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Author(s): Jim Holliman, M.D., F.A.C.E.P., Uniformed Services University, 2012

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Mammal and Human Bite Injuries

Jim Holliman, M.D., F.A.C.E.P.

Program Manager, Afghanistan Health Care Sector Reconstruction Project

Center for Disaster and Humanitarian Assistance Medicine

Professor of Military and Emergency Medicine

Uniformed Services University

Bethesda, Maryland, U.S.A.

Mammal Bite Injuries
Lecture Outline

- Non-bite injuries from animals
- Dog, cat, & rodent bites
- Human bites
- Rabies
- Tetanus

Relative Annual Death Rates (Worldwide)

- Suicides : 400,000
- Murders : 200,000
- Snakebites : 60,000
- Crocodiles : 1,000
- Farm animals : 800 (mostly from kick injuries)
- Tigers : 500 (?)
  - 1 million people eaten over last 5 centuries
- Lions : 400
- Leopards : 300
- Hippos : 300
- Elephants : 200

North American Large Wild Mammals Attack Risks

- Grizzly bears : 6 deaths in Yellowstone since 1900 ; 7 deaths in Glacier N.P. since 1907 ; maybe average of one death per year in Alaska
- Black bears : almost no reports of attacks
- Polar bears : very rare attacks
- Moose : some injuries but very rare deaths
- Jaguar , mountain lion : only one case each
- Bison : about one death per year
- Musk, ox, mountain sheep and goats : almost none
- Coyotes, wolves : almost none

The most dangerous mammal in North America

The Most Dangerous U.S. Big Game Mammals : Deer & Moose

- Kill over 100 people per year in car vs. animal collisions
- 1994 review of moose vs. car incidents in Maine :
  - 658 collisions
  - 70 % of vehicle occupants hospitalized
  - 17 % had cervical spine injuries
  - 9 % died

Averater, Wikimedia Commons

Mammal Bites : Epidemiology

- > 50 million pet cats & dogs in U.S.
- > 1,000,000 bites / year in U.S.
- 200 to 800 bites / 100,000 people per year
- 80 to 90 % of bites due to dogs
- 1 to 2 % of bites need admission
- 10 to 12 deaths from dog bites per year
- Tremendous economic cost

Venomous Mammals
(medical trivia)

- Only 3 known :
  - Short-tailed shrew (Blarina brevicauda) in northeastern U.S.
    - Secretes protein venom from maxillary glands
    - Injects venom with lower incisors
    - Venom causes edema, pain up to 2 weeks duration
    - No specific treatment
  - Male platypus (Ornithorhynchus anatinus) in Australia
    - Injects venom from hollow spur in hind leg
    - Causes pain, edema, lymphangitis
  - Spiny anteater (echidna) in Africa
    - Similar spur and venom
    - No reported human injuries

Mechanisms of Injury From Animals

- Horses
  - Bite frequently
  - Kick backward with both feet
- Cattle
  - Bite rarely
  - Kick forward with one foot
- Camels
  - Bite and kick
- Ostriches : kick & attempt to disembowel

Diseases Transmissable From Mammals to Humans (By Bite, Scratch, or Lick)

- Brucellosis
- Melioidosis
- Glanders
- Pasteurellosis
- Plague
- Yersiniosis
- Tularemia
- Rat-bite fever
- Tetanus
- Erysipeloid
- Staph Toxic Shock
- Tuberculosis
- Q fever
- Murine typhus
- Leptospirosis
- Simian herpes
- Foot and mouth disease
- Rabies
- Cat scratch disease
- Lymphocytic choriomeningitis
- Simian hepatitis
- Rio Bravo infection
- Sporotrichosis
- Blastomycosis

Mammal Bites By Species

- New York City
  - Dogs : 89 %
  - Cats : 4.6 %
  - Rodents : 2.2 %
  - Humans : 3.6 % !
- Ohio
  - Dogs : 91.6 %
  - Cats : 4.5 %
  - Rodents : 3 %
  - Humans : 0.03 %

Average Infection Rates From Mammal Bites

Dogs :	2 to 5 %
Cats :	30 to 50 %
Rats :	2 to 10 %
Monkeys :	25 %
Humans :	13 to 50 %*

*Higher rates reported mainly from delayed presentations

Mammal Bites : Etiologic Agents for Wound Infections

- Dogs
  - Staph. aureus : 10 to 30 %
  - Strep species : 30 to 50 %
  - Pasteurella multocida : 0 to 30 %
  - Corynebacterium species : 10 to 30 %
- Cats
  - Pasteurella multocida : 60 to 80 %
- Rodents
  - Strep species : 30 to 70 %

Mammal Bites : Increased Infection Risk Factors

- Age < 2 or > 50 years
- Diabetes
- Immunosuppressive illness
- Chronic alcoholism
- Puncture wounds
- Large wounds
- Extremities
- Delayed (> 4 to 24 hrs.) presentation

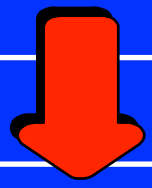
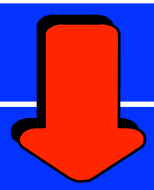
Mammal Bites : Use of Wound Cultures

- Initial (fresh) animal bite wound cultures :
  - Not recommended
  - Initial culture results do not correlate with later proven infecting organisms
  - However if the patient presents delayed, with signs of infection, then wound cultures are useful

Dog Bite Infections

- Overall infection rates are 2 to 5 % (however up to 20 % of hand bites)
- fortuitum80 % of these infections are aerobes :
  - Pasteurella multocida (zero to 1/3)
  - Staph. aureus
  - Strep
  - Corynebacterium
- Uncommon:
  - Fungi
  - Clostridia
  - Rabies
  - Mycobacteria

Incidence of Dog Bites (By Breed)

Decreasing	German Shepherd : most common
Incidence 	Pit Bull : most fatal bites
	Mixed Breeds
	Doberman
	St. Bernard
	Great Dane
	Rotweiler
	Collie

Fatal Dog Bites

- Injuries concentrated about head and neck (injuries only on limbs in most non-fatal bites)
- Fatal attacks cannot be predicted from the dog's prior behavior
- Most offending dogs revert to normal friendly behavior after the attack
- Therefore infants and disabled should never be left alone with a large dog

Considerations About Radiographs for Dog Bite Cases

- Large dogs can generate forces > 500 foot-pounds per square inch with their jaws
  - Therefore can cause extremity long bone fractures
- Also can cause dural penetration from scalp bites in small children (this can lead to fatal meningitis if missed in the E.D.)
  - So skull films may be needed to see if there is inner table penetration from teeth

Cat Bite Infections

- 30 to 50 % become infected
- These infection rates can still occur despite appropriate initial wound care
- Claw scratches also have high infection rates if not quickly cleansed (due to cat licking paws often)

Cat Bite Wounds Complications

- Wound cellulitis
- Septic arthritis
- Septic tendonitis
- Meningitis
- Disseminated pasteurellosis
- Tetanus
- Rabies
- Cat Scratch Fever
- Cosmetic defects, scarring

Pasteurella multocida

- Culturable in 75 % of cats (including large cats such as lions & tigers)
- Causes 3 types of disease :
  - Local soft tissue infection
  - Pneumonia / pulmonary abscess in immunocompromised patient : rare
  - Disseminated pasteurellosis : in patient with liver disease

Complications of Pasteurella Infection (in 40 %)

- Local septic arthritis
- Osteomyelitis
- Tenosynovitis
- Bacteremia

Cat-bite wound infection of second proximal interphalangeal joint due to *Pasteurella multocida*. Failure of cephalexin therapy resulted in septic arthritis.

Dog bite wound infected due to *Pasteurella multocida* and anaerobic bacteria.

Hershey 1994 Study of Cat Bite Cases Seen in the E.D.

