

# Infections and Infestations 2018

- Cascade Medical Center
- Paramedic Lecture Series
- March 18, 2018
- Leavenworth, WA





# Case Presentation 1

- A 43 year old male presents to the Free Clinic with an ulcerated lesion on the Right anterior chest wall. Recent return from a hiking trip in Costa Rica. No known injury. no fever, no chills, no previous similar problem.



# Case Presentation 1



# Case Presentation 1

- Tender reddened area with a central weeping lesion noted, mildly tender to touch, warm and erythematous. No obvious foreign body.
- Recommendation: Warm moist packs, topical Neomycin, return if worse.

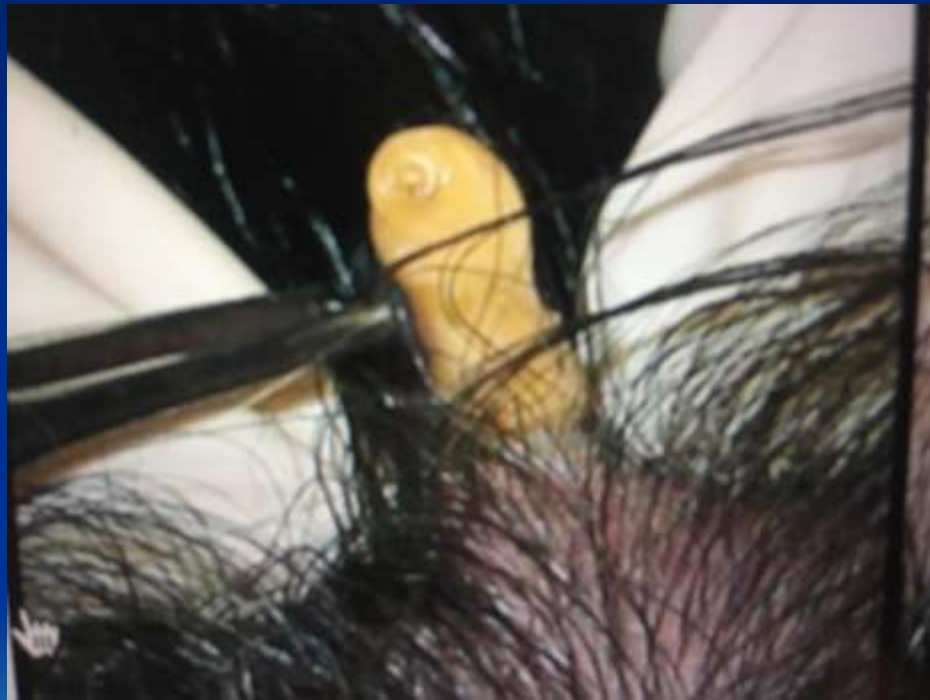


# Case Presentation 1

- When encountered at the bookstore 2 weeks later, pt reported lesion resolved and diagnosis elucidated when a winged insect erupted from the opening and flew away.
- Diagnosis: Myiasis due to Botfly
  - I won't miss the next one...



# Case Presentation 1



# Insect Vectors: Tick

- West Coast
  - Lyme Disease
  - Rocky Mountain Spotted fever
- East Coast and Central
  - Ehrlichiosis
  - Babesiosis







An adult female *Ixodes pacificus* (W  
blacklegged tick)



# Insect Vectors: Tick

- Lyme disease
  - caused by spirochete *Borrelia Burgdorfi*
  - most common time for infection late spring and summer
  - Tiny ticks, poppy seed to sesame seed size
  - Takes attachment for 48 to 72 hours before spirochetes can be transmitted
  - 1/100 chance of transmission if tick not engorged when removed



# Insect Vectors: Tick

- Lyme symptoms
  - Rash (Bullseye rash) erythema migrans
  - Flu like symptoms
  - Joint pain
  - 8% develop cardiac involvement and AV block, bradycardia, syncope
  - 10% develop Neurologic symptoms- headache, numbness, meningitis
  - Joint pain in 20%, intermittent arthritis in 50% if untreated



