Digestive System

Thorax & Abdomen

Horse

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By the end of this lecture you should be able to:

1. Understand the components and functions of the digestive system
2. Understand the anatomical features of each part of GIT.
3. Apply the normal topographical anatomy of the digestive system on the live animal.
4. Understand the clinical correlation of anatomy to some affections of the GIT.
Functions

- Prehension
- Mastication
- Chemical digestion
- Absorption
- Elimination of wastes
Key terms

- Digestive tube
- Digestive tract
- Gastrointestinal tract (GI)
- Gastroenteric tract
- Alimentary canal
- Gut
- Entery ---- intestine Entritis
Abdominal Regions

- 9 regions

- Imaginary planes:
  - 2 transverse planes ---- 3 (cr, middle, ca abdominal)
  - 2 sagittal planes
Abdominal Regions

- Cranial abdominal region
- Xiphoïd region
- Costal arch
- Hypochondrial region
- Middle abdominal region
- Lateral abdominal region
- Umbilicus
- Straight muscle of abdomen
- Linea alba
- Caudal abdominal region
- Inguinal region
- Pubic region
Body cavities and serous membranes

- Thoracic
- Abdominal
- Pelvic
Openings

@junction of thigh and abd
VAN
vascular lacunae
diaphragmatic openings
inguinal canals
pelvic inlet
umbilical ring
fetus
normal
adult
hernia
hernia
aortic hiatus
esophageal hiatus
caval foramen
Peritoneum

Serous membranes

Pericardium
  - Pericardial cavity
  - Pericardial fluid

Pleura
  - Pleural cavity
  - Pleural fluid
The Peritoneum

- Largest serous membrane in the body
- Closed sac in male
- 2 openings in female (uterine tube)
- Peritoneal cavity (between 2... contain serous fluid)
- Parietal and visceral
Peritoneum

Definition:

Structure:

Function:

Location:
- Abdominal cavity
- Pelvic cavity

Clinical:
- Large size
- Infection environment
- Peritonitis
- IP injections
- Adhesions
- No serous fluid
- Movement impaired
- Function impaired

Moist
Warm
Esophagus

- Def.
- 3 sections
- Rosette-like in C.S
The Stomach
Stomach of the horse

Type

Description:

Shape and Size

Position
Equine stomach
Stomach

Parts

- Cardia
- Fundus (saccus cecus)
- Body
- Pyloric

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Orifices
Sphincters
Surfaces
Extremities
Curvatures
Regions
Equine stomach
Fixation of the stomach

- Non peritoneal
- Peritoneal

**Vessels:**
- Arteries… Celiac a
- Veins … Gastric veins --- into portal vein
- Lymph … gastric l. nodes

**Nerves:**
- Vagus and sympathetic
Abdominal viscera in situ, left lateral view. The diaphragm and intercostal tissues have been removed.
Clinical

- Ext. clinical examination of the stomach in horse is inaccessible **Why?**
- Gastric distension in horse (if left) …. Rupture **Why?**
- Horse can’t vomit …. **Why?** ----V3S
Herniation and retraction of the gut tube.

**Fixed viscera:**
- stomach and duodenum (cranially)
- Ileum, cecum and colon (caudally)

**Mobile viscera:**
- Jejunum
Small intestine

Duodenum jejunum ileum
Stomach and duodenum dorsal aspect
Duodenum

- Starts caudal to pylorus --- ends at duodenojejunal flexure
- Length 1m
- Shape: horse shoe like
- 4 Parts:
  1. Cranial part:
     a. S shaped loop (duodenal bulb or duodenal ampula)
     b. Cr. duodenal flexure
     c. Major and minor duodenal papilla
  2. Descending (ca duodenal flexure)
  3. Transverse
  4. Ascending (duodenojejunal flexure)

- Blood Supply
Jejunum

- Longest: about 22 m
- Begins at DJ flexure & ends at JI junction.
- Long meso-jejunum (originate at T18 – L1&2)
- Found anywhere in abdomen, but mainly in Left dorsal part.
- (vlovulus- intussusception – incarceration of jejunal loops in the epiploic foramen or tunica vaginalis.
- 15- 20 jejunal Aa. (arcades)
Ileum