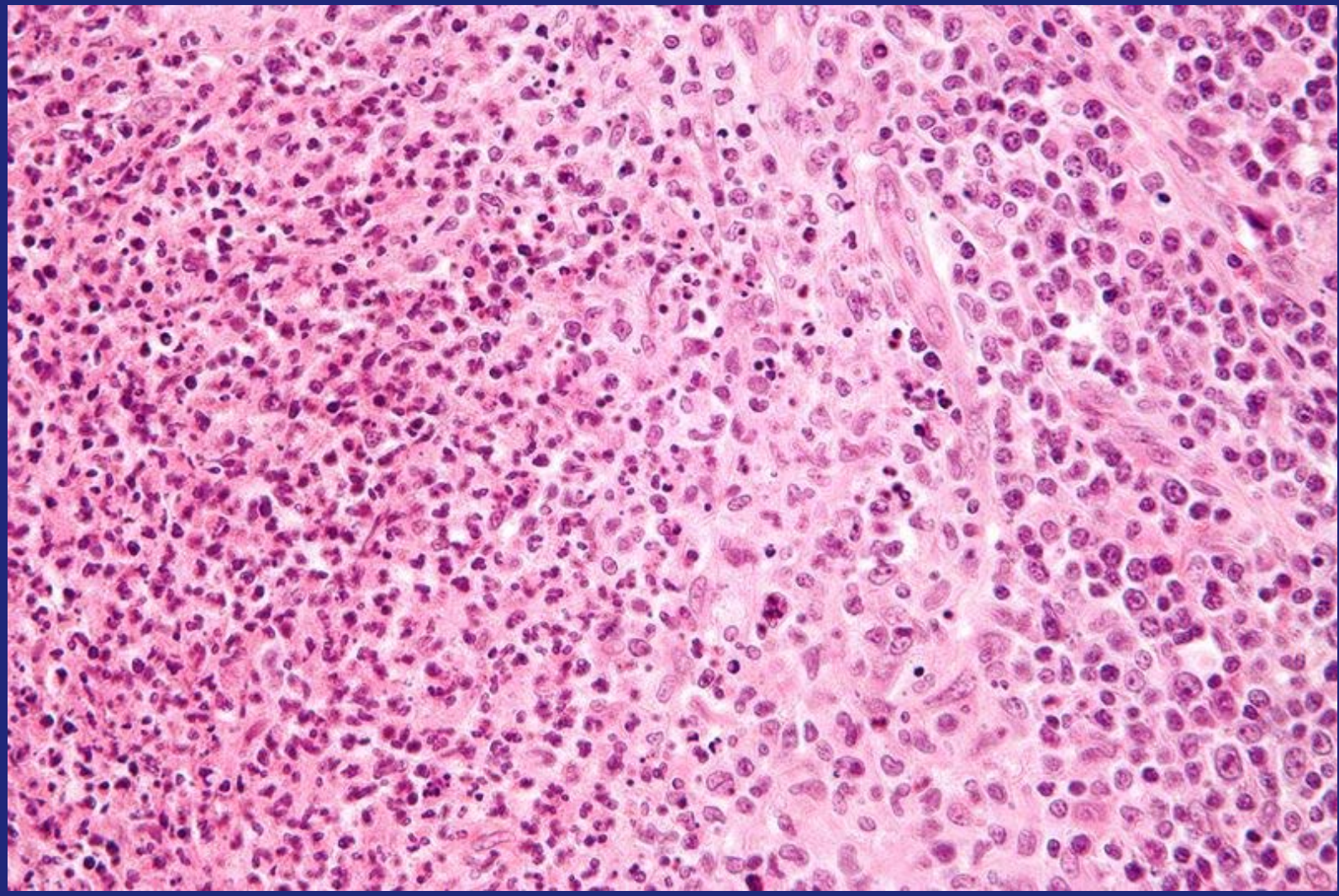
- 30 cases
- 40 % developed cellulitis
- 14 % required hospital admission
- Majority of wounds were on upper extremities
- Only empiric Rx failures were in cases treated with Augmentin (amoxicillin-clavulanate)

Cat Scratch Fever

- Caused by bite or scratch
- Due to pleomorphic bacterium : Bartonella henselae
  - Does not take up gram stain well (best seen with silver stains)
- Usually benign and self-limited illness
- Same bacteria associated with bacillary angiomatosis in immunocompromised patients
- Encephalitis can occur in 1 to 7 % of cases

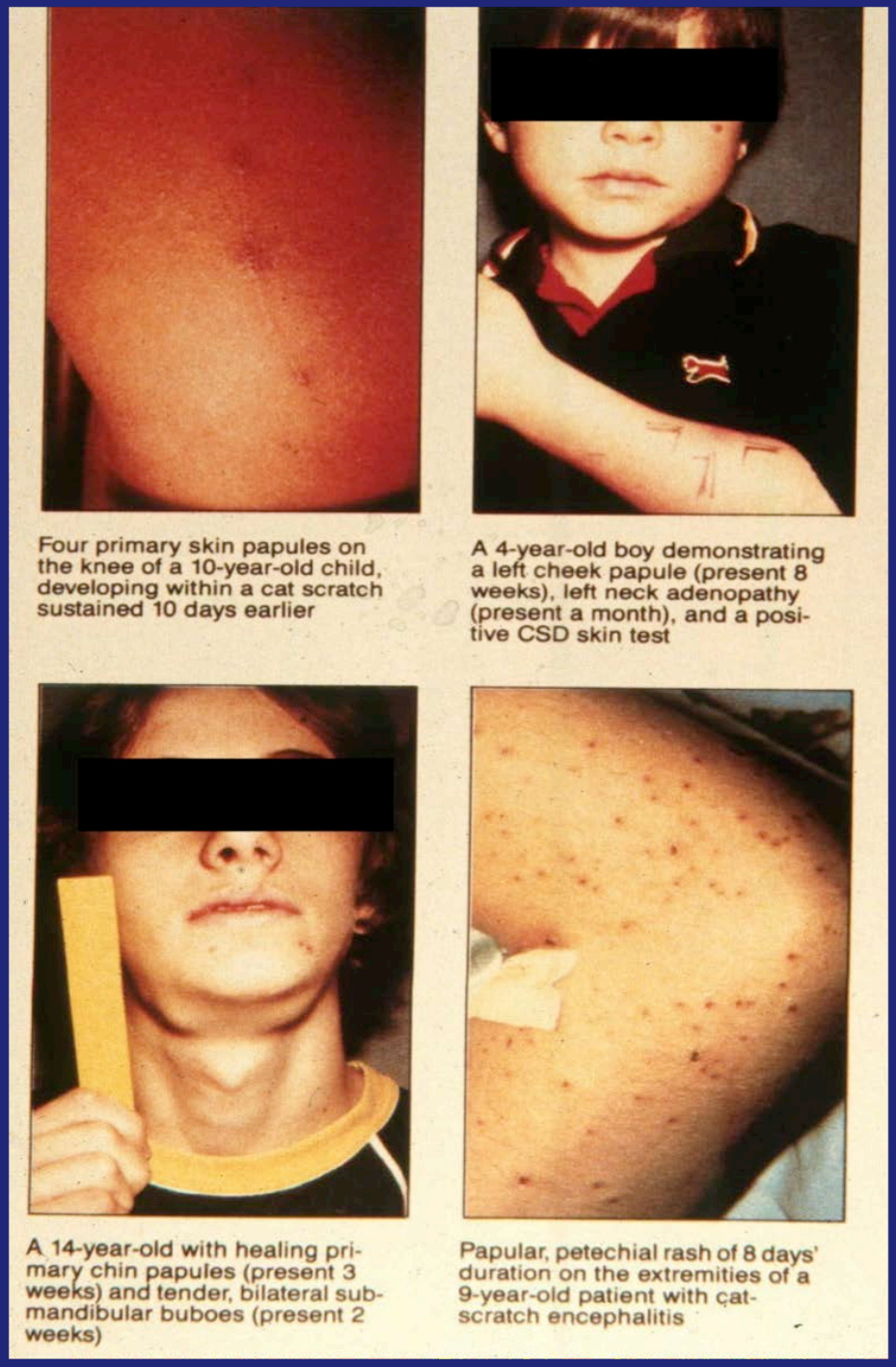
Cat Scratch Fever : Syndrome Progression

- Local lymphodenopathy next to bite or scratch site
- Red papule leads to pustule at bite or scratch site : heals in 1 to 4 weeks
- Regional lymphodenopathy / malaise / fever up to 3 months
- Rare progression to pneumonia or encephalitis or endocarditis
- Can be part of differential of FUO



Nephron, Wikimedia Commons

High magnification micrograph of Cat Scratch Disease.



