  - *But:* number needed to treat is 26.
- Antibiotics decrease rate of hand infections by 75%
  - Number needed to treat is 10

Recommendation: Prophylaxis for hand bites

Meta-Analysis #2
*Cochrane Review, 2001*

- Dog bites: No impact of antibiotics
- Hand bites - any species
  - Reduced infection by 90% (OR 0.1)
  - NNT = 4
- Rec: prophylaxis all bite wounds of hand

Meta-Analysis #3
*2004 Annals EM 4(3):274*

- 1) Human bites - yes
- 2) Hand bites - yes (any species)
- 3) Cat bites - no data, but … yes
- 8 studies, abx prophylaxis statistically sig reduction infection in 1+2 “confirmatory research required.” No evidence of efficacy in dog or cat bites (see 3 above)
- Troy Turner, Alberta “EBEM/ Sys Review”
Prophylactic Antibiotics - Cat Bites
Elenbaas, Ann Emerg Med, 1984

N = 4/6  N = 0/5

Prophylactic Abx Human Bites
Zubowicz & Gravier, Plastic and Reconstructive Surgery, 1991

Wound Care Principles
(in the absence of other data)

High Risk Wounds
• Don’t suture
• Give prophylactic antibiotics

Low Risk Wounds
• OK to suture
• No prophylactic antibiotics

High Risk Injuries
• Source: cat, human
• Wound: puncture, devitalized tissue
• Site: hand, feet, perineal
• Patient:
  – Cirrhosis/ alcoholic
  – Renal disease
  – Lung disease
  – Splenectomy
  – Malignancy, other immunosuppression
  – Elderly
Recommendations

• Dog Bites
  – Avoid suturing hands
  – Prophylactic antibiotics for hands, high risk pts
• Cat bites
  – Suture - face only; prophylactic antibiotics - all
• Human bites
  – CFI’s - leave open, give prophylactic antibiotics

Antibiotic Options

• Dog Bites
  – Unless high risk patient for serious infection, 1st generation cephalosporin
  – Otherwise, Augmentin, 2nd or 3rd gen ceph, azithro, levoquin
• Cat Bites - augmentin, 2nd or 3rd gen ceph, azithro., levoquin (Pcn & 1st gen ceph)
• Human (CFI’s) - augmentin, 2nd or 3rd gen ceph, amp + 1st gen ceph

Initial Management of CFI

• Any laceration in the vicinity of the MCP joint may be a CFI (Some pts mislead us)
• X-ray all CFI (bony injury, FB)
• Meticulous wound management
  – Anesthetize, irrigate, dry field exam
  – Determine if deep structure violation: tendon, bone, joint space, DNVTI
  – Consult with hand surgeon prn

DRYFIELD EXAM

HOW LONG CAN YOU KEEP A BP CUFF UP ABOVE SYSTOLIC FOR NO BLOOD FLOW TO THE AREA?

1. 10 MIN
2. 20 MIN
3. 30 MIN
4. 60 MIN
Simple Bites

• Suture?
  – Anything on the face
• Prophylactic antibiotics?
  – Hands or deep punctures
  – (anxious parents)
• Which antibiotics?
  – Simple, inexpensive; cover staph, strep

Admission?

• Admit CFI’s if:
  – Infected
  – Deep structure injury
  – Pt unreliable or high risk
  – Wound > 24 hrs old (consider)
  – Consultation, close follow-up unavailable

Treating Established Infections

• Given the large number of possibilities, wound cultures may be useful.
• High risk/ SIRS patients -> blood cultures.
• Alert lab for possible unusual organisms
• Cover staph, strep, pasteurella, anaerobes.

THE SOURCE OF MOST HUMAN RABIES 1984-95

1. DOGS?
2. CATS?
3. RACCOONS?
4. BATS?
5. OTHER?

8% 18% 65%
Rabies - US

Human rabies rare: 1-2 cases/year
Wild animals account for 92% of all rabies


- Bat (28)
- Dog/Coyote (2)
- Raccoon (1)
- Skunk (1)
- Mongoose (1)
- Cryptogenic Bat Rabies (90%)
  - 50% no known bat exposure
  - Only 3 aware of (but ignored) bite
  - 3 due to transplanted organs from rabies victim

Resource Phone Numbers

- CDC Rabies Hotline
  404-630-1050
  404-639-2888

- HIV PEPline
  888-448-4911
Key Points

- Dog bites low risk
- Dog *pasteurella* not = cat *pasteurella*
- Staph and strep must always be covered
- Be aggressive with high risk wounds
- Avoid unnecessary rabies prophylaxis, but … it’s a fatal disease. Don’t miss it.

Cat Bites Summary

- High risk of infection and complications
- Must be concerned about *P. multocida* – But also staph and strep

Dog Bites Summary

- Low infection rate except hands
  - Infections can be treated as outpatient
- Ordinary skin and mouth flora
  - *Pasteurella multocida* not a major threat
  - *Capnocytophaga canimorsus* rare, deadly

Managing High Risk Wounds

- Debride dead tissue
- Fewer sutures, avoid deep sutures
- IV prophylaxis in ED when used
- Splint
- Emphasize elevation
- Early wound check
Cat Bites

Suture?
No

Prophylactic antibiotics?
Yes

What organisms?
*P. multocida*, Staph, Strep

What drugs?
Augmentin, Cefuroxime, Diclox + Pen

CFI’s

Suture?
No

Prophylactic Abx?
Yes

Which orgs?
Eikenella, Staph, Strep

Which antibiotics?
Cefuroxime, Ceclor (2ndGenCeph), Augmentin

A parting thought …