

Lecture 2



Normal flora & introduction to infectious diarrhea

- Additional Notes
- Important
- Explanation
- Examples

Objectives

- By the end of this lecture the student should be able to:
 - ✓ Define and recognize the various types of acute diarrheal illness
 - ✓ Describe the epidemiology the host defenses in preventing the gastrointestinal infection
 - ✓ Explain pathogenesis by which *Escherichia coli campylobacter* and *yersinia* and their management
 - ✓ Discuss the microbiological methods used for diagnosis of each of the bacterial agents including microscopy, selective media for maximal recovery
 - ✓ Describe the pathogens, risk factors, clinical presentation and prevention of food poisoning travelers and antibiotic associated diarrhea.
 - ✓ Name the etiological agents causing food poisoning and their clinical presentation

Normal Flora in the GIT

- The infants' GIT is sterile.
- Breast-fed:
 - ✓ *Bifidobacteria species*
- Switch to cow's milk:
 - ✓ Enteric, bacteroides, enterococci, lactobacilli and clostridia
- Switch to solid food:
 - ✓ Microflora similar to parents
- Sigmoid colon and rectum is the most colonize part of the GIT by normal flora.

Introduction to diarrhea

- Acute diarrheal illness is one of the most **common** problems evaluated by clinicians.
- A major cause of **morbidity and mortality** world wide.
- Most of healthy people have mild illness but other might develop serious sequelae so it is important to identify those individuals who require early treatment.
- Etiology:
 - ✓ **Viral: 70-80%** of infectious diarrhea in developed countries
 - ✓ **Bacterial: 10-20%** of infectious diarrhea but responsible for most cases of severe diarrhea
 - ✓ **Protozoan: less than 10%**
- 1.2-1.9 episodes per person annually in the general population
- 2.4 episodes per child > 3 years old annually
- 5 episodes per year for children < 3 years old and in daycare
- Seasonal peak in the winter.

Food Poisoning Diarrhea

- **Most common causes:**
 - ✓ Staphylococcus aureus
 - ✓ Clostridium perfringens
 - ✓ Bacillus cereus
- **Enterotoxin mediated.**
- Lack of pus in the stool (no invasion)
- Incubation period is rapid. onset preformed toxin < 12 hr
- Vomiting ,non-bloody diarrhea, abdominal cramp
- Lack of fever
- Other viral and some parasitic infection

Invasive Diarrhea

- Pus and blood in the stool → Affect colonic mucosal surface of the bowel
- Fever due to inflammation
- Etiology:
 - ✓ Campylobacter
 - ✓ some E-coli
 - ✓ Shigella, Solmonella spp
 - ✓ Endameba histolytica
- Incubation period 1-3 days
- Extension to lymph nodes
- Dysentery syndrome- gross blood and mucous

Invasive Diarrhea

- E. Coli:

- ✓ Only about 10 -15% of strains of E. coli associated with diarrhea.
- ✓ There are five major categories of diarrheagenic E.coli:
- ✓ Pathogenic types of E. coli diarrhea:

- Enterohaemorrhagic E. coli (EHEC)

- cause a syndrome called hemolytic uremic syndrome (HUS)=↓Platelet count, hemolytic anemia and kidney failure.
- Bloody diarrhea, low grade fever and stool has no leucocytes
- Undercooked hamburgers, unpasteurized dairy products, apple cider, cookie dough

- Enteroinvasive E. coli (EIEC):

- Produce dysentery (Penetration, invasion and distraction)
- Similar to Shigella spp (Non motile, LNF)
- Fever, severe abdominal cramp, malaise and watery diarrhea

- Enterotoxigenic E. coli (ETEC):

- Major cause of traveler's diarrhea in infant and adult in developing countries from contaminated food and water.

Invasive Diarrhea

- **Campylobacter:**

- ✓ Campylobacter is difficult to detect.
- ✓ Source: poultry, birds, dog , cat → water, milk, meat, person to person can occurs.
- ✓ **Incubation period 2-6 days**
- ✓ Abdominal cramp, **bloody diarrhea**, nausea and vomiting are rare
- ✓ Self limiting 2-6 Day
- ✓ Chronic carrier
- ✓ Campylobacter may causes bacteremia.