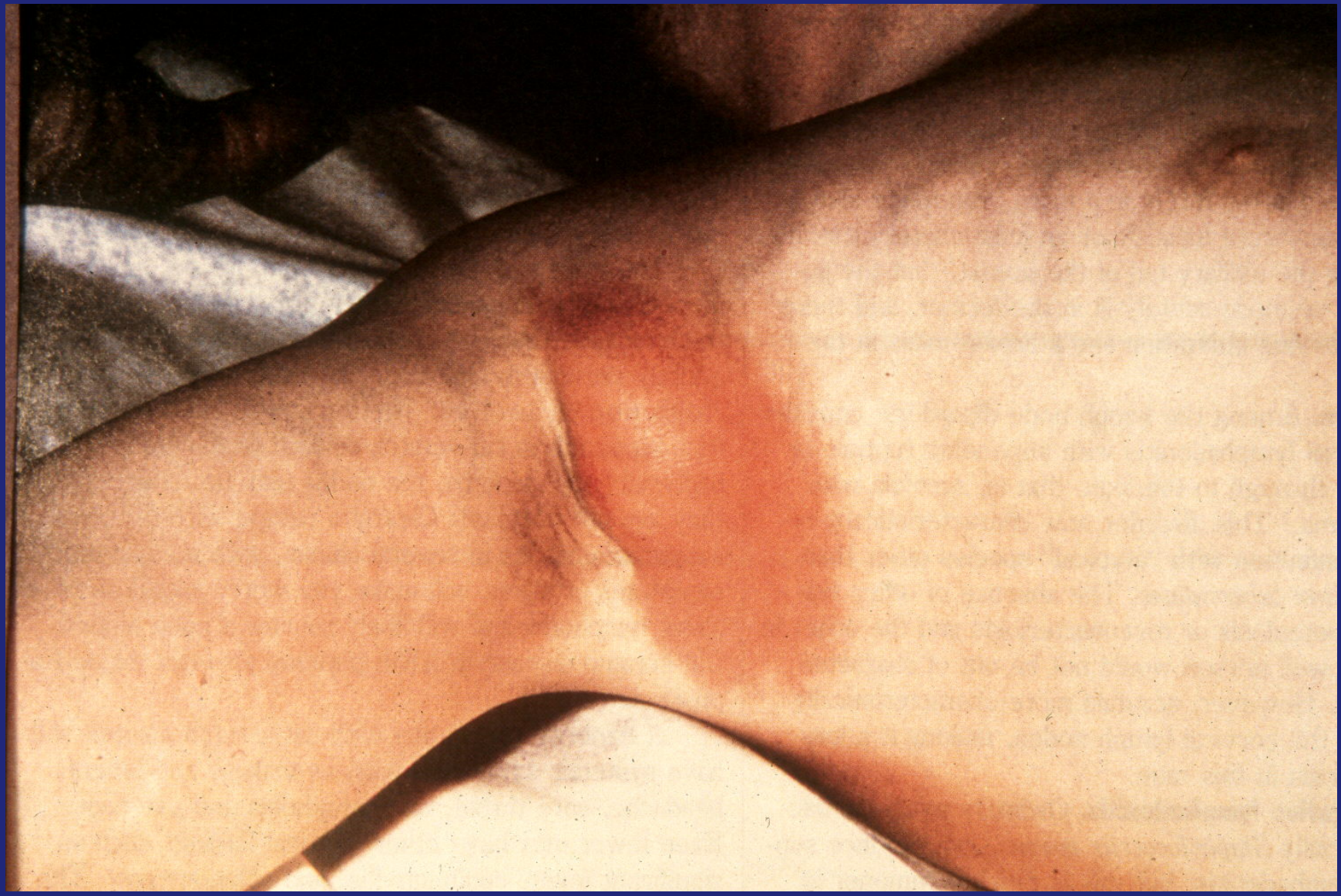
Four primary skin papules on the knee of a 10-year-old child, developing within a cat scratch sustained 10 days earlier

A 4-year-old boy demonstrating a left cheek papule (present 8 weeks), left neck adenopathy (present a month), and a positive CSD skin test

A 14-year-old with healing primary chin papules (present 3 weeks) and tender, bilateral submandibular buboes (present 2 weeks)

Papular, petechial rash of 8 days' duration on the extremities of a 9-year-old patient with cat-scratch encephalitis

Source Undetermined



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Axillary lymphadenitis from Cat Scratch Disease

Fundoscopic view of patient with choreoretinitis from Cat Scratch Disease (vision returned in 3 months)

Cat Scratch Fever Treatment

- Prior reports indicated that usual antibiotics were ineffective
- Two reports indicated success in hospitalized patients with gentamicin
- One recent small case number report found good response to oral ciprofloxacin

Rat Bite Infections

- Rat bite fever (classic)
  - Due to Streptobacillus moniliformis
  - Rash : may involve palms & soles, high fever, polyarthritis
- Sodoku (spirillary rat bite fever)
  - Due to Spirillum minus (a spirochete)
  - Regional lymphodenopathy, rash, fever
- Either type could be cause of FUO (fever of unknown origin)

Rat Bite Fever : Treatment

- PCN 500 mg QID x 7 days or Erythromycin or Tetracycline (same dose)
- Usually PO antibiotics are sufficient (occasionally relative PCN resistance is encountered)

Mammal Bites : Rules for Prophylactic Antibiotics

- Yes for all bites of the hands
- Yes for all human bites with significant skin penetration
- Yes for almost all cat bites
- Yes if any question of bite fascial penetration
- Probably not needed for simple, smaller dog or rodent bites, especially of the face or scalp

Prophylactic Antibiotic Choices for Mammal Bites

- Dogs : need to cover for Staph. aureus
  - Dicloxacillin or cephalexin 500 mg PO qid x 7 days
  - Erythromycin or azithromycin if patient PCN allergic
- Cats : need to cover Pasteurella multocida
  - Penicillin V potassium 500 mg PO qid x 7 days
  - Ciprofloxacin or azithromycin if PCN allergic (Rx failures reported for tetracycline, erythromycin, & cephalosporins)
  - Ciprofloxacin 500 mg PO qid x 7 days for cat scratch fever
- Rodents : Penicillin V potassium 500 mg PO qid x 7 days
- Note : Amoxicillin / clavulanate often touted as antibiotic of choice for bites but no good controlled study yet done to demonstrate this (is expensive & has high % side effects)

Mammal Bite : Wound Closure Rules

- Never suture human bites of the hands
- Never suture cat bites of the hands
- Never suture deep cat bite puncture wounds
- Seldom suture dog bites of the hands
- Usually OK to suture bites of the face or scalp
- Usually OK to suture rodent bites

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Source Undetermined

Dog bite lacerations of the face

Same patient after primary suture repair

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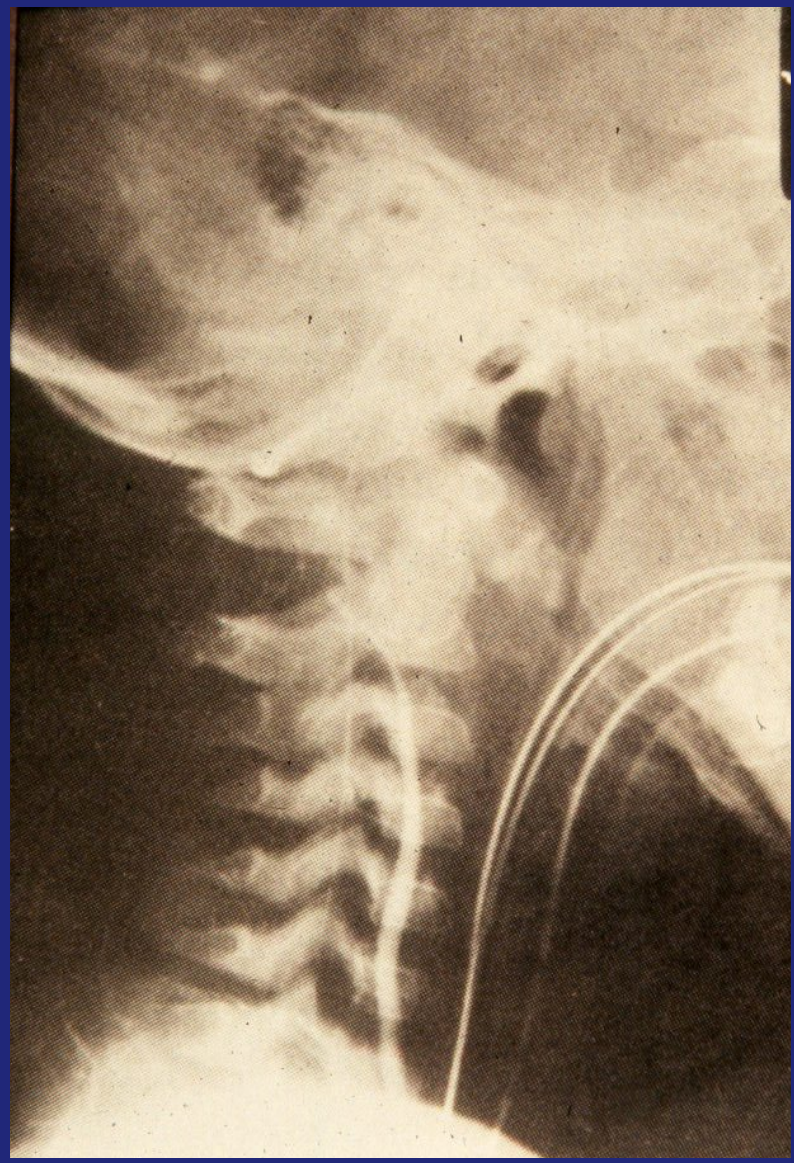
Source Undetermined

