Digestive system

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DEVELOPMENT ANOMALIES

Epitheliogenesis imperfecta of tongue

Abnormal smooth surface of tongue due to small filiform papillae. It occurs as a defect in autosomal recessive gene and occurs in Holstein-Friesian cattle. This is also known as smooth tongue.

Cheiloschisis This is most common congenital abnormality occurs due to failure of oral-nasal cavity to divide leaving cleft. It may also extend towards lips producing 'hare lip' condition.

Mega colon

There is distention of colon which abruptly terminate in rectum due to mutant gene in dogs.

Atresia coli In calf, the absence of colon occurs and the intestine terminates in blind caecum.

Atresia ani This is absence of anal opening.

Palatoschisis : A congenital fissure in the roof of the mouth resulting from incomplete fusion of the palate during embryonic development present in puppies.

Digestive System

Oral cavity

Stomatitis : This is the diffuse inflammation of the mucous membrane of the mouth but when confined to particular parts of the mouth it is known as:

Gingivitis : Inflammation of the gums.

Gingivitis characterized by inflamed gingiva.

Glossitis : inflammation of the Tongue.

Lampus: inflammation of the Palate.

Cheilitis: inflammation of the Lips.

Bovine: Ulcerative glossitis (Rinderpest)

Pharyngitis: inflammation of the part of Pharynx.

Tonsillitis: if the tonsils are affected, then the condition is known as tonsillitis.

Stomatitis: inflammation of oral mucosa**.**

Causes :

1. physical

(a) Trauma by awns, thorns, burrs, wood pieces, glass pieces, sharp bit, irregular sharp teeth, etc.

(b) Heat : Hot drenches, eating frozen foods.

2. Chemical: caustic alkalies, crossive acids, fertilizers.

3. Defi. of vitamines: (a) hypovitamino **(b)** Niacin deficiency : black tongue of dog.

4. Micro-organism:

i. **Bacteria:** *Actinomyces bovis, Actinobacilllus lignieresi, Spherophorus necrophorus, Pseudomonas aeruginosa, cornybacterium pyoggenus, streptococcus* and *staphylococci.*

ii. **Fungi :** *Monilia albicans and Odium Pullorum in poultry.*

iii. **Viruses:** FMD, Rinderpest, Infectious canine hepatitis, contagious ecthyma, vascular exanthema, Fowl pox, Blue tongue in sheep.

Macroscopically: catarrhal inflamation of the mouth and pharynx with reddening and swelling of the mucosa. Which is covered by small, whitish spores raised then surrounding.

Apthous stomatitis is the name given to the condition . The spot may later develop into small crust or into ulcer.

Thrush: is found in birds, this is the name given to a condition in which grey or yellowish thick material tenacious gets attached to the mucus membrane.

1. Vesicular stomatitis

Vesicular stomatitis is a condition in which vesicles or blebs or blister containing fluid are formed on the mucosa and seen in Viral diseases as foot and mouth disease, infectious vesicular stomatitis and herpes virus.

Macroscopic picture

- Vesicles containing clean fluid are seen on oral mucosa (lips, tongue, gums, dental pad and hard palate).

- The size are varies and filled with clear fluid

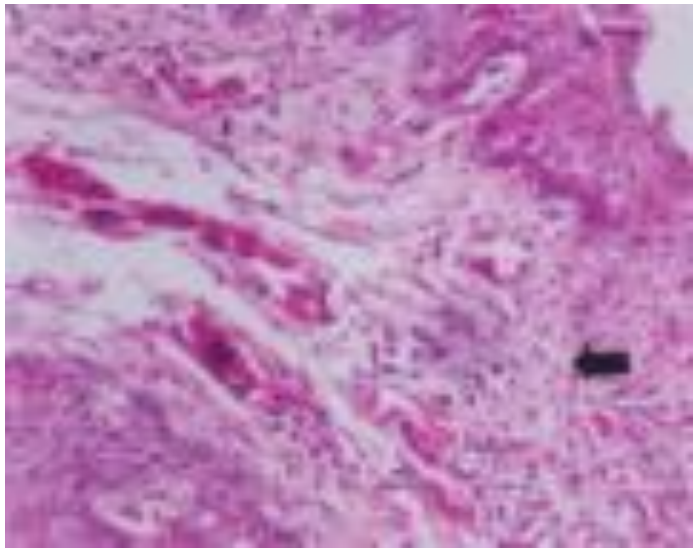
- Rupture of vesicles leaving an erosion or ulcer.

Dental pad showing ruptured vesicle in case of vesicular stomatitis.

Microscopically

- The affected epithelial cells show vacuolar and hydropic degenerations.

- Some vesicles may be rupture by mouth movement, leaving erosions with intact germinal basal layer.



Erosion of the tongue showing desquamation of the epithelium with congested blood vessels and inflammatory cells in lamina propria. H&E.