- Shortest $\frac{1}{2}$ m
- Opens at ileocecal opening
- 2 curvatures:
  - Greater …. Ileocecal fold
  - Lesser … mesoileum (short)
- Thick wall (ileal sphincter) At L3-4 it passes from ileocecal opening: into lesser curvature of base of cecum.
- Ileal papilla: (site of intussusception)
Large intestine

Cecum
Colon
Rectum
Anal canal
Cecum

- Def.
- Shape & Length
- Curvatures
- Parts
- Teniae ceci (bands)
- Orifices
- Blood and Nerve supply
Auscultation
Trocharization of cecum

(a) Trocharization is performed in the upper right paralumbar fossa using an 18-gauge 6 in. intravenous catheter.
(b) An intravenous extension set can be attached to the end of the catheter once the stylet is removed and the unattached end placed in a cup of water. Bubble formation in the water indicates that gas is still being retrieved, and when the bubbling ceases there is no more gas and the catheter can be removed.
Colon

Ascending  Transverse  Descending
# Arrangement of Asc. Colon

<table>
<thead>
<tr>
<th>Part</th>
<th># of taeniae</th>
<th>Sacculation</th>
<th>Diameter</th>
<th>Bl. supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>RVC</td>
<td>4</td>
<td>4 rows</td>
<td>Wide</td>
<td>Colic A.</td>
</tr>
<tr>
<td>SF</td>
<td>4</td>
<td>4 rows</td>
<td>Wide</td>
<td></td>
</tr>
<tr>
<td>LVC</td>
<td>4</td>
<td>No</td>
<td>smallest</td>
<td>anastomosis</td>
</tr>
<tr>
<td>PF</td>
<td>1</td>
<td>No</td>
<td>widest</td>
<td></td>
</tr>
<tr>
<td>LDC</td>
<td>1</td>
<td>No</td>
<td>smallest</td>
<td></td>
</tr>
<tr>
<td>DF</td>
<td>3</td>
<td>Weak</td>
<td>Largest (ampulla coli)</td>
<td></td>
</tr>
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</tbody>
</table>
Abdominal viscera in situ, left lateral view. The diaphragm and intercostal tissues have been removed.

A. Left kidney in adipose capsule
B. Left lobe of liver
C. Stomach
D. (Black) spleen
E. (White) jejunum
F. Small colon
Continuation of desc. Colon through pelvic cavity, to terminate as the anal canal.

Parts
Relations
  Female
  Male
Muscles: Rectococcygeus
Anal Canal

- Terminal part of digestive tract.
- Muscles
  1- internal anal sphincter
  2- external anal sphincter
  3- Levator ani
  4- Suspensory lig. of anus (ventral rectal loop)
    - **Origin:** 1st. cd vertebra
    - **Insertion:**
      I. in male .... Continues as retractor penis m.
      II. In female ..... Continues as retractor clitoridis & blends with constrictor vulvae M.

Action as accessory anal sphincter.
Liver = hepar
Basic lobation of liver
Weight
Position & direction
Surfaces
Borders
Lobes
Gall bladder
Porta hepatis
Renal impression
Liver of a horse (visceral view)
Liver of a horse (visceral view)
Liver of a horse (visceral view)
Peritoneal fixation

- Coronary lig.
- Rt. & Lt. triangular ligg.
- Falciform lig. (ventral part of ventral mesogastrium)
- Round lig
- Lesser omentum (dorsal part of ventral mesogastrium)
  - Hepaticgastric
  - Hepatoduodenal
- Hepato renal lig.

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Blood Supply

- Portal vein
- Hepatic artery
- Hepatic vein
Pancreas
Pancreas

- Shape triangular
- Position --- sublumbar, cd to stomach and liver
- Description
  - 2 surfaces
  - 3 borders
  - 3 parts (body and Rt, left lobes)
  - The body is perforated by portal ring for portal V.
- Secretory ducts (pancreatic duct and accessory pancreatic duct.)
Quiz

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What problems can you see associated with the large colon?

Its poorly attached to the body wall. Secured only at the cecal base and transverse colon. The rest is freely moveable and susceptible to volvulus.
Why do you sometimes see blockage in the transverse colon?

Funnel shaped and short.
Which site is the most dangerous in terms of blockage?

Pelvic flexure
Why do you sometimes see impaction at the ceco-colic opening? What do you do to fix?

Enlarged cranial part of base falls over craniocaudally and blocks the ceco-colic orifice. Trocarization needs to be done.
Why do you sometimes see impaction (or peristasis) at the ileo-cecal opening? How would you fix this?