Same patient after healing, with good cosmetic outcome

Mammal Bites
Criteria for Hospital Admission

- Admit to hospital if :
  - Patient presents with deep established infection
  - Possible penetration of joint capsule
  - Surgical (Operating Room) repair required
  - Associated fracture present



PD-INEL Source Undetermined

Dog bite of the neck that caused intimal disruption of the vertebral artery.

PD-INEL

Source Undetermined

Child bitten by a ferret

PD-INEL Source Undetermined

Another child bitten by a ferret

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Source Undetermined

All these should have primary suture repair

Facial lacerations from dog bite before and after repair

Infections Transmitted By Human Bites

- Streptococci : 50 %
- Staph. aureus : 38 %
- Eikenella corrodens : 29 %
- Actinomycosis
- Syphillis
- Tuberculosis
- Hepatitis B
- ? AIDS (no cases proven yet)

Human Bite Wounds : Treatment Sequence

- Culture the wound (± anerobes)
- Wound cleansing / opening
- Debridement / irrigation
- PO or IV cephalosporin for 5 to 7 days
- Add gentamicin if Eikenella corrodens is cultured
- Splint / elevation of limb
- Change bandage at least daily

Human Bite Wounds : Treatment Based on Anatomic Site

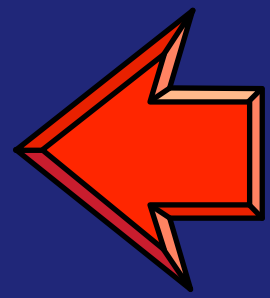
- Hickeys (skin abrasion only) : cleansing, consider tetanus immunization, apply topical antibiotic creme
- Face : irrigate, consider tetanus, OK to suture, give PO antibiotic
- Trunk or breast : same as face (some may need delayed closure)
- Hand : do not suture ; often need admission ; If discharged, F/U in 24 hours

Human Bite Wounds of the Hand : Indications for Admission

- Presentation > 24 hours from injury
- Any degree of infection beyond local wound cellulitis
- Lymphangitis or any purulent drainage
- Pain on passive ROM of fingers
- Questionable tendon or joint space involvement
- Immunocompromised
- Unable to follow outpatient instructions

Human Bite Wounds : Closed-fist Injuries

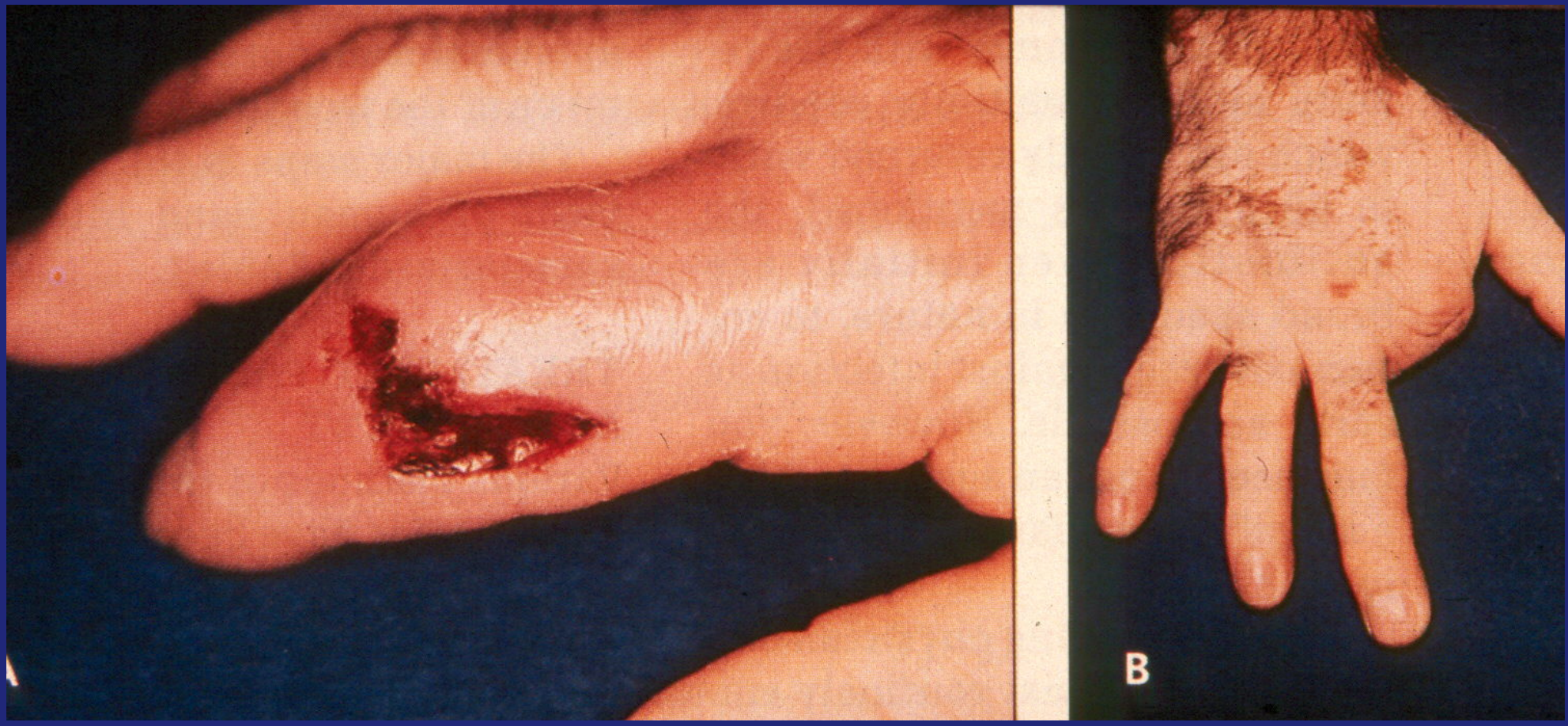
- Get X-rays of hand ; look for :
  - Foreign bodies (tooth chips)
  - Fractures (boxer's fracture common)
  - Air in joint or tendon space
  - Defects in subchondral bone plate
- Irrigate
- IV antibiotics (best choice debatable)
  - PCN + cephalosporin
  - ? gentamicin, ? ceftriaxone
- Splint