2. Catarrhal stomatitis

It is a mild superficial acute inflammation of oral mucosa. It is caused by mild irritant as trauma, chemical and infectious agents.

Macroscopic picture

The buccal mucosa shows redness, swelling and covered with grayish or brownish gray mucous.

The living animal express pain and difficult prehension and mastication

- Bacterial decomposition of food results in a fetid odor.

Microscopic picture

•Dilatation of the submucosal blood vessels beside infiltration of the submucosa by inflammatory cells and hyperplasia of lymphoid tissue of soft palate tonsils, and pharynx.

• Desquamation of the epithelial lining which covered with mucus and bacteria.

3. Suppurative stomatitis

- **It occurs associated with wound infected with pyogenic microorganisms.**
- **Papular Stomatitis: It is characterized by presence of small (1 cm. or less) circumscribed solid elevations.**
- **The inflammation may be focal or diffuse. The inflamed oral tissue shows redness and swelling.**
- **The pus are usually removed by movement of food leaving erosion or ulcer.**

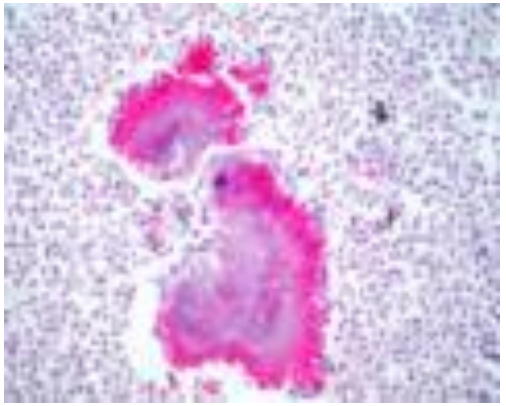


Fig. 10: Tongue showing suppurative inflammation of tongue due to actinobacillosis characterized by colonies in center, radiating clubs and surrounded with neutrophils. H&E

4. Necrotic Stomatitis: It is characterized by presence of yellow-grey round foci of coagulative necrosis on the border of the tongue which extend upto submucosa. Necrotic area is demarcated by hypermic zone and connective tissue. It usually occurs in calves due to necrobacillar infection.

5. Fibrinous Stomatitis: It is characterized by presence of dry skin like grey deposit due to epithelial necrosis and fibrin exudation.

Macroscopically

- Focally slight swollen gray, yellow or brown oral mucosa surrounded by red zone.

- Ulcer may be round, oval or irregular in shape and vary in size.

Tongue showing necrotic glossitis.

6. Erosive and Ulcerative Stomatitis:It is characterized by circumscribed lose of superficial and deeper layers of epithelium. It is caused by foreign bodies and corrosive acids.

7. Sclerosing Stomatitis: It shows broad grey white fibrous band and atrophic pale-red muscles running from dorsum to the substance. These changes are due to chronic proliferation of connective tissue.

Papular Stomatitis: It is characterized by presence of small (1 cm. or less) circumscribed solid elevations.

Bovine Erosions and ulcers
Malignant Catarrhal Fever
Herpes Virus
Ulcerative stomatitis

Neoplasm of the oral cavity

Viral papilloma occurs frequently in the oral cavity of dogs, cattle and rabbit. It may be disappears if not removed surgically within 1-3 months.

Epulis is a fibroblastic tumour, usually occuring in the gums consisting of dense fibrous tissue with variying amounts of epithelium and few gaint cells.

OR

Epulis is a benign neoplasm derived from connective tissue or periodontal ligament.

Carcinoma, sarcoma, fibroma and melanoma are other tumour occasionally seen.

Inflammation of teeth and periodentium

Pulpitis

It is the inflammation of vascular part of the tooth (pulp).

The causes are usually bacteria and enter through enamel defect or via blood. It may lead to osteomyelitis

Periodontitis

It is the inflammation of tissue around teeth.

It may be superficial (gingivitis) or deep (pyorrhea).

Anodontia is lack of tooth development.

Oligodontia is development of fewer teeth than normal.

Polydontia is the presence of supernumerary teeth.

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Degenerative dental diseases

1. Dental attrition

- **It is the wearing away of dental structure as a result of poor masticatory function, or oral cavity conformation.**

2. Dental caries

- **It is characterized by digestion of the inorganic matrix of enamel and dentin demineralization.**

Teeth showing segmental enamel hypoplasia

Salivary glands

Dilatation: of the salivary ducts may occur when the flow of saliva is obstructed by foreign bodies, inflammatory exudates etc.

Raunla: Dilatation occurs as cyst on the floor of the mouth is called Ranula, which smooth and rounded, containing a clear fluid and which can be easily ruptured.

Ranula: It is cyst on the floor of the mouth caused by the dilatation of the salivary duct. Ranulais smooth, rounded cyst containing a clear fluid.

Salivary Mucocoele:It is a pseudocyst which is not lined by epithelium and filled with saliva.