# Insect Vectors: Tick

- Treatment for Lyme disease
- Antibiotics as soon as recognized
  - Doxycycline
    - 100 mg PO BID for 10-21 days
  - Amoxicillin
    - 500 mg PO TID for 14 to 21 days
  - Cefuroxime
    - 500 mg PO BID for 14-21 days
  - Ceftriaxone IV for 28 days for severe late disease




# Insect Vectors: Tick

- Rocky Mountain Spotted Fever
  - Gram Negative Bacteria, Rickettsia Rickettsii
  - Transmission can occur in 6-10 hours of tick attachment
  - Symptoms usually 5-7 days after exposure
    - Fever, headache, Nausea, Arthralgias and myalgias
    - Kids especially may present with severe abdominal pain and get worked up for appendicitis, or bowel obstruction



# Insect Vectors: Tick

- Rocky Mountain Spotted Fever
  - Hallmark rash in 90 % cases
    - Blanching erythematous characteristic rash develops with macules that becomes petechial over time
    - Rash generally presents after the other symptoms
    - Starts on the ankles and wrists, then progresses to the trunk,
    - Rash on palms and soles very characteristic
- 





SOURCE: CDC | ID#1962

## Rash caused by Rocky Mountain spotted fever

Rocky Mountain spotted fever may cause a rash of small red spots or blotches that

# Insect Vectors: Tick

- Rocky Mountain Spotted Fever
  - Severe complications include
    - Seizures
    - Encephalitis
    - Adult respiratory distress syndrome (ARDS)
    - Non cardiogenic pulmonary edema
    - Arrhythmias
    - GI Bleeding and coagulopathy
    - skin necrosis



# Insect Vectors: Tick

- Rocky Mountain Spotted Fever
  - Differential Diagnosis-Fever and Headache
    - Meningococcal meningitis
    - West Nile Virus
    - Encephalitis
  - DDX-Fever and Petechial Rash
    - Meningococcemia
    - Thrombotic thrombocytopenic purpura
    - Vasculitis
    - Bacterial Sepsis



# Insect Vectors: Tick

- Rocky Mountain Spotted Fever

- Treatment

- Doxycycline 100 mg PO or IV BID, start as soon as diagnosis is suspected
    - Continue 7 days or 3 days after last fever
    - Chloramphenicol is a more toxic option usually used in pregnancy or true tetracycline allergy, and with great caution in 3<sup>rd</sup> trimester



# Insect Vectors: Mosquito

- West Nile Virus
  - Widespread but infrequent
    - 2873 US cases in 2012 outbreak
  - Infrequent neuroinvasive disease
    - Roughly 1 in 200 cases get CNS disease
  - Peak infections late summer and early fall
    - Bird-mosquito- bird cycle, with humans and horses incidental hosts
    - Also spread with blood products, organ donation, and transplacental



# Insect Vectors: Mosquitos

- West Nile Virus

- Presentation

- Abrupt onset fever, myalgias, headache, back pain and anorexia
    - Eye pain and GI symptoms may occur
    - 25-50% develop a somewhat measles like rash after a week, chest back and arms
    - CNS disease
      - Meningitis, encephalitis
      - Flaccid paralysis
      - Confusion, coma, death possible





Pic 46: Rash in West Nile fever  
Picture Source: [openi.nlm.nih.gov](http://openi.nlm.nih.gov)



# Insect Vectors: Mosquitos

- West Nile Virus Treatment
  - Interferon alfa 2-b may be useful
  - Ribavirin appears unsafe in animal models
  - IV immunoglobulin has been tried
  - Supportive treatment
  - Vaccines in humans show promise, not yet available





# Insect Vectors: Mosquitos

- Zika Virus
  - Related to Dengue, Yellow Fever and West Nile organisms
  - 20% of infected pts show symptoms
    - Fever, rash, conjunctivitis, hand and foot arthralgia
  - Neurologic complications and birth defects are the dreaded complications
    - Meningoencephalitis, Guillain-Barre Syndrome,
    - Myelitis
    - Congenital microcephaly in infants





# Insect Vectors: Mosquitos

- Zika Virus
  - Vacation virus
    - Hawaii, Caribbean,
    - Florida, Texas
  - Transmitted by mosquitos
  - Sexually Transmitted, clears from semen in 3-6 months, vaginal mucus in 18 days
  - Minor symptoms usually require no treatment
  - Neurologic complications do occur