These are all indications for surgical exploration

Berteun, Wikimedia Commons

Human bite wound with early cellulitis



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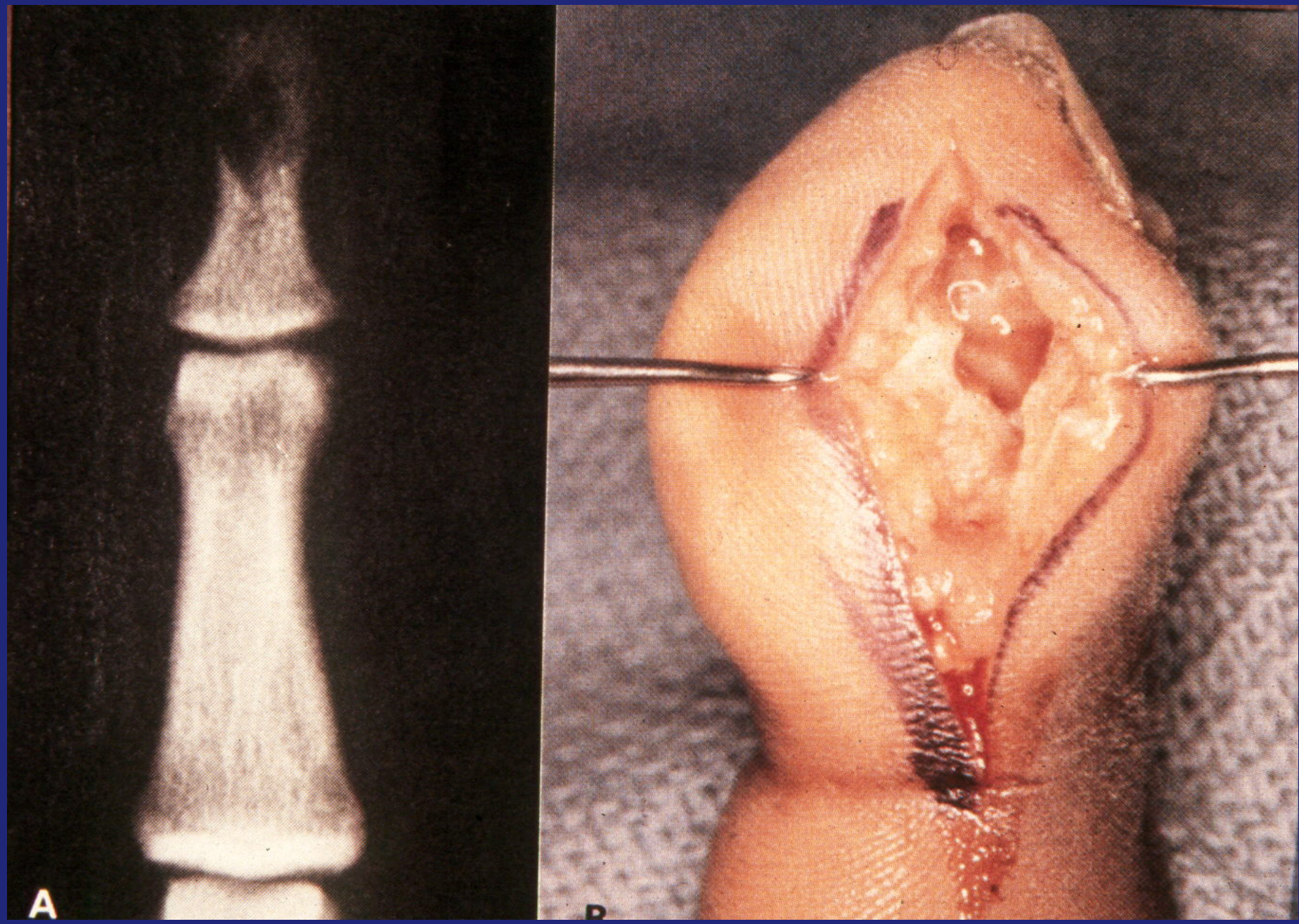
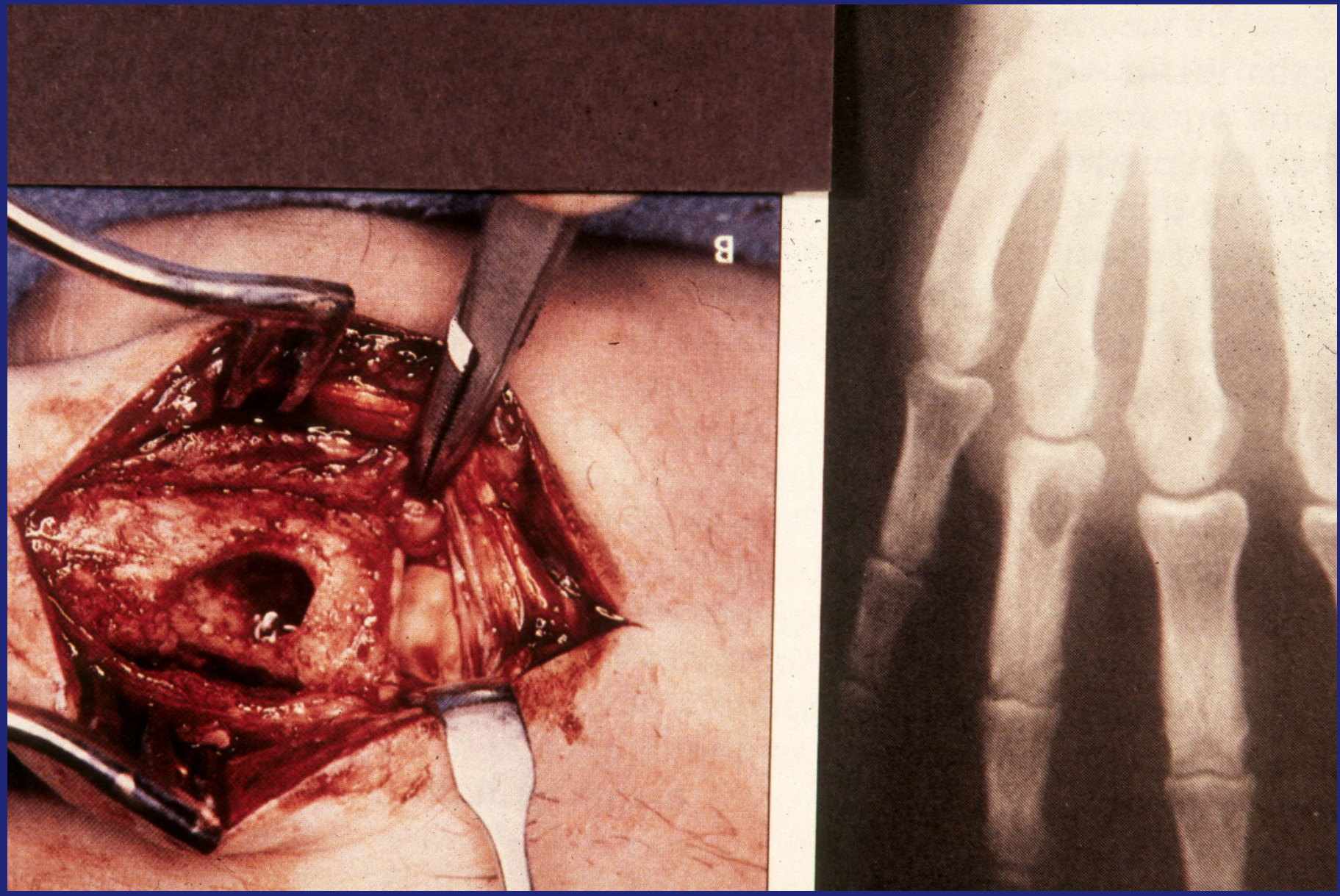
Septic arthritis from human bite resulting in digit amputation



