MISCELLANEOUS CASES

NAME THAT PATHOGEN!

CLINICAL MICROBIOLOGY SERVICE

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CASE - A BUNNY'S TALE

- 20 yo woman from Staten Island, no hx TB, no immunosuppression
- Seen at a Bklyn hosp ED on 8/20 w 5 days of fever, sweats, chills, no cough
- 5 days later reappears at ED with w SOB, fever (104), malaise, R sided pleuritic CP
- X-ray revealed LLL infiltrate and R pleural effusion

WHAT SPECIMENS SHOULD BE ORDERED?

MICRO & OTHER LABS

- BLOOD CULTURES, PLEURAL TAP & URINE SPECIMENS TO MICRO
- LABS ON ADMISSION: WBC 9.8, Hgb 10, plt wnl. (Note: thruout hospitalization, WBC not above 12.3; no anemia, no thrombocytopenia)

RESULTS

- Blood cultures positive
  - ✓ GNR
- More history taken
- Pt has 2 dogs, but no report of bite or cellulitis

WHAT IS LIKELY DX?

AT THE NYC DOH LAB

- Identification by routine semi automated systems in Micro lab was *Pasteurella multocida*
- Identification Methods
  - ✓ DFA panel of Select BT agents
  - ✓ PCR
- Organism identification as
  - ✓ *Francisella tularensis &* NOT *P. multocida*

CLINICAL HISTORY – CONSISTENT WITH PNEUMONIC TULAREMIA

NYC DOHMH

- *Francisella tularensis* is a select agent considered to be a biological threat agent that poses a substantial risk to public health, therefore, reportable to NYC DOH
- *F. tularensis* was weaponized by U.S. in 1950's & 1960's during offensive biowarfare program.
- Bureau Communicable Diseases notified; epi investigation begun
- CDC and NYS DOH notified
- Appropriate PHL staff prophylaxed with doxycyline

Francisella tularensis

- As few as 10 organisms sufficient to cause severe disease and death
  - ✓ One of the most infectious bacterial pathogens known
- 30-60% fatality rate if untreated
- Usual lymph node involvement
  - ✓ Not this case
- Transmission
  - ✓ Ticks, animal bites, cutaneous inoculation, ingestion or handling infected animals
- TX: Streptomycin, Gentamicin, tetra & chloramphenicol (1-2 wks)

OTHER SELECT AGENT MISIDENTIFICATIONS

- *Bacillus anthracis*
  - ✓ *B. megaterium*
- *F. tularensis*
  - ✓ *P. multocida*
- *Yersinia pestis*
  - ✓ *Shigella*
  - ✓ *Acinetobacter*
- *Brucella spp.*
  - ✓ "Slow-growing" Staph
  - ✓ *Hemophilus sp*
  - ✓ *Acinetobacter sp*

A SHOCKING CASE

DAY 1: 14 yr old male sustained a traumatic injury to the dorsum of rt foot from a piece of glass while playing in a local sprinkler system.

DAY 2: Returned to ED with fever, chills edema. Sutures removed & wound cleaned.

OR: I&D of wound . Noted streaking to the medial aspect of the leg. Rapidly progressing cellulitis of the calf. Febrile to 104,, loss of limb Considered.

ID & MICRO CONSULTED Infection with toxin producing bacteria highly suspect

TX: Clindamycin & Gentamicin

THE MICRO LAB

MICRO SPECIMENS ORDERED

- BLOOD CULTURE
- WOUND CULTURES
  - BACTERIOLOGY
  - MYCOBACTERIOLOGY

THE DIFFERENTIAL?

- Group A *Streptococcus*
- *Aeromonas hydrophilia*
- *Pleisiomonas shigelloides*
- *Vibrio vulnificus*
- *Pseudomonas species*
- *Mycobacterium marinum*

MICRO RESULTS

CULTURES

- 5 COLONIES ON CULTURE
  - OXIDASE POSITIVE
- IDENTIFICATION
  - SPECIAL MEDIA

CURVED, MOTILE GRAM-NEGATIVE RODS

IDENTIFICATION

VIBRIO VULNIFICUS

TX & PT OUTCOME

- AMINOGLYCOSIDE ADDED TO CEFTAZADIME & CIPROFLOXACIN
- SKIN GRAFTING
- RECOVERED

VIBRIO VULNIFICUS

"Vulnificus"

Latin for inflicting wounds

- **HABITAT:** Marine & Estuaries. Most common in July & Aug when temp is 70C; Halophilic (1% NaCl)
- **PORTAL OF ENTRY:**
  - Necrotizing soft tissue trauma in seawater (onset 4 hr to 4 days)
  - Raw/undercooked seafood, particularly oysters leads to gastroenteritis within 16 hr

PATHOGEN ACQUISITION

FAMILY WAS QUESTIONED

- WAS HE NEAR A BEACH? NO
- HOW DID HIS FOOT GET CUT?
  - SPRINKLER SYSTEM IN PARK IN WASHINGTON HEIGHTS
- DID HE HAVE CONTACT WITH ANY FISH?
  - NO….BUT A FISH VENDOR WAS NEAR THE SPRINKLER & AT THE END OF THE DAY HE DISCARDS THE ICE THAT COOLS THE FISH INTO THE DRAIN OF THE SPRINKLER!