Sialoadenitis: Inflammation of the salivary glands is known as sialoadenitis. It is caused by traumatic injury or infections. Macroscopically the glands are swollen and red which can cause atrophy of the gland

Sialoliths: Sialoliths: These are salivary calculi and commonly found in horses. It appears as concentrically laminated body formed of $caco_3$. salivary calculi blocks the flow of saliva and produces stasis, distension of ducts and finally atrophy of the gland and more **common in horse.**

Sialoadenitis Or Parotiditis:

- **It is the inflammation of salivary glands. It is rare in domestic animals and may be due to traumatic injury or due to infection by bacteria, stasis of saliva in the ducts facilitates infection .**

Macroscopically:

- **The gland are swollen and red**
- **Abscesses may be found in glands and sometimes cystic dilatation may occur.**
- **Inflammation of the salivary glands may causes atrophy of the gland.**

Esophagus

Choke: is obstruction of the esophagus occurring in the horse and cattle, but more common in the former.

- **In the horse choke occurs in the thoracic area while in cattle and dog the pharynx is obstructed.**

- **Choke may be complete or incomplete**

Causes :

1. Impacted masses of feed due to : improper chewing, bed teeth and rapid gulping of dry feed.
2. Old Age
3. in cattle: large object of food- beet root, carro, apple, potatoes, foetal membrane, stick, wire (Large bones of dog).

4. Enlargement of Lymph Node – Mediastinal and cervical)

5. Enlarged Thyroids.

6. Neoplasm of adjacent tissue- especially thymus, thymoma in new born animals.

Incomplete choke feed will be returned and water will come out of the nostril when animal is Watered. Inhalation of the feed will causes secondary foreign body pneumonia.

In Cattle, complete obstruction will causes dangerous Tympany.

Macroscopically, the esophagus shows distention of the esophageal portion above the obstruction .

Gross picture of esophageal choke.

Ectasia: **the dilatation of esophagus may be fusiform or cylindrical-shaped dilatation.**

Causes :

1. **Accumulation of food proximal to a stenosed area.**

2. **In ruminants accumulation of food during regurgitation on the distal side of the stenosis.**

3. **Trauma from horns etc. Rupturing the muscular coat.**

Esophagitis

The inflammation of esophagus is infrequent due to the strong stratified squamous epithelial lining.

Causes

1. **Trauma- Probang: stomach tube, Foreign bodies**

2. **Caustic chemical and reflex gastric acid.**

3. **Infection with parasites (tricmoniasis, Congylonemiasis and Spirocercosis), mycotic as (candidiasis) and viral (bovine viral diarrhea).**

Macroscopically

The mucosa is red and swollen.

The affected part is hyperemic and contain linear erosion and ulceration.

Microscopically

Epithelial erosion or ulceration and proliferation of adjacent epithelial lining to repithelization of damaged area.

Ingluvitis : inflammation of crop. (crop of birds)

Causes:

- **Trauma by foreign bodies.**
- **Chemical agent: phosphorus, fertilizers.**
- **Infectious disease.**
- **Parasites- Acuria sp. capillaria sp.**

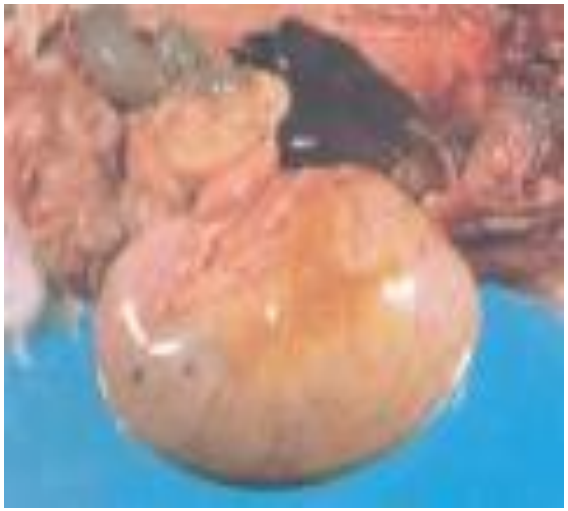
Crop showing ingluvitis represented by dilatation of blood vessels, leucocytic infiltration and edema in lamina propria besides erosion in mucosa. H&E

Lesion

include congestion, edema and tympanitis.

Abomasum Displacement

- **The abomasum may be displaced from normal position, either to the left or the right, but left side displacement is more common in buffalo.**



Gross picture of abomasum displacement.