- **Laboratory:**

- ✓ Transport media Cary Blair
- ✓ CAMPY BAP contain antibiotics
- ✓ **grows best at 42°C, microaerophilic** (grows best at lower oxygen than atmospheric and more Nitrogen)
- ✓ Gram stain/culture biochemical/Serology

Invasive Diarrhea

■ *Yersinia enterocolitica*

- ✓ Mesenteric lymphadenitis in children and septicemia in immunocompromised hosts
- ✓ Children 1-5 yrs usually mild with bloody diarrhea.
- ✓ Children >5 years: bloody diarrhea + appendicitis-like pain
- ✓ Adults: bloody diarrhea □+ arthritis
- ✓ Growth at 25°C-30°C media Cefsulodin-Igrasan-Novobiacin (CIN)

■ *Listeria monocytogenes*

- ✓ heat-resistant organism survives in poorly pasteurized milk → consumed by host → penetrates GI mucosa and invades phagocytes → grows intracellularly (intracellular infection)
- ✓ Incubation period is long, takes 2 to 3 weeks.
- ✓ Growth at 25°C-30

Antibiotic associated diarrhea

- *Clostridium difficile*
 - ✓ Transmit from person to person via Fecal-Oral route
 - ✓ Have been cultured from inanimate hospital surfaces
 - ✓ Disruption of the indigenous bacterial flora of the colon
 - ✓ Produce toxin A and B that can bind to surface epithelial cell receptors **leading to inflammation mucosal injury and diarrhea**
 - ✓ Patient Presents with fever, leukocytosis, abdominal pain and diarrhea
 - ✓ Pseudomembrane can result (neutrophils, fibrin, and cellular debris in the colonic mucosa) and toxic megacolon
- Diagnosis: toxin detection by EIA
- Treatment: **Metronidazole ± Vancomycin and supportive treatment**

Remember !

1. Normal flora:
 - **Bifidobacteria species** from breast feeding.
2. Food poisoning diarrhea:
 - enterotoxin mediated.
 - IP is quick. Less than 12 hours.
 - Most common bacteria:
 - ✓ *Staphylococcus aureus*
 - ✓ *Clostridium perfringens*
 - ✓ *Bacillus cereus*
3. Invasive diarrhea:
 - Organism mediated (virulence factors)
 - **EHEC**: causes hemolytic uremic syndrome
 - **EIEC**: similar to shingella + causes dysentery (mucus and blood in stool)
 - **ETEC**: Traveller diarrhea syndrome
 - **Lesteria** is a **gram +ve bacilli**, **non-spore forming** & beta hemolytic.
 - **Comptlobacter**: needs a specail media to grow Cary Blair (microaeropic media)
 - **Clastridium difficile** is a **gram +ve bacilli**, **spore-forming**. (Mteronidazole ± vancomycin)

Quiz

3.A

2.A

1.C

ANSWERS:

1. A 22-year-old athlete male presented to the clinic with 5 hours history of diarrhea. From the history he had eaten a pizza from refrigerator. Although his family have eaten with him and they haven't had any symptoms. The most likely etiologic organism from the following:

- a) Listeria b) Yersinia c) Staphylococcus aureus d) E.coli

2. Which of the following species of E.coli could cause traveller diarrhea syndrome?

- a) ETEC b) EHEC c) EPEC d) EAEC

3. The best drug used to treat Clostridium difficile:

- a) Metronidazole b) Ampicillin c) Rifampicin d) Ceftriaxone

Quiz

4. A patient had a chronic diarrhea. From the history he consumed large amount of raw cheese. The lab investigations show:

Gram +ve non-spore forming bacilli. Which of the following is the most causative organism?

- a) Campylobacter b) Listeria c) Clostridium difficile d) Yersinia

5. A 24-year-old patient presented with dysentery stool. The lab results showed gram –ve bacilli. Which of the following is the most causative organism?

- a) ETEC b) EHEC c) EIEC d) EAEC

5. Which one of the following organisms is considered as normal flora?

- a) Bigifidobacteria b) Clostridium difficle c) S.aureus d) Shigella