V. VULNIFICUS FACTS

- RAPIDLY PROGRESSIVE, HIGHLY FATAL, FEVER, SHOCK, MULTIORGAN DAMAGE
  - ✓Assoc with bullous skin lesions
- NECROTIZING FASCITIS
- GASTROENTERITIS
  - Mild to severe non bloody diarrhea
- CAUSES 95% OF ALL SEA-FOOD RELATED DEATHS IN US
- 60% MORTALITY FROM SEPTICEMIA UNLESS TX RAPIDLY INITIATED
- VIRULENCE FACTORS

  CAPSULE, LPS ANTIGENS, CYTOTOXIN HEMOLYSIN, ELASTOLYTIC PROTEASE, COLLAGENASE

HURRICANE KATRINA

August 29, 2005

- TOTAL
  - *Vibrio sp.*
    - 22 cases, 5 deaths
- WOUND ASSOCIATED
  - *Vibrio vulnificus*
    - 82%
  - *Vibrio parahaemolyticus*
    - 18%
- GASTROENTERITIS
  - *Vibrio cholera* (nontoxigenic)
    - 2 Cases

PEDIATRIC CASE #1

- 7 MTH OLD BOY
- SWOLLEN RT SHOULDER
- TEMP 104
- FAMILY OWNED BLACK RIVER SNAKE
- LIVED IN AQUARIUM ON FLOOR
- BABY CRAWLED ON RUG
- 4 BLOOD CULTURES NEGATIVE
- CULTURE
  - *SALMONELLA ARIZONAE*
  - ISOLATED FROM BABY
  - ISOLATED FROM SNAKE'S STOOL SPECIMEN

CDC RECOMMENDATIONS

- Children <5 years of age & immunocompromised persons avoid direct contact with reptiles
- No reptiles in households with children < 1 yr of age or in childcare programs
- Pet store personnel & reptile owners be aware that reptiles harbor & can transmit *Salmonella* to humans

PEDIATRIC CASE #2

A 4 yo female developed persistent watery diarrhea

- ✓ A sibling & several day care center friends had developed similar symptoms
- ✓ The child drank city water
- ✓ No travel in the previous 6 mths

WHAT IS YOUR GUT REACTION?
WHAT SPECIMENS SHOULD BE ORDERED?

SPECIMENS

- HOW MANY STOOL SPECIMENS WILL YOU ORDER FOR OVA & PARASITE EXAM?
  - ✓ UPPER GI INFECTION
    - ✓ 5-6 STOOLS REQUIRED FOR UPPER GI
    - ✓ DUODENAL ASPIRATE
    - ✓ ENTERO-TEST (STRING TEST)
  - ✓ 3 FOR ROUTINE PARASITES