- **This condition most commonly occur after parturation during pregnancy left up by the normal position & abomasum may be traps by rumen.**

Stomach

Gastritis

- **Inflammation of mucus membrane of stomach is called gastritis which is frequent in all domestic animals.**

- **It may be primary mostly due to ingestion of toxic substances or secondary to an infection as canine distemper, hog cholera and viral diarrhoea.**

Causes

A. Physical:

1. Overfeeding , causing dilatation of the stomatch.

2. Feeding with frozen roots causing bloat , produces gastritis.

3. Faulty dentition, preventing mastication is another causes of gastritis.

B. Chemicals:

1. **Caustic & corrosive chemicals like mercury, lead, copper, arsenic & phosphorus.**
2. **feeding easily fermentable foods liberates irritating substances which produce gastritis.**

3. Stress: in this condition increase production of large amount of adrenaline which is responsible for gastritis .

C. Bacteria: ***Colibacillosis, Enterotoxaemia & Salmonellosis*****.**

D. Viruses: ***swine fever, transmissible gastroenteritis*****.**

E. Fungi: ***Mucormycosis, Moniliasis & Aspergillosis.***

F. Parasites: stomach worm : ***Trichostrongylus, Hemonchus & larval paramphistomes.***

Classification of Gastritis :

1.ACUTE GASTRITIS 2. CHRONIC GASTRITIS

1. ACUTE GASTRITIS

A) Acute Catarrhal Gastritis

B) Acute Haemorrhagic Gastritis

C) Parasitic Gastritis

A) Acute Catarrhal Gastritis:

In this type of gastritis, the inflammatory exudates is mucous that is causes by mild irritants.

Macroscopically:

- **The gastric mucosa is covered with mucous exudates.**
- **There is increase thickness of the stomach wall.**
- **It has a reddish appearance.**

Microscopically:

- **The gastric mucosa appear hyperemic**
- **There is leucocytic infiltration into the mucosa & submucosa.**
- **Some of the gastric glands may be damaged and lost.**

B) Acute Haemorrhagic Gastritis

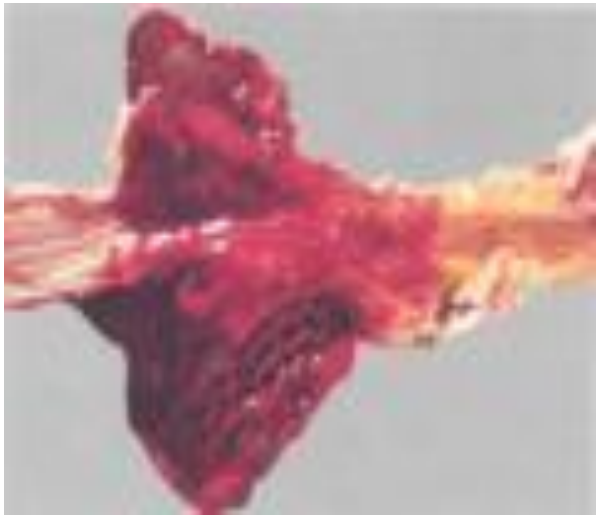
This is caused by severe type of irritants. This also seen in some systemic diseases such as pasteurellosis, braxy, leptospirosis, uremia and some chemicals etc.

Macroscopically:

- The gastric mucosa is red in colour.
- The gastric contents a red blood mixed if the blood is digested it gives brownish colour.

Microscopically:

- **There is extensive haemorrhage into the mucosa & submucosa of the stomach along with leucocytic infiltration mainly neutrophils.**



Gross picture of hemorrhagic gastritis in uremic dog.

C) Parasitic Gastritis

Infestation of parasitic and larval produces gastritis.

Eg .

Pig: *Hyostrongylus Rubidus*

Cat: *Gnathostoma Spinigerum*

Cattle/Sheep: *Hemonchus Contortus, Trichostrongylus axei*

Horse: *Trichostrongylus Axei, Larval of Gasterophilus equi*

Macroscopically:

- **In low infestation, it produces catarrhal gastritis.**
- **In heavy infestation it produces hemorrhagic gastritis leading to ulceration.**

Microscopically:

- **There may be present of parasitic ova in the submucosa along with presence of inflammatory cells (Neutrophils & Eosinophils).**

2. CHRONIC GASTRITIS

The causative agents are same of acute but persist for long time/period.

Macroscopically :

- **The condition is usually of a hypertrophic type with thickening of the gastric wall.**
- **The mucous membrane is thickened and covered with tenacious, viscid glassy mucus.**

Microscopically :

- **There is desquamation of the epithelium with increased interstitial connective tissue.**
- **There is hyperplasia of the gastric gland giving cystic appearance.**
- **Infiltration of inflammatory cell such as macrophages & giant cells.**

Gastric Ulcer:

These ulcer are seen postmortem. Small superficial defects are known as erosions & these are common among ruminants.

Causes:

a) Trauma

B) Infectious Agents : Rinderpest, Pox, Bovine Malignant catarrh

C) Circulatory Disturbances: Hyperemia or focal haemorrhages in to the gastric mucosa causes loss of the epithelium resulting Ulcer.

D) Nervous Effect: the sympathetic & vegus nerves control the secretion & blood circulation of abomasum to any factor that disturb the nerve may produce stress resulting haemorrhage & increase glandular secretion resulting ulcers.

