Lecture series
Gastrointestinal tract

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GASTROINTESTINAL MOTILITY - II
MOVEMENT OF SMALL INTESTINE

• TYPES OF MOVEMENT
• 1) MIXING /SEGMENTATION CONTRACTIONS
• 2) PROPULSIVE CONTRACTIONS

• However both the contraction occurs simultaneously in small intestine
Small Intestine (mixing/segmentation)

- Mixing movements – segmentation – also helps propulsion
- Propulsive – peristaltic - velocity of 0.5 to 2.0 cm/sec,

- faster in the proximal intestine and slower in the terminal intestine - very weak and usually die out after traveling only 3 to 5 cm

- Net movement 1 cm/min - 3 to 5 hours are required for passage of chyme from the pylorus to the ileocecal valve
Regularly spaced

Isolated

Irregularly spaced

Weak regularly spaced

Segmentation movements of the small intestine.
Small Intestine

- Peristaltic activity of the small intestine is greatly increased after a meal - by the beginning entry of chyme into the duodenum causing stretch of the duodenal wall.

- gastroenteric reflex that is initiated by distention of the stomach and conducted principally through the myenteric plexus from the stomach down along the wall of the small intestine.

- gastrin, CCK, insulin, motilin, and serotonin, all of which enhance intestinal motility

- secretin and glucagon inhibit small intestinal motility
Small Intestine

- The function of the peristaltic waves in the small intestine is **not only to cause progression of chyme toward the ileocecal valve but also to spread out the chyme along the intestinal mucosa**

- On reaching the **ileocecal valve**, the chyme is sometimes **blocked for several hours** until the person eats another meal;

- **gastroileal reflex** intensifies peristalsis in the ileum and **forces the remaining chyme through the ileocecal valve into the cecum of the large intestine**
Small Intestine

- Although peristalsis in the small intestine is normally weak, intense irritation of the intestinal mucosa, as occurs in some severe cases of infectious diarrhea, can cause both powerful and rapid peristalsis, called the peristaltic rush.

- Nervous reflexes that involve the ANS and brain stem and partly by intrinsic enhancement of the myenteric plexus reflexes.

- The powerful peristaltic contractions travel long distances in the small intestine within minutes, sweeping the contents of the intestine into the colon relieve the small intestine of irritative chyme and excessive distention.
Ileocecal Valve

- prevent backflow of fecal contents from the colon into the small intestine

- the ileocecal valve protrudes into the lumen of the cecum and therefore is forcefully closed when excess pressure builds up in the cecum

- thickened circular muscle - the ileocecal sphincter remains mildly constricted and slows emptying of ileal contents into the cecum - immediately after a meal, a gastroileal reflex intensifies peristalsis in the ileum
Ileocecal Valve

- Resistance to emptying at the ileocecal valve **prolongs the stay of chyme in the ileum** and thereby **facilitates absorption**.

- Normally, only **1500 to 2000 milliliters** of chyme empty into the cecum each day.

- When the **cecum is distended**, contraction of the ileocecal sphincter becomes **intensified** and ileal peristalsis is inhibited.

- When a person has an **inflamed appendix**, the irritation of this **vestigial remnant of the cecum** can cause such intense spasm of the **ileoceleal sphincter** and partial paralysis of the ileum.
Pressure and chemical irritation relax sphincter and excite peristalsis.

Fluidity of contents promotes emptying.

Pressure or chemical irritation in cecum inhibits peristalsis of ileum and excites sphincter.
(1) Absorption of water and electrolytes from the chyme to form solid feces.

(2) Storage of fecal matter until it can be expelled.

- The proximal half of the colon is concerned principally with absorption and the distal half with storage.

- Because intense colon wall movements are not required for these functions, the movements of the colon are normally very sluggish.
Poor motility causes greater absorption, and hard feces in transverse colon causes constipation.

Excess motility causes less absorption and diarrhea or loose feces.
Defecation

- Most of the time, the rectum is empty of feces - weak functional sphincter exists about 20 centimeters from the anus at the juncture between the sigmoid colon and the rectum.

- There is also a sharp angulation here that contributes additional resistance to filling of the rectum.

- When a mass movement forces feces into the rectum, the desire for defecation occurs immediately, including reflex contraction of the rectum and relaxation of the anal sphincters.

