Microbiology
437

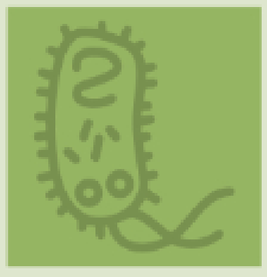
MED437
KING SAUD UNIVERSITY

VIRAL GASTROENTERITIS

VIRAL INFECTION OF GIT

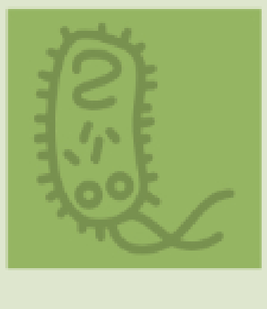
Gastroenteritis

Definition	It is an inflammation of the gastrointestinal tract which involves both stomach and small intestine leading to acute diarrhea and vomiting.
Etiology	- Rotavirus. (Most common & can cause severe infection in children) - Adenovirus serotype 40 & 41. - Caliciviruses (Norovirus/ norwalk virus) - Astrovirus. - Other: Coronavirus, Torovirus, and Enterovirus.
Epidemiology	- Worldwide; in poor hygiene, overcrowding, and poverty. - Mainly infant & young children > older children. - Transmit by faecal-oral route. - Peeks in winter months. - Endemic infection: group A Rotavirus & Adenovirus 40 & 41. - Epidemic infection: Norovirus (from Caliciviruses).
Clinical Features	- Incubation period: short (1-2 days in Rotavirus). - Symptoms: NON BLOODY diarrhea (watery), vomiting, fever, and abdominal cramps. - **Note**: dehydration with decreased Na^+ is a **Life threatening** condition caused by diarrhea and vomiting. - Winter vomiting disease: - Vomiting more than diarrhea (caused by calicivirus)
Lab Diagnosis Immunoassay	- Cell culture: not used, due to poor growth. - Electron microscopy: not used (expensive). - ELISA for detection of viral Ag in stool samples (Rotavirus, Adenovirus, Astrovirus, and Caliciviruses). - Immunochromatography (Rotavirus & Adenovirus). - Latex agglutination, gel electrophoresis, and RT-PCR; for Rotavirus.
Treatment	- Self-limiting, treated by rehydration and supportive treatment.
Prevention	- Sanitation & hygiene measures. - Vaccines for Rotavirus only: live attenuated vaccine, oral; Rotashield (withdrawn), Rotarix, RotaTeq.

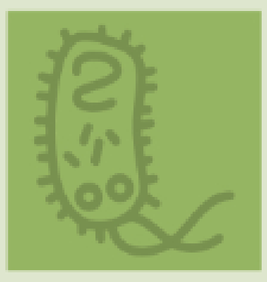
Viral Gastroenteritis

Virus	Rotavirus	Enteric Adenoviruses	Caliciviruses (Norovirus)	Astroviruses
Family	Reoviridae (Respiratory & Enteric Orphan).	Adenoviridae.	Caliciviridae (Calyx=cup).	Astroviridae (astro=a star).
Description (know if it's DNA or RNA)	- Non-enveloped. - 11 segments ds-RNA. - Double-layered icosahedral capsid. - ~70 nm. - RNA-dependent RNA polymerase.	- Non-enveloped. - ds-DNA. - Icosahedral capsid. **Note**: the only virus with fiber protruding from capsid vertices.	- Non-enveloped. - ss-RNA with +ve polarity. - Icosahedral capsid.	- Non-enveloped. - ss-RNA with +ve polarity. - Icosahedral capsid.
Morphological Features	Double-shelled with wheel-like structure.	Classical icosahedral capsid with fibers (spikes).	Cup-like depression on its surface.	5 or 6-pointed star on its surface.
Classification	7 groups (A-G). Most common: group A.	6 subgenera (A-F), & 51 serotype. - Enteric Adenoviruses: subgenus F, 40 & 41 serotype. - Fastidious	Two morphologic types: - Typical Caliciviruses (Sapovirus). - Small round structured viruses (Norovirus).	8 serotypes.
Epidemiology	- Most common cause of gastroenteritis - Affect all age groups but mainly 6-24 months. - Endemic	-	- Faecal-oral (water, shellfish). - All age groups. - Outbreaks of GE in schools, camps & cruises. - All age group	-
Special informations	Outcomes are vary: - ½ of all GE cases are admitted. - Developed countries have low mortality. - Developing countries have significant mortality. - Deaths are reported	Grow in cell culture. Fibers for: attachment, hemagglutinin, type-specific Ag.	-	