# Insect Vectors: Mosquitos

- Dengue Fever (Break Bone Fever)
- Similar to Zika and Chikungunya fever
- Classic Dengue Fever
  - Acute fever
  - Headache
  - Retro-orbital pain
  - Muscle and bone pain
  - 50% have a macular rash





Pic 39: Rashes – Dengue  
Photo Source: [www.healthmds.org](http://www.healthmds.org)



# SKIN RASHES IN DENGUE FEVER




# Insect Vectors: Mosquitos

- Hemorrhagic Dengue Fever
  - Shock
  - Increased vascular permeability
  - Hemorrhagic manifestations
  - Marked thrombocytopenia, 100,000 platelets or lower
  - Positive tourniquet test
    - BP cuff for 5 min, 10 or more petechiae per sq inch





# Insect Vectors: Mosquitos

- Hemorrhagic Dengue Fever
  - Critical phase, day 3-7
    - Persistent vomiting and abdominal pain
    - Tender hepatosplenomegaly
    - Pleural effusions
    - Mucosal bleeding
    - GI Bleeding
    - Restlessness
    - Narrowing pulse pressure
- 

# Insect Vectors: Mosquitos

- Chikungunya (African for ‘stooped walk’)
- Similar signs and symptoms to Dengue, carried by the same mosquito vector
  - Joint swelling specific to Chikungunya
  - Bleeding manifestations and leukopenia go with Dengue fever
  - Yes, people have had both, simultaneously



# Insect Vectors: Mosquitos

- Chikungunya
  - Caribbean, Pacific Islands, Florida, Europe
  - 85% of infected people show symptoms
    - High fever
    - Polyarthralgia 2-5 days after fever
      - Bilateral symmetrical arthralgias
      - Distal more than proximal
      - Often disabling pain in joints
    - Deaths in older or compromised patients
    - 50% macular rash
    - Chronic arthritis does occur in 25% infected





Pic 56: Rash – Chikungunya

# Vectors: Rodents

- Leptospirosis (Swineherds Disease)
  - Zoonosis caused by spirochetes
  - Hosted by various mammals
    - Rodents ,cattle swine, horses ,sheep and goats
  - Temperate and tropical disease, 10 times as likely in tropical areas
    - Range includes Washington state and Hawaii
  - Human infection from contaminated water or soil



# Vectors: Rodents

- Leptospirosis
  - Usually mild, but may be severe and fatal
  - Abrupt onset of fever, chills, rigors, myalgia and headache
  - Rash
  - Conjunctival suffusion may be diagnostic
    - Rare in other illnesses
  - Aseptic Meningitis may occur









# Vectors: Rodents

- Leptospirosis
  - Severe Complications
    - Jaundice, renal failure
    - Peripheral radiculopathy
    - Pulmonary hemorrhage
    - ARDS
    - Optic Neuritis
    - Peripheral neuropathy
    - Rhabdomyolysis



# Vectors: Rodents

- Leptospirosis
  - Treatment
  - Often self limited
  - If recognized, antibiotics are indicated
    - Doxycycline 100 mg BID for 7 days or
    - Azithromycin 500 mg daily for 3 days or
    - IV PCN, ceftriaxone or Doxycycline for severe disease



# Vectors: Rodents

- Hanta Virus
  - Deer mouse is the primary reservoir
  - Contact with infected mouse nests or droppings is the primary route of aerosolized transmission to humans
  - Not spread human to human, and rarely to the fetus
  - Fever
  - Adult Respiratory Distress Syndrome







# Vectors: Rodents

- Hanta Virus
  - Retrospectively identified back to 1959
  - More prevalent , in the US, Southwest and West Coast
  - Rare, only 690 US cases to 2016
  - 80% Fatality in the initial US group of patients



# Vectors: Rodents

- Hanta Virus

- Clinical Features

- Fever usually over 101
    - Bilateral diffuse interstitial edema in lungs
    - Respiratory compromise within 72 hours of hospital admission

- Incubation

- Usually 2-3 weeks

- Prodrome/Febrile Phase

- Fever, chills, myalgia without URI symptoms
    - Duration 2-8 days with rapid progression