E. Obstruction of pylorus: by foreign bodies that injured the epithelium & produces the ulcer.

F. Chemicals: Corrosive chemicals may causes ulcers.

G. Parasites: in case of horse larvae of gastrophilus & Hebronema megastoma causes gastric ulcer.

Macroscopically:

The erosions of the size of a millet and usually affect the mucosa superficially.

Microscopically:

- **The erosion is covered by an exudate consisting of mucus, fibrin & inflammatory cells. The epithelium is desquamated & the sub mucosa may infiltrate by large number of leucocytes.**

Intestine

Torsion: may be define as twisting of intestine on its axis is called Torsion.

Volvulus: may be define as twisting of intestine on its mesenteric axis.

Intussusception: it is telescoping of a portion of intestine in to another, usually the anterior into the posterior occur mostly in the jejunum and cecum in dog & cattle.

Hernia: is the protrusion of the abdominal viscera/Organs through natural and artificial opening. Hernia of the intestines is commonly seen in domestic animals especially in pig & Horse.

Enteritis:

Enteritis is the inflammation of the whole of the intestinal tract. But usually, it is applied to the inflammation of the small intestine.

- **The inflammation on colon is called Colitis.**
- **The inflammation on Cecum is called Typhlitis.**
- **The inflammation on Rectum is called Proctitis**

Causes:

Causes by Bacteria: ***E.coli, Salmonella & Clostridium***

Virus: ***canine distemper, feline enteritis***

Fungi: ***Aspergillus, Monilla***

Chemicals: ***Strong acid & Alkali***

Based on nature of the exudate & the changes produced in the intestinal tract, enteritis is classified as:

1. **Acute Catarrhal enteritis**
2. **Chronic Catarrhal enteritis**
3. **Hemorrhagic enteritis**
4. **Fibrinous enteritis**
5. **Suppurative enteritis**
6. **Necrotic enteritis**

1. **Acute Catarrhal enteritis:** Catarrhal enteritis is characterized by increased number of goblet cells, congestion and infiltration of neutrophils and mononuclear cells in mucosa of intestine. it is mildest of inflammation of the intestinal tract, occurring in the diffuse, manner throughout the bowel.

Cause:

A) Enteritis in suckling animals:

B) Viral diarrhoea: mucosal disease in cattle

C) Enterotoxaemia in sheep

D) virus gastroenteritis in pig

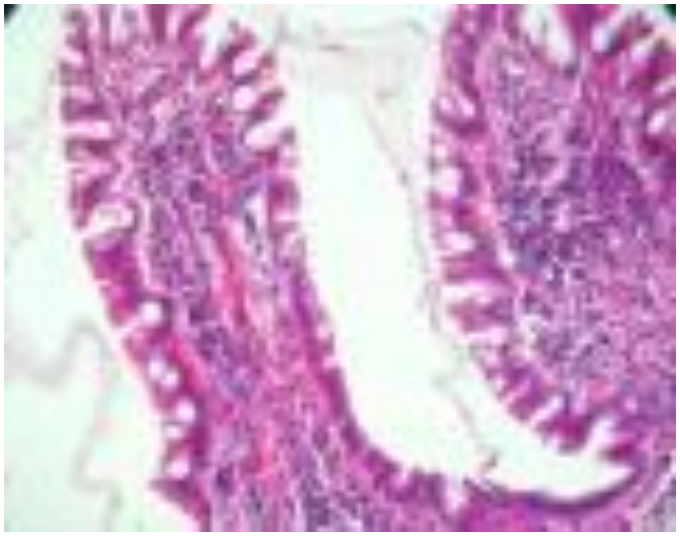
Macroscopically:

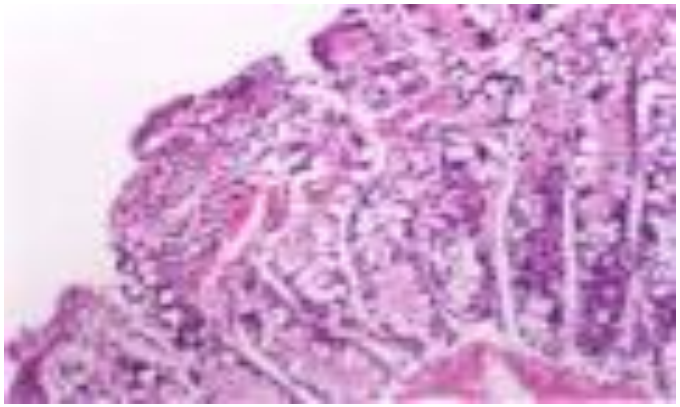
- **The mucosa is reddish in color & slightly thickened, covered with mucinous exudate.**

- **The payer's patches are prominent being hyperplastic, outline zone of hyperemia.**

Microscopically:

- **Edema of the intestinal is due to exudates with leucocytes in the lamina propria & a little extents in the mucosa.**
- **Hyperemia is evident by the engorgement of the blood vessels.**
- **Goblet cells are numerous arising from metaplasia of the epithelial cells & produce large amount of mucin.**
- **The tips of villi may be reddened & edematous.**





Intestine showing catarrhal enteritis represented by increase number of goblet cell congested blood vessels besides leucocytic infiltration. H&E.

