Mammalian Bites

Hugh H. West, M.D.
Department of Emergency Medicine
University of California, San Francisco
Topics in Emergency Medicine 11/9/11
hugh.west@ucsf.edu

PREVIEW

• DOG BITES
• CAT BITES
• HUMAN BITES
• MANAGEMENT
• PROPHYLAXIS

THE REGAL SHIBA INU (SEE HACHI)

THE REGAL SHIBA INU (SEE HACHI)
DOG BITE PATIENT

- 22 yom cco dog bit him on the right cheek just pta (0200), EtOH, surprised the dog as the dog was eating, no other complaints
- no co-morbidity, dog and pt shots utd
- PE two jagged tears to the right of mouth, diagonally oriented, approx 6 cm and 3 cm, meeting at the apex of an inf based flap

Q: CLOSE THE WOUND?

YES, COSMETIC IMPACT REQUIRES THAT YOU ADDRESS THIS ONE WAY OR ANOTHER.

Q: PROPHYLACTIC ABX?

1. NOT NECESSARY
2. YES OF COURSE
3. MORE HX?
4. NONE OF ABOVE
management

- EP had surgical training, chose to close, extensive NS irrigation by ED tech, then multilayer closure with good cosmetic result
- no antibiotics, d/c w/ 48h f/u
- no patient discussion re: options
- no involvement of consultants
- no pt discussion of antibiotics

outcome

- infection, suture removal, IV antibiotics, hospitalization and OR by plastic surgery, multiple revisions, had residual scar AND damage to the 7th w/ facial mm impaired and to the 5th with a small sensory loss medial to injury (2/2 infection vs injury)
- nerve function not documented initially
- suggestion: conservative management

Dog Bite statistics

- 4.5 million per year (1.5% of population)
- 19% medical attention (875,000/yr)
- >1/3 to E.D. (316,000 in 2006)
- 31,000 reconstructive surgery 2006 (9.8% of E.D. seems high, 0.7% of 4.5 million)
- admissions up 1993->2008 (86%/ 55% cor)
- fatalities up 1970->2010 (15-> 30/yr)
Quinn 2010 WJEM 11:435

- DB RCT Augmentin vs. placebo x3d
- conducted at UCSF and Stanford
- 94 pts w/ dog bites <12 hrs old

Details of the Study

- Treatment arm: Augmentin x3 days
- First dose given in the emergency dept.
- Exclusion criteria (four):
  1. >12h old
  2. Immunosuppressed
  3. Penicillin allergic
  4. Deep injury
- Wound closure: 35% abx, 70% placebo

Results

- 48 pts on abx w/ zero infections
- 46 pts on placebo w/ 4% infection (2pts)
- CI -1.0 to +4.5% (CI crosses zero)
- More patients needed
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 per wound in cat bites

_Capnocytophaga canimorsus_

- 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, etc
  - Renal failure, adrenal hemorrhage, DIC
- Cultures positive in 3-11 days
- Early diagnosis: organism in blood smear
Fig 1 Peripheral ischaemic gangrene secondary to capnocytophaga septicaemia

Capnocytophaga canimorsus Sensitivities

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

- Low infection rate except hands
  - Infections can be treated as outpatient
- Ordinary canine oral flora, not skin/mrsa
  - Pasteurella multocida not a major threat
  - *Capnocytophaga canimorsus* rare, deadly
Microbiology of Cat Bite Wounds

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


### Pasteurella 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></td>
</tr>
<tr>
<td>2nd, 3rd gen cephs</td>
<td></td>
</tr>
</tbody>
</table>

#### Pasteurella 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
Cat Bites Summary

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

Human Bites

- Two very different entities
  - simple bite
  - clenched fist injury (CFI)
- Bad reputation of human bites due to CFI's.