# Vectors: Rodents

- Hanta Virus
  - Cardiopulmonary Phase
    - Capillary leak in lungs occurs
    - Rapid progression of
      - Shock
      - Pulmonary edema
      - Cardiac arrhythmias
      - Bronchorrhea
      - Often Death
  - Convalescent Phase
    - Dramatic resolution of above in 24-48 hours



# Vectors: Rodents

- Hanta Virus

- Treatment

- Early recognition
    - ICU
    - Mechanical ventilation
    - Early use of vasopressors
    - Extracorporeal membrane oxygenation
    - Ribavirin treatment discussed, not proven
    - Steroids not recommended



# Vectors: Rodents/Fleas

- Plague

- Bacterial infection caused by *Yersinia Pestis*
- Zoonotic infection from rodent fleas, humans are an incidental host, Cats can transmit
- Potentially person to person
- Mortality
  - Untreated, 60-100%
  - Treated, 15%
- 3 clinical manifestations in humans
  - Bubonic plague, 80-95% of cases
  - Septicemic plague, 10-20%
  - Pneumonic plague is rare

# Vectors: Rodents/Fleas

- Bubonic Plague
- Sudden onset of fever, chills, Headache
- Pain and swelling in a lymph node area
  - Bubo, Greek for groin
  - Painful, not fluctuant
- If Bubo phase is untreated, sepsis, pneumonia, meningitis, shock follow





# Vectors: Rodents/Fleas

- Septicemic Plague
  - Febrile, extremely ill without localizing symptoms or Bubos
  - Nausea, vomiting, diarrhea, abdominal pain
  - Hypotension
  - Disseminated Intravascular Coagulation
  - Multiple organ failure late in disease



# Vectors: Rodents/Fleas

- Plague
  - Antibiotic Treatment
    - 7-14 days
    - Aminoglycosides
      - Gentamicin is preferred
    - Doxycycline or tetracycline
    - Fluoroquinolones, 3<sup>rd</sup> line treatment
      - Levofloxacin, ciprofoxacin, moxifloxacin
    - Bactrim
      - delayed or incomplete responses




## 2<sup>nd</sup> Case

- 61 year old generally healthy patient returns from a cruise to Alaska
- Within 30 days develops loose stools, GI bloating and discomfort, flatulence, anorexia and 5% weight loss.
- No fever, no chills, no nausea or vomiting
- Sudden development of lactose intolerance



# 2<sup>nd</sup> Case

- Repeated stool tests for Giardia are negative
  - Symptoms continue for 3 months
  - Differential Diagnosis?
    - Parasites
    - Malignancy
    - Malabsorption
    - IBS
    - Inflammatory Bowel disease
- 



# Parasites

- Giardia
  - Protozoan Parasite
  - Water borne, food borne, or fecal oral  
Resistant to chlorination, not heat resistant
  - Clinical Manifestations
    - 50% clear the infection without symptoms
    - 15% shed cysts asymptotomatically
    - 35% are symptomatic



# Parasites

- Giardia
  - Incubation 7-14 days
  - Acute symptoms
    - Diarrhea-90%
    - Malaise-85%
    - Foul smelling fatty stools-75%
    - Abdominal cramps and bloating-70%
    - Flatulence-75%
    - Weight Loss-66%



# Parasites

- Giardia
  - Chronic Infection
    - Loose stools
    - Weight loss, 10-20% body weight
    - Malaise and fatigue
    - Depression
    - Flatulence and Belching
    - Acquired Lactose intolerance



# Parasites

- Giardia
  - Complications
    - Urticaria, rash, aphthous ulcers
    - Rarely hepato-biliary disease
  - Treatment
    - Tinidazole
      - 2 grams oral single dose
    - Nitazoxanide
      - 500 mg PO BID for 3 days
    - Metronidazole (Flagyl)
      - 500 mg BID for 7 days
      - 75-100% effective

# Parasites

- *Dientamoeba Fragilis*
  - Anaerobic intestinal protozoan parasite
    - Trophozoites, no cysts
  - Fecal oral route
  - May coexist with pinworms