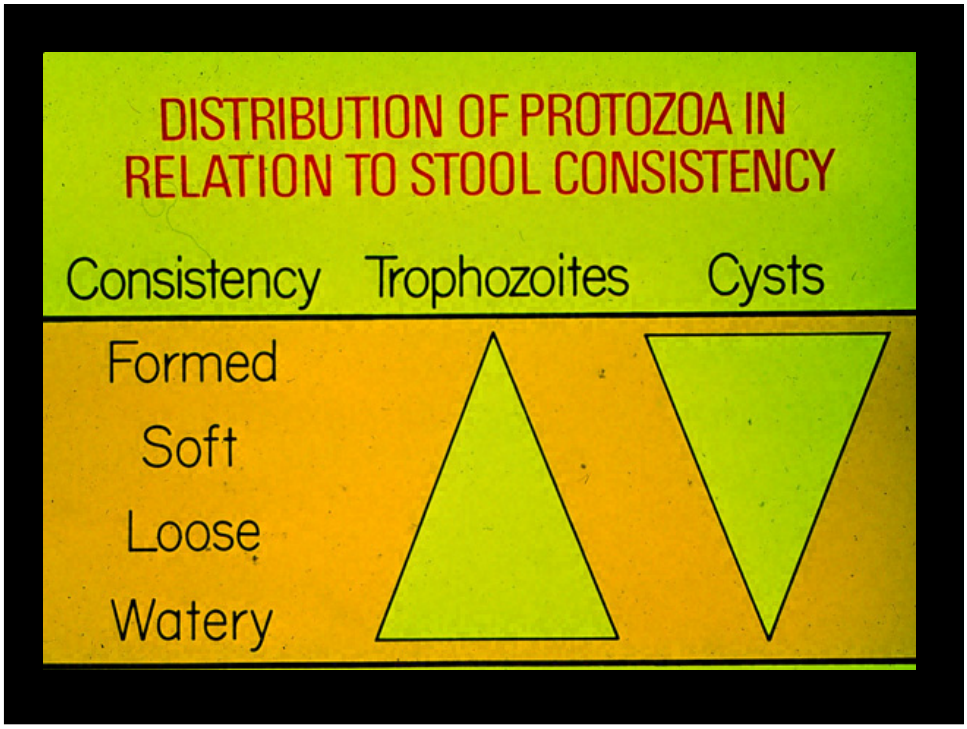
PARASITOLOGY

- SPECIMEN PRESERVATIVE
  - SAF – SODIUM ACETATE ACETIC ACID FORMALIN
- MICROSCOPIC EXAMINATION – 3 SPECIMENS
  - TRICHROME & AFB STAINS ON ALL STOOLS
  - STOOLS EXAMINED FOR O & P, INCLUDING *ISOSPORA, CRYPTOSPORIDIUM*, *CYCLOSPORA*
  - *MICROSPORIDIUM* BY REQUEST ONLY
- ENZYME IMMUNOASSAY (EIA) FOR *GIARDIA* & *CRYPTOSPORIDIUM* – ON REQUEST
  - SENSITIVITY & SPECIFICITY IS 99/100%
  - DISTINGUISHES *GIARDIA* FROM *CRYPTOSPORIDIUM* ANTIGENS USING SPECIFIC CAPTURE ANTIBODIES

GIARDIA LAMBLIA

- OVA & PARASITE

- MICROSCOPY
  - ✓ IODINE & TRICHROME STAINS
  - ✓ TROPH
  - ✓ (“LITTLE OLD MAN”)
- OTHER SPECIMENS
  - ✓ DUODENAL ASPIRATE
  - ✓ ENTERO-TEST (STRING TEST)
- UPPER GI PATHOGEN
- IMMUNOCHROMATO GRAPHIC ASSAY



GIARDIA HIGHLIGHTS

- TRANSMISSION
  - FECAL CONTAMINATION OF FOOD & WATER
  - PERSON-TO-PERSON
  - STD BY ANAL INTERCOURSE
- ANIMAL & HUMAN HOSTS
  - ✓HIKERS FROM SPRING WATER
- *GIARDIA* ATTACHES TO INTESTINAL WALL USING VENTRAL "SUCKER" DISK

ADOLESCENT CASE

- HPI
  - ✓19 YO MALE STUDENT, HEADACHE, FEVER, LETHARGIC
- PMHX
  - ✓HEALTHY, NO HX MAJOR ILLNESS
- PE
  - ✓FEBRILE (40 C), NECK SUPPLE, PURPURIC RASH TRUNK, LEGS & WRISTS

WHAT IS THE DIFFERENTIAL?

- MENINGITIS
  - ✓BACTERIAL ?
  - ✓VIRAL ?
- ENCEPHALITIS

LAB DX THE CULTURES

- CSF
  - ✓CULTURE & SUSCEPTIBILITY
  - ✓VOLUME 5 - 10 ML
  - ✓RAPID TRANSPORT
  - ✓DO NOT REFRIGERATE
- BLOOD
  - ✓PEDS PLUS BLOOD BOTTLE
- URINE

- GRAM STAIN TAKEN FROM SKIN LESION
  - ✓GRAM-NEGATIVE DIPLOCOCCI

ETIOLOGIC AGENTS

- AGE GROUPS
  - ✓NEONATES
    - Group B Strep
    - *E.coli*
    - *Listeria*
  - ✓ALL OTHERS
    - *N. meningitidis*
    - *S. pneumoniae*
    - *Listeria*
    - *S. aureus*
    - GNR

N. MENINGITIDIS

- MULTIPLE SEROGROUPS
- ENDEMIC WORLWIDE
  - ✓A,B,C,Y,W135
- SPORADIC U.S. CASES
  - ✓B & C
  - ✓W135
- PEAK SEASON
  - ✓NOV - JAN

ETIOLOGIC AGENT

- *N. MENINGITIDIS*
  - ✓MENINGOCOCCAL MENINGITIS & MENINGOCOCCEMIA
  - ✓MENINGITIS WITH SEPSIS
    - 30% MORTALITY
  - ✓8-20% ASYMPTOMATIC CARRIAGE IN ORO- NASO-PHARYNX
    - TRANSIENT, INTERMITTENT OR PERSISTENT