Osteomyelitis of distal phalanx from human bite



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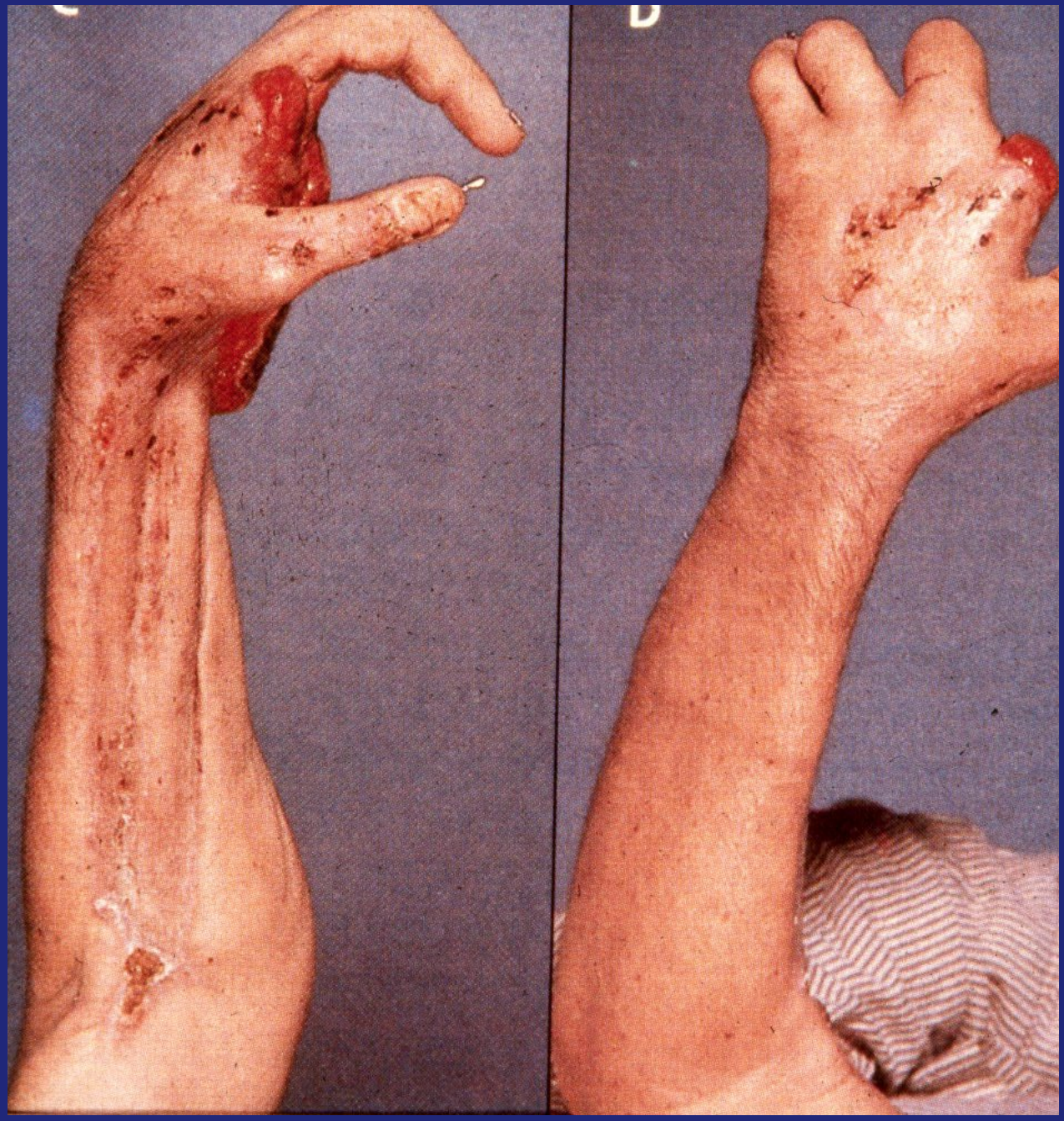
Osteomyelitis of proximal phalanx from human bite

Evilgurl, Flickr

Typical “occult” human tooth bite mark over metacarpal head ; note early edema and cellulitis

Mixed bacterial infection from human bite, 6 hours after time of injury



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Unfortunate outcome for the same patient on the prior slide

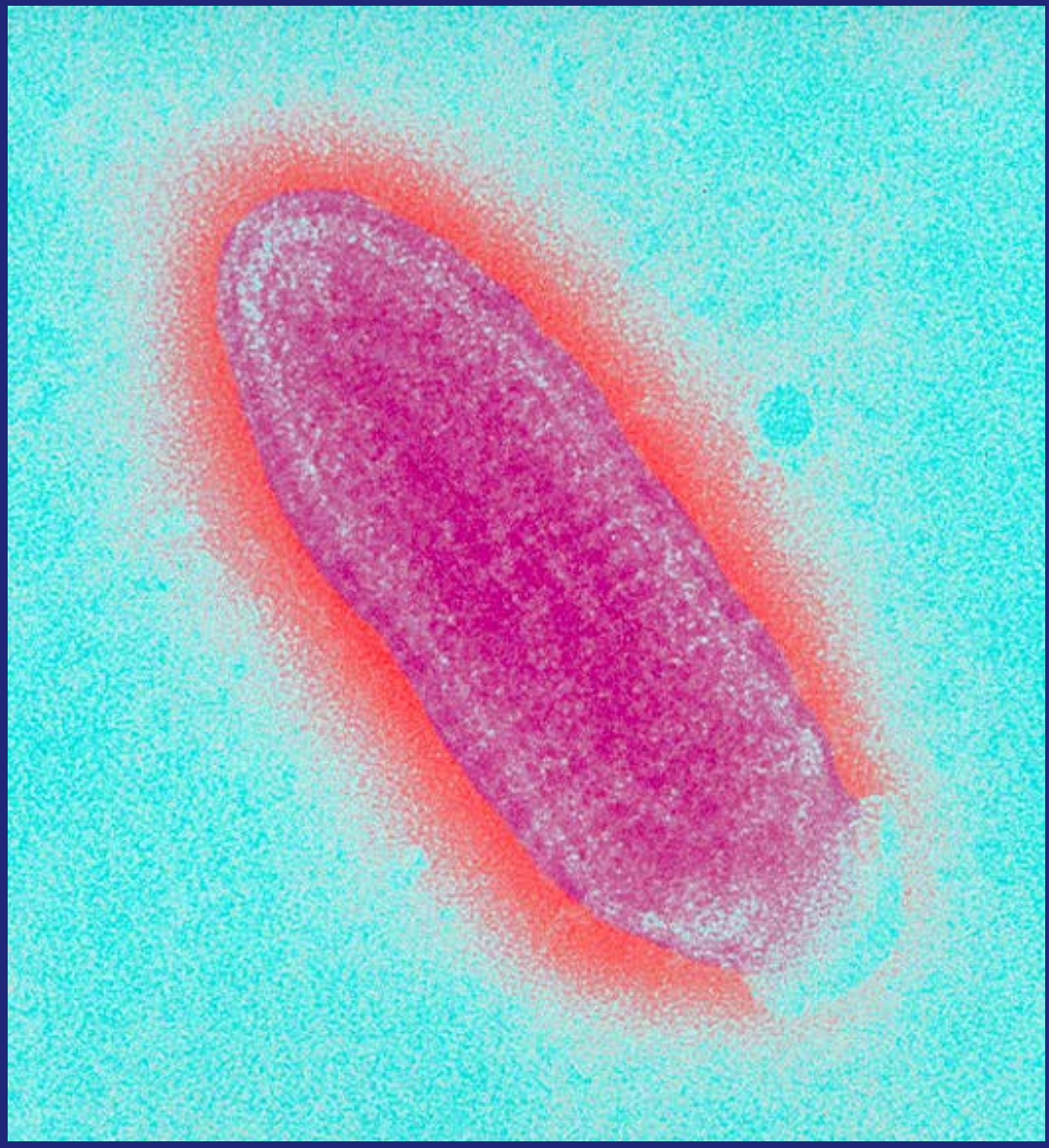
Cost Comparisons of Some Rx Items for Animal Bites (Pennsylvania, 2005)

- Penicillin VK 500 mg PO qid for 7 days : $ 4.20
- Dicloxacillin 500 mg PO qid for 7 days : $ 11.76
- Cefalexin 500 mg PO qid for 7 days : $ 6.44
- Augmentin 500 mg PO tid for 7 days : $ 40.32
- Cefazolin 1 gram IV : $ 0.89
- Nafcillin 1 gram IV : $ 5.83
- Ceftriaxone 1 gram IV : $ 32.21
- 5 cc. Rabies Immune Globulin IM : $ 302.85
- 5 one cc. doses HDCV : $ 517.80
- Wound culture / sensitivity : $ 66.00

Note : the IV costs listed do not include the nursing administration fees

Rabies

- Caused by an RNA rhabdovirus
- Transmitted by inoculation of infectious saliva
- Rarely can be transmitted by inhalation (from bats in caves)
- Causes a severe, uniformly fatal encephalitis
  - Only 4 documented survivors worldwide so far



Sanofi Pasteur, Flickr

Electron micrograph of the rabies virus, demonstrating the bullet shape and capsular spikes.

State Farm, Flickr

Dog with rabies. There is a ferocious appearance, excess salivation and anisocoria.

Rabies Prophylaxis for Mammal Bite Wounds

- Pennsylvania currently has second highest state rate in U.S. of wild animal rabies
- Raccoon - based epidemic in eastern U.S. since late 1970's
- State Public Health Laboratories will do exams of sacrificed animals for rabies
- HDCV is current agent of choice (replaces DEV)
- Followup antibody titer after completion of series no longer recommended

Rabies Incidence in U.S.A.