- Internal & External (Voluntary, striated, pudendal nerve) sphincters
Mixing Movements of colon — Haustrations

- large circular constrictions occur in the large intestine. At each of these constrictions, about 2.5 centimeters of the circular muscle contracts

- the longitudinal muscle of the colon, which is aggregated into three longitudinal strips called the teniae coli, contracts

- These combined contractions of the circular and longitudinal strips of muscle cause the unstimulated portion of the large intestine to bulge outward into bag like sacs called haustrations.
Defecation Reflexes

- When feces enter the rectum, **distention of the rectal wall initiates afferent signals** that spread through the myenteric plexus to initiate peristaltic waves in the descending colon, sigmoid, and rectum, **forcing feces toward the anus**

- As the peristaltic wave approaches the anus, the **internal anal sphincter is relaxed** by **inhibitory signals** from the myenteric plexus;

- if the **external anal sphincter is also consciously, voluntarily relaxed** at the same time, defecation occurs

- **Parasympathetic defecation reflex** that involves the sacral segments of the spinal cord – **pelvic nerves** – **enhance intrinsic myenteric reflex**
APPLIED
GASTRIC OBSTRUCTION

• Obstruction can occur in any part of the gut

Causes:

• Spasm of a segment of gut
• Paralysis of segment of gut
• Peritoneal adhesion
• Fibrotic constriction from ulcer
• Cancer
SITE OF OBSTRUCTION

- At pylorus—persistent vomiting of stomach content result in loss of excessive hydrogen ion causing metabolic alkalosis
- At small intestinal —vomitus contain large amount of water and electrolyte resulting in severe dehydration.
- At distal end of large intestine—constipation, rupture of intestine, circulatory shock resulting from severe vomiting.
SITE OF OBSTRUCTION IN LARGE INTESTINE
VOLVULUS

- It is an obstruction caused by twisting or knotting of the GIT.
- Most common site is sigmoid colon

**Causes** - abdominal adhesion after surgery/injury
- disease of LI such as Hirschsprung disease

**Treatment** - colonoscopy in mild cases
- surgery in severe cases
Diarrhea is the frequent and profuse discharge of intestinal contents in loose & fluid form.

It occurs due to the increased movement of intestine

**Cause :-**

- Dietary abuse
- Infection
- Intestinal disease
Types of diarrhea

1-ACUTE
2-CHRONIC

• Acute diarrhea lasts for around 1-2 days. It is mostly due to viral/bacterial infection
• Also known as travellers diarrhea
• Chronic diarrhea lasts for around at least 4 weeks. It usually results due to intestinal disease or disorder such as celiac or crohn's disease
Symptoms of diarrhea

- Nausea, abdominal pain, cramping, bloating
- Dehydration, fever, bloody stools
- Fatigue, increase thirst, decrease urination

Treatment:

- Proper hygiene of hands
- Well cooked food in hygienic condition
- Avoid frozen food
- ORS
- Antibiotics if needed
DIVERTICULOSIS

• It is the condition of having diverticula in the colon, which are out pocketings of the colonic mucosa and submucosa through weaknesses of muscle layers in the colon wall.

• These are more common in the sigmoid colon, which is a common place for increased pressure.

• This is uncommon before the age of 40, and increases in incidence after that age.
APPENDICITIS

- Inflammation of appendix is known as appendicitis.
- Appendix does not have any function in human being.
- But it can create major problem when diseased.
- Appendicitis can develop at any age.
- It is very common between 10 and 30 years of age.
PARALYTIC ILEUS

• It is due to the paralysis of the intestinal muscles
• It is also known as pseudo-obstruction & is one of the major cause of intestinal obstruction in infant and children

CAUSES-
- Gastroenteritis
- Electrolyte imbalance mainly k+
- Abdominal surgery
- Decrease blood supply to gut
- Drugs like narcotics
- Adhesion, gallstone, hernia, impacted stool, tumor
TUBERCULOSIS OF INTESTINE

• It is infection of the peritoneum, hollow or solid abdominal organs, & abdominal lymphatics with mycobacterium

**Signs & Symptoms**
- abdominal pain
- weight loss
- fever
- anorexia
- change in bowel habits
- nausea, vomiting
Pathophysiology

- Tubercle bacilli enters gut through ingestion of infected milk or sputum.
- Mucosal layer gets infected and forms epitheloid tubercles in the lymphoid tissue of the submucosa

Complications - bowel rupture

Treatment - ATT drugs
INTUSSUSCEPTION

• It is a form of bowel obstruction in which one segment of intestine telescopes inside of another.
• It usually occur at junction of small & large intestine

Causes-
• A)viral infection
• B)child born with polp or diverticulum
References

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