2. Chronic Catarrhal enteritis

It is seen with those granulomatous diseases involving intestine as partuberculosis (Johne's disease, tuberculosis, Hjarre's disease in fowl).

Macroscopic changes:

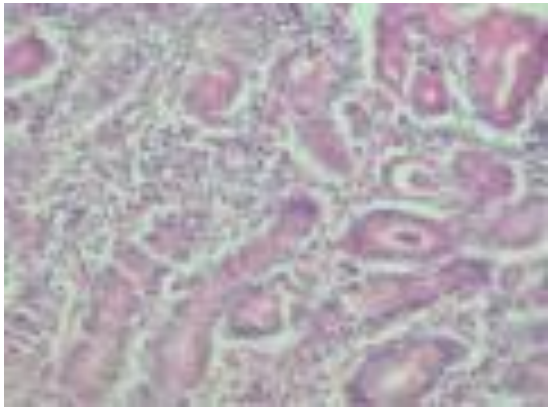
- **The diameter of the intestine is increased and its wall is thickened.**
- **The thickened mucosa is usually yellowish-white, ridged and covered with a layer of mucus.**
- **The intestinal wall is thickened and covered with mucus. The intestinal content is watery.**

Microscopically:

- **The intestinal wall is infiltrating with inflammatory cells particularly lymphocyte and plasma cells, fibroblasts and macrophages resulting in thickening of the mucosa.**

- **The intestinal glands are atrophied due to the pressure of the infiltrating cells.**

- **The mucosa is covered with tenacious mucus.**



Chronic enteritis characterized by infiltration of chronic inflammatory cell in the lamina propria. H&E.

3. Hemorrhagic enteritis:

- This is more severe form of catarrhal enteritis, ch/by the presence of erythrocyte in the exudate in the exudates.

- This is mostly seen in septicemic, bacterial, and viral diseases.

eg. Anthrax, Rinderpest, enterotoxaemia & colibacillosis

Macroscopic changes:

- There is infiltration of blood in the intestinal wall which is thickened & the intestinal content are blood mixed.

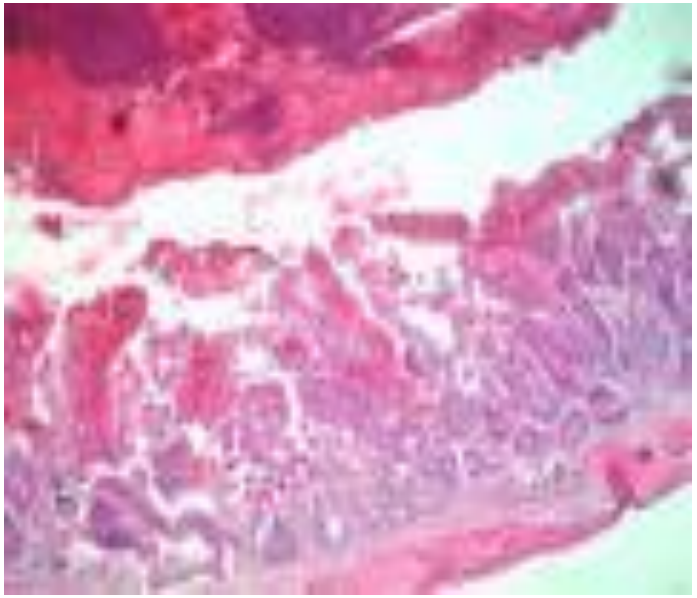
- The blood found in the anterior portion of the intestines is digested & so is brown in colour while in the posterior portion it is brown.

The intestinal wall is hemorrhagic and thickened.

Microscopically:

- **RBC may be found in the exudate of the mucosa.**

- **The villi may show necrotic changes & thrombosis of some enteric vessels is evident.**



Microscopic picture of hemorrhagic enteritis characterized by extravasations of erythrocytes, necrotic epithelial lining and inflammatory cells. H&E

4. Fibrinous enteritis :

- It is an acute inflammation of the intestine where the predominant constituent of the exudate is fibrin.

Causes

1. Severe chemical agent as mercuric chloride and arsenic.
2. Infectious agents as *Escherichia coli* and *Salmonella*

Macroscopic changes:

- The intestinal mucosa is covered by yellowish gray fibrinous membrane and the lumen contains ropes of fibrin.

- The intestinal mucosa is usually eroded, congested and edematous.

Intestine showing gross picture of fibrino-necrotic enteritis.