Clinical Features

Rotavirus	Enteric Adenoviruses	Caliciviruses (Norovirus)	Astroviruses
- Most common cause of infants & young children gastroenteritis or infantile GE - IP= 1-2 days. - Watery, non-bloody diarrhea with vomiting & fever. - Dehydration <u>Intestinal infection:</u> - GE in infants & young children. - Asymptomatic in older children & adults. - Chronic diarrhea in low immune hosts. <u>Extra-intestinal infection:</u> - Encephalitis in small number of cases.	In comparison to Rotavirus: - Longer IP. - Less severe. - Prolonged illness.	Children: vomiting (projectile) Adults: diarrhea.	- Mild GE - Outbreak of diarrhea <5 yr.

Doctor's Notes

Rotavirus

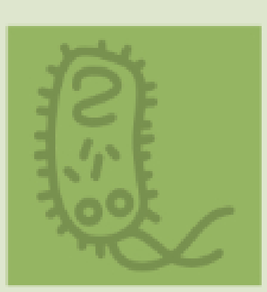
- The infection could be transmitted through fecal-oral route; either by direct contact with and infected person or by touching a contaminated surface.
- Pathogenesis of rotavirus:
  - Ingesting the virus → reaches the small intestine → infect the epithelial cells of the small intestine (mainly the epithelial cells on the tip of the villi) → shortening and atrophy of the villi → production of digestive enzymes that get produced by these cells is decreased → malabsorption (nutrients don't get absorbed by the brush borders) → hyperosmotic effect → diarrhea
  - In immunocompetent: recovery will take one week
  - In immunocompromised: might have persistent infection and chronic diarrhea
  - Usually the child will develop immunity against that specific type of rotavirus

Enteric Adenovirus 40 & 41 serotypes

- This is the only type that causes GE
- 2nd most common non bacterial cause of GE in infants and young children
- Adenoviruses usually grow on cell culture but enteric adenoviruses are fastidious (don't grow on the routine cell culture)
- The diarrhea might last longer than rotavirus but the symptoms are mild
- No vaccine

Norovirus

- Most common non bacterial epidemic cause of GE

Quiz:

1. Which one of the followig has a vaccine?
   A. Rotavirus
   B. Enteric Adenovirus
   C. Norovirus
   D. Astrovirus

2. Which of the following can come from shellfishes?
   A. Rotavirus
   B. Enteric Adenovirus
   C. Norovirus
   D. Astrovirus

3. Which of the following has the worst complication?
   A. Rotavirus
   B. Enteric Adenovirus
   C. Norovirus
   D. Astrovirus

4. Which of the following has double stranded DNA?
   A. Rotavirus
   B. Enteric Adenovirus
   C. Norovirus
   D. Astrovirus

CASE: A 7 years old child come to you with a history of fever, diarrhea and vomiting for the last three days. His diarrhea appears to be watery, with no blood.

5A-What is the diagnosis, and what most likely caused it?

5B- What will you do to confirm the cause?

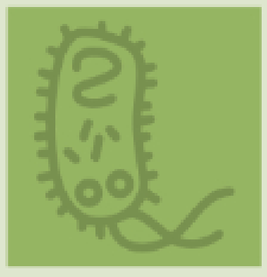
5C- What is the management?

Answers:
1. A
2. C
3. A
4. B

5A: Viral gastroenteritis, most likely Rotavirus.

5B: ELISA, immunochromatography, latex agglutination, gel electrophoresis, and RT-PCR.

5C: it’s a self-limiting disease, so we rehydrate and support him.

THANK YOU!

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