N. MENINGIDITIS IN USA

- 3,000 CASES & 300 DEATHS/YEAR
- COLLEGE STUDENTS
  - ✓125-175 CASES & 15 - 20 DEATHS/YR
- FRESHMAN IN DORMS HAVE 6X RISK OF DEVELOPING MENINGOCOCCAL INFECTION OVER OTHER COLLEGE STUDENTS
- CHILDREN <1 YR; MILITARY RECRUITS, REFUGEES, PATIENT HOUSEHOLD CONTACTS, MICRO LAB PERSONNEL
- CDC ADVISORY PANEL RECOMMENDS VACCINATION (INCLUDES A, C, Y & W135)

CASE CHALLENGE

AUGUST 2003: 2 MEN EVALUAED AT ED IN FLORIDA WITH 4-DAY HX OF FEVER, CHILLS, MYALGIA, FATIGUE, NAUSEA & HEADACHE.

- ✓THICK & THIN MALARIA SMEAR PREPARED
- ✓1ST PT FROM UGANDA
  - ✓MALARIA SMEAR WAS READ AS NEGATIVE
- ✓2ND WAS A NATIVE FLORIDIAN
  - ✓MALARIA SMEAR WAS READ AS POSITIVE
- ✓HIGH INDEX OF SUSPICION, SO SAMPLES SENT TO DOH

ANY THOUGHTS?

MMWR 2004 53:412-413

LAB & CLINICAL ERRORS

CASE

- ONLY ONE BLOOD SPECIMEN SENT TO LAB
  - ✓NEED MULTIPLE BLOOD SAMPLES
- SMEAR WAS POORLY PREPARED
  - ✓PH OF STAIN?
  - ✓SMEARS FROM PT 1 & 2 WERE REVERSED IN LABELING
- *P. VIVAX* REPORTED ON PT 2 (NATIVE FLORIDIAN) BY A PRIVATE LAB
- DOH CONFIRMED *P. OVALE* NOT *P. VIVAX* BY PCR

MALARIA

- ABOUT 60 CASES/YR MALARIA REPORTED FL
- MOSTLY IMPORTED
- AIRPORT MALARIA
- LOCAL CASES USUALLY DUE TO *P. VIVAX*
- **NEED FOR PROPER SMEAR PREP, MICROSCOPIC ID, SPECIMEN HANDLING & LABELING**

MALARIA ON THE MOVE

REPORTS OF MALARIA ARE INCREASING IN MANY COUNTRIES & AREAS THOUGHT FREE OF THE DISEASE

- HUMAN MIGRATION
  - ✓ACTIVE TRANSMITTERS
  - ✓PASSIVE ACQUIRERS (low-level immunity)
- INTERCONTINENTAL TRANSFER
  - ✓AIRPORT MALARIA/IMPORTED MALARIA
    - URBANIZATION
    - REFUGEES

PUBLIC HEALTH BREAKTHROUGH

OCTOBER 2002
SEQUENCING OF THE MOSQUITO & *P.FALCIPARUM* GENOMES
THE AIMS ARE TO

- Engineer a mosquito incapable of carrying the malaria parasite
- Target drug resistance
- Vaccine development

PLASMODIUM SPECIES & SPECIMEN HANDLING

PLASMODIUM SP

- *P. VIVAX*
- *P. OVALE*
- *P. MALARIAE*
- *P. FALCIPARUM (medical emergency)*

BLOOD SPECIMENS

- BLOOD SPECIMEN IN LAVENDER TOP TUBE OBTAINED ON ADMISSION

WRIGHT-GIEMSA STAIN
THICK & THIN SMEARS

- 200-300 OIL IMMERSION FIELDS EXAMINED
- ONE SET OF NEGATIVE FILMS WILL NOT RULE OUT MALARIA
- EXAMINE 4-5 ADDITIONAL BLOOD FILMS (IN 6 HR INTERVALS) OVER 36 HR

HALLMARKS FOR MALARIA IDENTIFICATION

SPECIES	HOST RBC	TROPHS	GAMETO-CYTES
P. vivax	Enlarged & pale	Ameboid fill entire RBC	Round to oval; almost fill the RBC
P.falciparum	Normal	Small rings Multiple rings/RBC	Crescent (banana) shaped
P.malariae	Normal	Ribbon/band shaped	Round to oval; almost fill the RBC

DRUG RESISTANCE

- RESISTANCE TO CHLOROQUINE & SULFADOXINE PYRIMETHAMINE IS COMMON
- NOW COMBINATION THERAPY
- AFRICA TO ADOPT ACT AS 1ST LINE THERAPY
  - ✓ARTEMISININ-BASED COMBO THERAPY
- MAY BE COST PROHIBITIVE