- 4,000 proven domestic animals / year
  - Predominately dogs, cats, cattle
- 15,000 proven wild animals / year
  - Represents sampling by state labs so true incidence is much higher
- Average 1 U.S. human death / year (about 800 worldwide human deaths reported per year)

Rabies : Clinical Progression

- Bite
- Incubation period : weeks to months (no symptoms) ; shorter for head or neck bites
- Prodromal phase : 2 days to 2 weeks
- Neurologic symptoms : one week or more
- Paralytic phase : several weeks to months

Rabies : Symptom Progression

- Prodrome phase : fever, malaise, headache, sore throat
- Neurologic phase : paresthesias at bite site, anxiety, restlessness, insomnia, dysphagia, hydrophobia (from fear of painful esophageal spasms), spasms, seizures
- Flaccid paralysis : leads to coma
- Cardiovascular collapse
- Supportive treatment uniformly ineffective to date

Risk of Rabies Transmission from Animal Bite

High Risk	Intermediate Risk	Low Risk
Bats Raccoons Foxes Coyotes / bobcats Other carnivores	"Outdoor" cats and dogs Cattle in Midwest USA	Rodents Lagomorphs (hares & rabbits) Farm animals Indoor cats and dogs

Protocol for Starting Rabies Prophylaxis

- High risk bite & animal escapes : give prophylaxis
- High risk bite & animal captured : send animal's head to State Health Lab for path exam ; treat only if lab confirms rabid animal (brain sections show Negri bodies)
- Low risk animal & animal escapes : consider prophylaxis only if bite clearly unprovoked
- Low risk animal & animal captured : keep animal under reliable observation one week ; if animal gets sick : immediate check by veterinarian or State Health Lab ; if animal remains well 7 days : no Rx needed

Mammal Bites : Rabies Prophylaxis Summary

- If animal cannot be recovered :
  - Dog / Cat / Cattle : yes
  - Foxes / Skunks / Raccoons : yes
  - Bats / Bears : yes
  - Rodents / Rabbits : no
  - (? if unprovoked squirrel ; due to one case report of rabid squirrel)
  - Deer / Elk / Moose : no

Rabies Prophylaxis

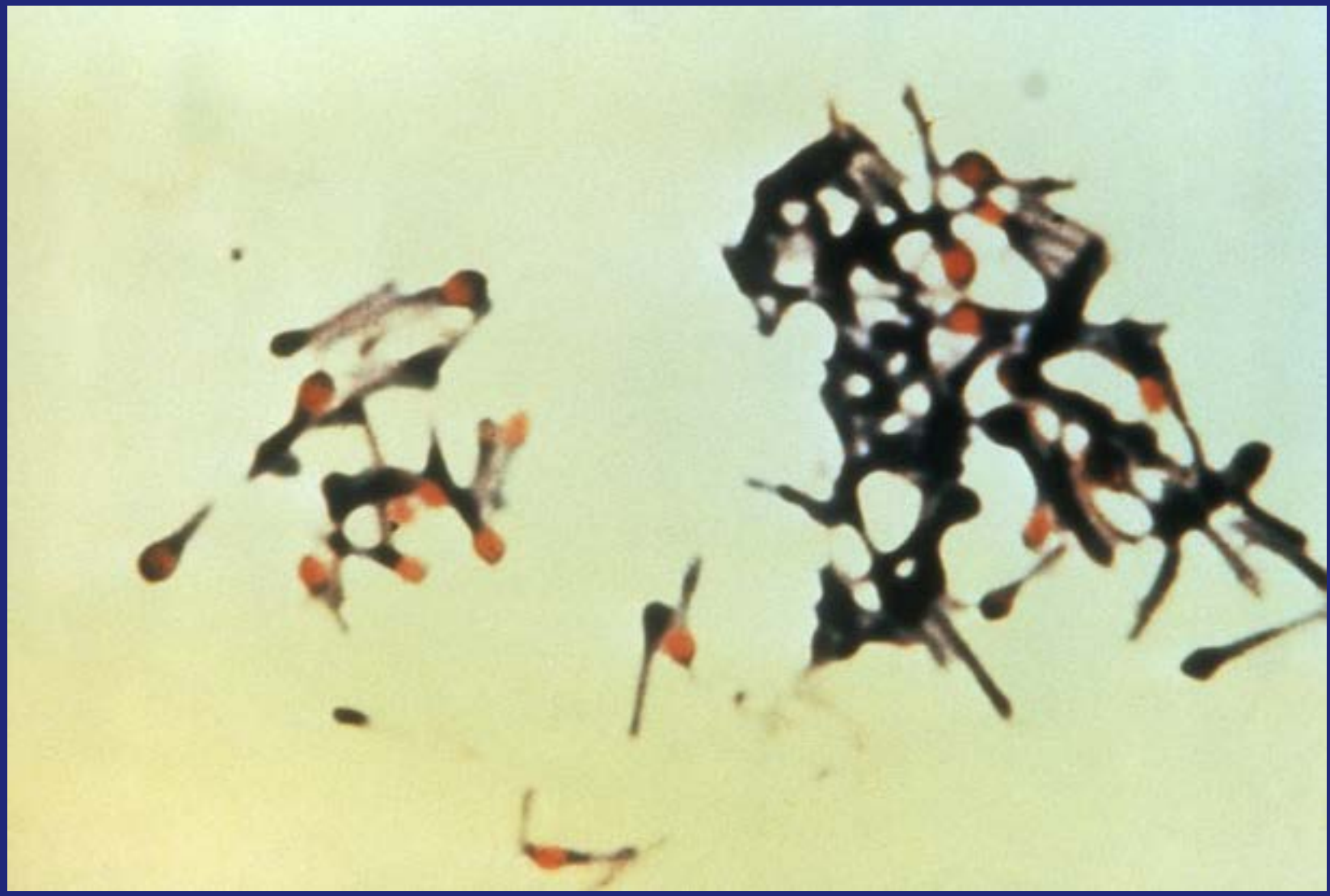
- Post-exposure :
  - HDCV 1.0 ml IM on days 0, 3, 7, 14, 28
  - Plus RIG 20 IU / kg IM on day 0
- Pre-exposure :
  - HDCV 1.0 ml IM on days 0, 7, 21
  - This is utilized for forest rangers, veterinarians, & others who have higher risk of encountering rabies
  - Still requires booster dose after each exposure

Countries Without Animal Rabies

- Pacific Islands
- Caribbean Islands
- United Kingdom
- Iceland
- Singapore
- Australia
- Portugal
- Spain
- Sweden
- Japan
- Taiwan

Tetanus : Etiology

- Clostridium tetani (gram positive bacillus) spores enter wound, replicate, and produce toxins ; anerobic environment required
- Causative toxins
  - Tetanospasmin : causes tetanus
  - Tetanolysin : reduces tissue redux potential ; promotes bacterial replication



Centers for Disease Control and Prevention, Wikimedia Commons

Micrograph of Clostridium tetani

Mechanism of Action of Toxicity from Clostridium tetani

- Bacteria release tetanospasmin toxin
- Tetanospasmin then :
  - Travels via lymphatics and retrograde up neuronal axons
  - Blocks inhibitory neurotransmitter release (glycine, GABA)
- Results in hyperactivity (disinhibition) of motor neurons

Autonomic Nervous System
Effects of Tetanus

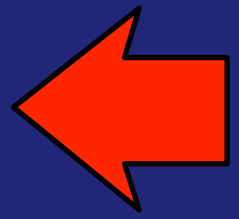
- Disinhibition of sympathetic nervous system results in elevated catechol secretion by the adrenals, causing :
  - High blood pressure / hypertensive crisis
  - Tachycardia
  - Fever

Tetanus : Epidemiology

- 90 U.S. cases reported / year ; case incidence 0.04 / 100,000 per year
- ? 1,000,000 deaths / year world-wide ; 90 % due to neonatal tetanus (often due to soil contamination of umbilical stump)

Classification of Tetanus

- Generalized : most common type
- Localized (These may progress to
- Cephalic generalized)
- Neonatal



Tetanus : Clinical Course

- Incubation period = time from inoculation to appearance of first symptoms
- Period of onset = from first symptom to time of first reflex spasm

Progression of Symptoms in Generalized Tetanus

Tetanus : Differential Diagnosis

- Oral or Dental or Temporomandibular joint pathology
- Acute dystonic reaction
- Strychnine ingestion
- Stiff-man syndrome
- Rabies
- Black widow spider bites
- Hypocalcemic tetany
- Meningoencephalitis or CNS metastases
- Trichinosis
- Hepatic encephalopathy
- Cocaine abuse