The ileum telescopes into the cecum (intussusception). Surgical remedy.
Why do you sometimes see impaction at the ileum?

- Thick walled.

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Potential areas of intestinal obstruction.

Ileum
Ileo-cecal opening
Ceco-colic opening
Pelvic flexure
Transverse colon
Name features of the transverse colon.

- Funnel shaped (risk of impaction)
- Attached to roof of body cavity.
- 2 taeniae.
- Present cranial to the cranial mesenatric artery
Name features of the right dorsal colon, including location, size and taeniae number.

Mostly within the thoracic cage. Shortest but widest. At base of cecum it turns left close to the stomach and liver and becomes the transverse. 3 taeniae
Which parts of the colon can be palpated per rectum?

- Left ventral colon
- Left dorsal colon
How many taeniae are at the pelvic flexure?

1
What is the flexure where the left dorsal colon turns right?

Diaphragmatic flexure
What flexure does the left ventral colon flex upon itself sharply and the diameter narrows.

Pelvic flexure
What is the flexure where the right ventral colon turns on itself to become left ventral colon.

Sternal flexure
Where does the right ventral colon begin?

- At the caeco-colic junction at base cecum at the level of last rib, running ventrally and cranially on right body wall and abdominal floor to the xiphoid area.
How can the base of the cecum be palpated?

- Located dorsally and can be palpated per rectum.
What attaches the body of the cecum to the right ventral colon?

- Cecolic fold

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Where does the cecum extend and how many taeniae ceci does it have?

Pelvic inlet to diaphragmatic area.

4
What are unique features of the large intestine that differentiate the horse from a dog or ox?

- Longitudinal bands (taeniae coli) which are responsible for sacculations (haustra).
What can get strangulated at the epiploic foramen?

Loops of jejunum
Describe the location of the epiploic foramen.

- Between the right lobe of liver and descending duodenum, and between caudal vena cava and portal vein.
Characteristics of internal surface of stomach

- Margo plicatus
  - Cardiac sphincter thick, enters oblique
  - Two pyloric sphincters (cranial/caudal)
The peritoneal fold that attaches the intestine to the posterior abdominal wall is the

1. Mesentery
2. Lesser curvature
3. Omentum
Vermiform is a name given to the

1. cecum
2. appendix
3. rectum
Another name for the gallbladder is

1. choledochus
2. Ductus choledochus
3. cholecyst
The fluid secreted by the liver and poured into the intestines is called

1. chyle
2. bile
3. chyme
4

- How many taeniae are at the pelvic flexure?
- How can the base of the cecum be palpated?
- Where does the right ventral colon begin?
- How many taeniae does the left ventral colon have?
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Why do you sometimes see impaction at the ileum?

Thick walled.
When would a duodeno-cecostomy need to be performed?

- Gastro-duodeno-jejunitis (side to side anastomoses of descending duodenum to base of the cecum)
Potential areas of intestinal obstruction.

- Duodenoc Cecostomy
  - Long great mesentery
  - Ileum
  - Ileo-cecal opening
  - Ceco-colic opening
  - Pelvic flexure
  - Transverse colon
Name features of the transverse colon.

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- Between the right lobe of liver and descending duodenum, and between caudal vena cava and portal vein.
Where is the jejunoileum?

Mostly on left dorsal part of abdomen.
(loose coils mixed with coils of small colon)
What are three ligaments of the greater omentum?

- Gastrophrenic ligament
- Gastroplenic ligament
- Lenorenal (renosplenic) ligament
Characteristics of internal surface of stomach

- **Margo plicatus**
  Cardiac sphincter thick, enters oblique
  Two pyloric sphincters (cranial/caudal)
The ileum telescopes into the cecum (intussusception). Surgical remedy.

- Why do you sometimes see impaction (or peristasis) at the ileo-cecal opening? How would you fix this?
- Do you ever see impaction in the cecum?
- Why do you sometimes see blockage in the transverse colon?
- Why do you sometimes see impaction at the ileum?
Stomach capacity is:

a. 50-80 ml depending on the animal’s size.
b. ....... ml depending on the animal’s size.
c. ......... ml depending on the animal’s size.
The falciform ligament attaches the liver to the:

1. Diaphragm
2. Stomach
3. Spleen
4. Duodenum.
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Activities