Infection Rate Simple Bites

- Bardsley, 1983
  - Ear bites
  - Sutured/grafted primarily
  - Infection: 10%
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
- 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

Microbiology of Human Bites

- Data comes from CFI's
  - Staph and Strep common, not mrsa
  - *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

<table>
<thead>
<tr>
<th>Sensitive</th>
<th>Resistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin</td>
<td>1st gen. cephalosporins</td>
</tr>
<tr>
<td>2nd and 3rd gen cephs</td>
<td>Dicloxacillin</td>
</tr>
<tr>
<td>Trimethoprim/sulfa</td>
<td>Aminoglycosides</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>Clindamycin</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>Controversial</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>Parenteral 1st gen. Cephs</td>
</tr>
<tr>
<td>Azithromycin</td>
<td></td>
</tr>
</tbody>
</table>

**Initial Management of CFI**

- Any laceration in the vicinity of the MCP joint may be a CFI (Some pts mislead us)
- X-rays rec for 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

**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
Wound Care Principles
(in the absence of other data)

<table>
<thead>
<tr>
<th>High Risk Wounds</th>
<th>Low Risk Wounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don’t suture</td>
<td>OK to suture</td>
</tr>
<tr>
<td>Give prophylactic antibiotics</td>
<td>No prophylactic antibiotics</td>
</tr>
</tbody>
</table>

Managing High Risk Wounds

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

Risk Factors for Infection

- Source: cat, human, primate, pig, camel
- Location: hand (CFI), oral (thru/thru), perineum
- Type: puncture, old, dirty (devitalized/fbs)
- Patient:
  - Immunosuppression, HIV+, transplant, steroids
  - malignancy/ chemo, splenectomy
  - compliance/ social issues

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 – 1st generation cephalosporin or diclox from older studies, or Augmentin/Ceftin vs Moxifloxacin/Clinda pen-allergic
- Cat Bites – Augmentin, Moxifloxacin pen-allergic
- Human (CFI’s) – Augmentin or Ceftin, Moxiflox or Clinda for pen-allergic patients

Simple Bites

- Suture?
  - Anything on the face
- Prophylactic antibiotics?
  - Hands, deep puncture/ injury below, cats
  - (anxious patients/parents)
- Which antibiotics?
  - Simple, inexpensive vs augmentin/moxi

Admission?

- Consider Admission of bites or CFI’s if:
  - Infected
  - Deep structure injury
  - Pt high risk or compliance issues
  - Wound > 24 hrs old
  - Consultation, follow-up not available

Antibiotic Prophylaxis

- Augmentin 500 mg po q12h x5d
- Ceftin 250-500 po bid x5d
- Moxiflox 400mg q24h x5d
- Dicloxacillin 250 po q6h x5d
- Keflex 500 po q6h x5d
- TMP-SMX 160 po bid x5d
- MRSA coverage not necessary
Prophylactic Antibiotics in Dog Bites
Controlled Studies

<table>
<thead>
<tr>
<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>
</tr>
<tr>
<td>Elenbass, 1982</td>
<td>115</td>
<td>0%</td>
<td>3%</td>
</tr>
<tr>
<td>Boenning, 1983</td>
<td>55</td>
<td>3.0%</td>
<td>4%</td>
</tr>
<tr>
<td>Rosen, 1985</td>
<td>66</td>
<td>10%</td>
<td>6%</td>
</tr>
<tr>
<td>Ordog, 1986</td>
<td>420</td>
<td>0.8%</td>
<td>3.6%</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%
  - 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*

% Percent infected

<table>
<thead>
<tr>
<th>Placebo</th>
<th>Oxacillin</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 4/6</td>
<td>N = 0/5</td>
</tr>
</tbody>
</table>

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

% Percent Infected

<table>
<thead>
<tr>
<th>Placebo*</th>
<th>Cefaclor</th>
<th>Kefzol &amp; Penicillin</th>
</tr>
</thead>
<tbody>
<tr>
<td>47%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Key Points

- Dog bites low risk
- Dog *pasteurella* not = cat *pasteurella*
- Staph and strep should be covered
- Be aggressive with high risk wounds
- MRSA not a consideration according to the published literature (oral no skin flora)