Causes of Tetanus in 239 Patients from One Review

Etiologic factor	Number of patients
Neonatal tetanus	3 (1.1%)
Acute injury	166 (69.5%)
Puncture	85
Laceration	81
Circumstances - Indoor activity	68
Gardening related activity	65
Animal related	7
Major trauma	7
Other	19
Other identified condition	53 (22.2%)
Chronic wound, abscess, etc.	48
Parenteral drug use	5
No apparent source	17 (7.2%)

Reported Cases of Tetanus in the U.S. Armed Forces

U.S. Armed Forces		
Unit	Period	No. of cases
Army	1956 to 1977	0
Navy / Marine Corps	1946 to 1977	1*
Air Force	1958 to 1977	2

- *The case of tetanus in the Navy occurred in an individual who was circumcised several days before enlisting and who then developed tetanus despite post-enlistment immunization

Classification of the Severity of Tetanus

Severity	Incubation period (d)	Period of Onset (d)	Associated findings
Mild	10 or more	4 to 7	Local rigidity, mild trismus
Moderate	7 to 10	3 to 6	Severe trismus dysphagia, spasms
Severe	Less than 7	Less than 3	Severe spasms, diffuse rigidity, autonomic dysfunction

("d" = "days")

Tetanus Mortality

- 1982 to 1984 overall mortality 26 %
- All patients < 30 years old survived
- 52 % of patients > 60 years old died
- Some reports : > 90 % mortality for neonatal tetanus

Diagnostic Confirmation of Tetanus

- A measurable titer of anti-tetanus antibody excludes the diagnosis
- This test seldom would be available acutely however
- Prior episode of tetanus does not confer immunity (toxin dose too low to stimulate antibodies)
- Diagnosis cannot be excluded just because no wound present

Tetanus : Treatment

- Admit to ICU
- Limit exams & consults on patient (they trigger spasms)
- Intubation & mechanical ventilation
- High-dose benzodiazepines
  - Diazepam : up to 500 mg/day may be needed (IV)
  - Lorazepam : up to 80 mg/day in 2 mg IV increments
- Methocarbamol 3 to 4 g IV q6h if unable to take benzodiazepines, or Dantrolene 1 to 2 mg/kg q 4h as an adjunctive agent
- Pancuronium (paralysis) : may be necessary to control severe spasms and prevent fracture (2 mg IV increments)

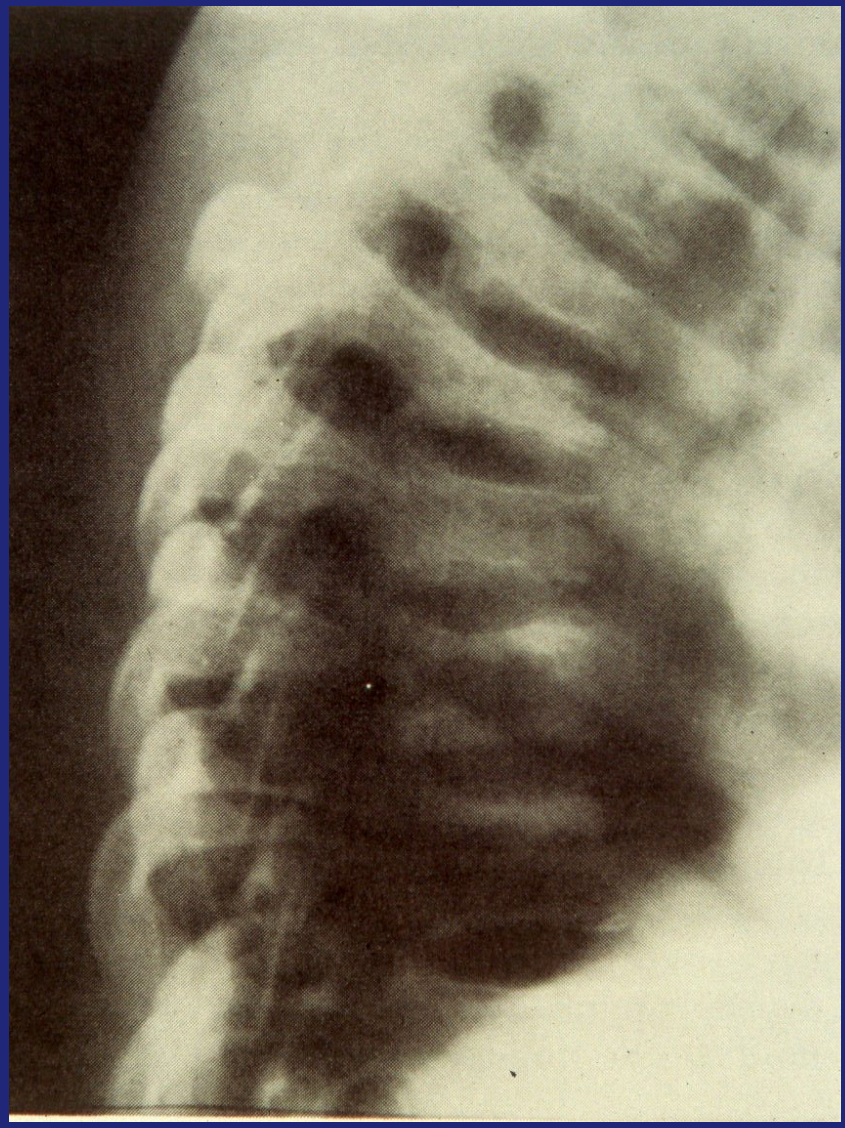
Tetanus : Additional Treatment Measures

- Human tetanus immune globulin (binds unbound toxin) 500 to 5000 units IM
- Labetolol : 0.25 to 1.0 mg / min. constant infusion or morphine 0.5 to 1.0 mg / kg / 6 h IV
- Temporary cardiac pacing for bradyarrhythmias
- "Prophylactic" SQ heparin 5000 units q 12 h
- Metronidazole 500 mg IV q 6 h
- Wound debridement
- Enteral hyperalimentation
- Supportive psychotherapy
- Active immunization at follow-up (3 doses of toxoid)

Complications of Tetanus

- Rhabdomyolysis : leads to renal failure
- Respiratory failure
- Negative nitrogen balance
- Fractures, tendon separations
- Ectopic calcification
- Autonomic instability (like "pheochromocytoma crisis")

A child suffering from tetanus in opisthotonos



Compression fractures of upper mid-thoracic vertebral bodies in a case of tetanus.

Routine Diphtheria, Tetanus, and Pertussis Immunization Schedule Summary for Children

Dose	Age / Interval	Product
Primary 1	6 weeks or older	DTP
Primary 2	4 to 8 weeks after first dose	DTP
Primary 3	4 to 8 weeks after second dose	DTP
Primary 4	6 to12 months after third dose	DTP
Booster	4 to 6 years old, before entering elementary school (not necessary if 4th primary immunizing dose administered on or after 4th birthday)	DTP
Additional boosters	Every 10 years after last dose	Td

Considerations for Use of Tetanus Immune Globulin (Hypertet)

- Immunodeficient patient : Check serum antitetanus antibody levels and give passive immunization (Hypertet 250 u IM) for any wound if patient is antibody deficient and cannot mount antibody response to Td
- Also give Hypertet 250 u IM to any patient with a highly tetanus prone wound who has lapsed immunity (> 10 years since last Td immunization)

Tetanus - Prone Wounds

- Deep punctures
- Large, deep lacerations
- Imbedded foreign body
- Stool or soil contamination
- Delayed presentation
- Deep burns

Tetanus Immunization
General Guidelines

- Standard dose is 0.5 cc for both dT and TT (tetanus toxoid without diptheria booster)
- Good general rule for most wound cases is to administer it if > 5 years since last dose (even for minimal skin injuries)
- Also give TIG (Hypertet) if :
  - Patient never immunized
  - Immunosuppressed
  - Allergic or severe local reaction to toxoid
  - Highly tetanus prone wound & > 10 years since last dose

Mammal and Human Bites Lecture Summary

- Consider need for radiographs
- Always perform careful wound cleansing & irrigation
- Decide if antibiotics & suture closure are indicated
- Assess for risk of rabies & tetanus
- Assure close followup