# Parasites

- Dientamoeba Fragilis
  - Symptoms similar to Giardia
    - Abdominal Pain-80%
    - Diarrhea-72%
    - Anorexia-16%
    - Fatigue-9%
    - Weight Loss-3%
    - Acquired Lactose Intolerance



# Parasites

- Dientamoeba Fragilis
  - Treatment
    - Metronidazole
      - 500-750 mg PO TID for 10 days
    - Paramomycin
      - 25-35 mg/kg in 3 divided doses for 7 days
    - Iodoquinol
      - 650 mg PO TID for 20 days
    - Doxycycline
      - 100 mg PO BID for 10 days



# 2<sup>nd</sup> Case

- 3<sup>rd</sup> Stool sample returns positive for *Dientamoeba Fragilis* trophozoites
- Treatment with metronidazole for 10 days
- Symptoms resolved





# Viral

- Influenza
  - Seasonal winter outbreaks
  - Transmitted person to person by large and small droplets, aerosolized
  - Fever, chills and myalgias, often prostration
  - Treatment with Tamiflu within 48 hours,
    - Perhaps only 14 hour decrease in severe symptoms
  - Secondary infections and complications



# Viral

- Norovirus (Norwalk Virus)
  - Most common cause of viral gastroenteritis
  - Extremely contagious human to human
  - 20 million annual cases, 400,000 ED Visits
  - Incubation period is 24-48 hours
  - Non bloody vomiting and diarrhea
  - 50% have fever
  - Headache, myalgias, malaise
  - IV fluids, Zofran, supportive treatment

# 3<sup>rd</sup> Case Report

- 1991
- 44 year old chronic alcoholic presents to the ED on the reservation, c/o R arm pain for 2 days
- Stable VS except temp of 101
- Painful inflamed abscess R forearm 3x3 cm
- Exam otherwise normal except intoxication



# 3<sup>rd</sup> Case Report

- Wound incised and drained, purulent material, gram stain shows Gram + cocci
- Patient insisted on leaving, unstable gait
- Nurse rechecked VS, systolic BP now 80
- Patient argued, collapsed, transferred to ICU



# 3<sup>rd</sup> Case Report

- ICU
  - Demise within 24 hours
- Diagnosis
  - Gram + Sepsis, of course, but Code Sepsis protocols were in their infancy then



# Bacterial

- Toxic Shock Syndrome
  - Originally described in 1978,
  - Cluster of deaths in young women 1980
  - Methycillin Sensitive Staph Aureus (MSSA), less frequently MRSA
  - Toxic shock Syndrome Toxin 1
    - 90-100% of strains causing menstrual TSS
    - Decreased since discontinuation of super absorbent tampons



# Bacterial

- Toxic Shock Syndrome

- Presentation

- Abrupt Fever, hypotension and rash in a healthy patient
    - 1st 48 hours
      - Severe watery diarrhea
      - Poor urine output
      - Cyanosis
      - Extremity edema
      - Cerebral ischemia-confusion, irritability, somnolence



# Toxic Shock Syndrome





# Bacterial

- Toxic Shock Syndrome
  - Treatment
    - IV Clindamycin plus Vancomycin
    - Possibly IV immunoglobulin
    - No steroids



# Bacterial

- Toxic Shock Syndrome
  - Group A streptococcus also implicated
  - Case rates increased 3 fold between 2002 and 2010 in one Utah study
  - Can present from minor trauma, often with no visible break in the skin
  - Can present with necrotizing fasciitis
  - Can be confused with Rocky Mt Spotted Fever and Leptospirosis



# Bacterial

- Toxic Shock Syndrome, streptococcal
  - Mortality is 30-70%
  - Treatment
    - Treat for shock
    - Surgical debridement if possible
    - Antibiotics
      - Clindamycin IV
      - Imipenem IV



# Infections and Infestations 2018

- Take Home Points
  - Get a travel history
  - Identify Fever
  - Look for rash and giant lymph nodes
  - Suspected Hanta Virus goes to the ICU
  - Doxycycline for treatment of tick borne illnesses
  - Although your Cat is cute, your Dog won't give you Bubonic Plague
  - Have a safe trip home