Microscopically:

- The intestinal mucosa covered with fibrin mixed with inflammatory cells and necrotic epithelium.

- The intestinal mucosa shows necrotic epithelium, congested blood vessels and infiltration with neutrophils.

5. Fibrinous enteritis:

- It is not common & may result due to infection by pyogenic organism of wounds caused by helminths.

Causes :

- Pyogenic organism: *Streptococci, Salmonella* & *Shigella*

Macroscopic changes:

- The exudate contain pus.

Microscopically:

- The exudate contains, besides mucus, desquamated cells neutrophils and bacteria

6. Necrotic enteritis:

- **It is the inflammation of the intestine associated with an extensive necrosis of the intestinal mucosa.**

Causes

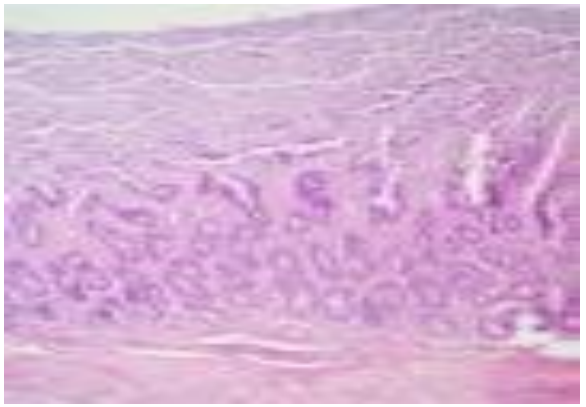
- **The causes is usually a severe chemical, bacterial (salmonellosis), viral (cattle plague) or parasitic disease (coccidiosis) and Nutritional deficiency (Vitamin B and protein).**

Macroscopic changes:

- The cardinal signs of inflammation are seen besides necrosis of the intestinal mucosa.
- Fibrin may found in necrotic mucosa.
- The mesentery lymphatic gland are swollen & juicy.

Microscopically:

- Congested blood vessels and leucocytic infiltration besides necrosis of the epithelial lining are noticed.



Necrotic enteritis showing necrosis of the mucosa and infiltration of the lamina propria with H&E

Hepatitis:

- It is the inflammation of the liver parenchyma is called hepatitis and inflammation of bile duct is called cholangitis.

- It is also called alternative inflammation because the inflammatory process is caused by same etiological agent that also produce degeneration and necrosis of the liver.

- Chronic inflammation of the liver is called as Cirrhosis.

A. Condition in which the liver is Primarily affected:

1) Infectious Canine Hepatitis (Rubarth's Disease)

2) Blackhead in Turkey(Histomonas Affection)

3) Leptospirosis

4) Viral hepatitis of Ducks

5) Viral hepatitis of Poultry

A. Condition in which the liver is also affected along with other organs:

1) Necrobacillosis
2) Tuberculosis
3) Histoplasmosis
4) Toxoplasmosis
5) Rift valley fever
6) Salmonellosis
7) Pasteurellosis
8) Brucellosis
9) Glanders
10) Actinomycosis

Route of infection:

1. Portal Vein
2. Hepatic Artery
3. Bile Duct
4. Umbilical vein of the new born animals
5. by direct extension from neighbouring organs incase of Traumatic reticulitis.

Acute toxic hepatitis:

- This condition is ch/by necrosis, which is usually preceded by degenerative changes like cloudy swelling & fatty degeneration.

- It is again classified a/c to each anatomical distribution into Focal necrosis, centrilobular, Midzonal, peripheral, diffuse and paracentral necrosis.

1. Focal necrosis: in this condition numerous microscopic necrotic areas are seen scattered in the liver .

Causes:

1. Viral: Equine viral rhino-pneumonitis

2. Bacterial: *Johne's disease, Salmonellosis, Tularemia, Listeriosis* in new born.

3. Obstruction of biliary passages.

2. Centrilobular necrosis or periacinar necrosis: in this condition, the cells nearest the central vein are affected.

Grossly:

- The liver is enlarged & paler than normal.
- In severe cases the organ may be redder due to increased quantity of blood.
- Congestion of the central part is present, the periphery is paler due to degenerative changes in the cells.

Microscopically:

- The cells around the central veins have disappear, blood taking up their places.
- Away nearer the periphery the cells may show fatty degeneration & those beyond these cells cloudy swelling.
- Infiltration of peripheral connective tissue by lymphocytes.

3. Mid zonal necrosis:

- The condition is found in yellow fever in case of man affects the hepatic lobe.

4. Periportal necrosis:

- in this the cell adjoining to the portal tract become necrotic along with infiltration of leucocytes.

- This more commonly seen in phosphorus poisoning

5. Massive necrosis or Acute yellow atrophy:

- In this condition, there is necrosis of considerable number of the cells in a lobule.

- Since whole parenchyma of the lobule is dead no regeneration occurs, the reticulum & fibrous frame work collapse & there is post necrotic scarring.

6. Saw dust liver: this condition is found in well fed cattle. When there is presence of focal necrotic areas over the liver .

Cirrhosis (End stage liver)

Cirrhosis of the liver is chronic hepatitis ch/by fibrosis, degeneration and hyperplasia of hepatic cells. The stimulates for the fibroblastic proliferation is some irritant, chronic and enough to produce degeneration and necrosis of the parenchymatous cells.

The irritant may reach the liver through

A) The portal vein

B) Hepatic artery

C) Bile duct

Causes

1. Alcohol

2. Post necrotic hepatitis

3. Auto immune disease
    a)Primary bellary cirrhosis
    b)Auto immune hepatitis

4)Metabolic disease
    a)Haemato-chromatic disease
    b)Wilson disease
    c)Galactosemia

1. Portal or Nodular cirrhosis

Causes: Usually, the causes of portal cirrhosis are the same as described under acute focal toxic hepatitis. It occurs following massive destruction of hepatic parenchyma and Reticulin network. All the liver elements are showed regeneration, which lead to nodular hepatocytes, distortion of organs with fibrous tissue and anastomosis between hepatic artery and central vein with more necrosis and cirrhosis.

Pathogenesis:

When the irritant is conveyed the portal veins, changes are noticeable first noticed at the periphery of the lobules.The changes are as follows:

- There are degeneration of hepatic parenchyma, stimulation of the connective tissue in the interlobular septa to proliferate, infiltration of lymphocyte and macrophages in to the island of Glisson along with the new connective tissue.

- There is formation of new blood vessels which anastomose with the network of the portal vein as well as branches of the hepatic artery resulting hepato-venous then ischemia of some part & hepatic necrosis & hyperplasia of hepatic cells.

- Newly form connective tissue become mature & causes contracts of liver that interfere of blood circulation so hyperplasia does not progress.

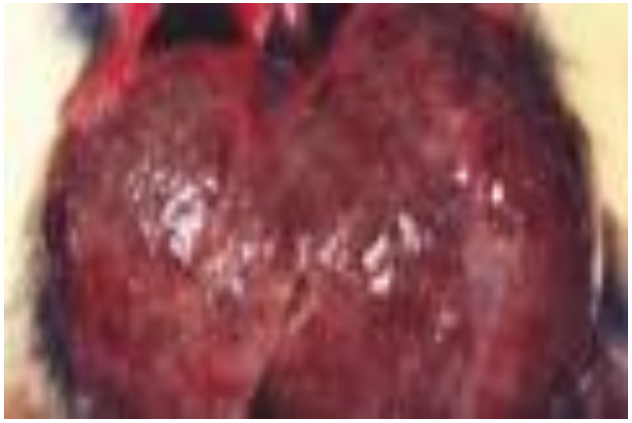
- In new fibrous tissue, in the portal areas especially, new bile ducts are formed. These are not functional, lacking in outlets & so stasis of bile occurs.

- As the fibrous tissue grows into liver lobule, the hepatic cells become atrophied due to pressure & lack of nutrition.

Macroscopically

- The liver is hard & firm nodular.
- In the early stages the organs may be large.
- Atrophy of the parenchyma & contraction of the fibrous tissue, the liver may be reduced in size.
- The colour of the organ is tawny or yellowish-gray & this colour the name "cirrhosis".

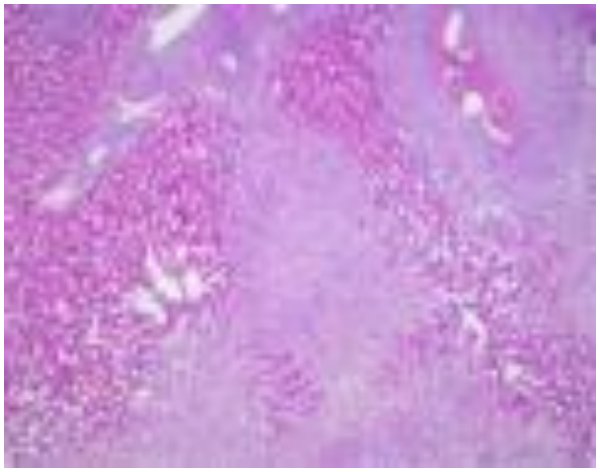
Gross picture of liver cirrhosis. The liver is small in size and nodular



Gross picture of liver cirrhosis. The liver is small in size and nodular.

Microscopically

- There is increase in fibrous tissue with in an around the lobules.
- In the portal areas small new bile ducts & inflammatory cells are present.
- The parenchymatous cells show various stages of degeneration- cloudy swelling, fatty degeneration & even frank necrosis.



portal cirrhosis represented by massive replacement of hepatic parenchyma by fibrous tissue.

stained blue with Mason Trichrom.

Gall bladder and bile duct

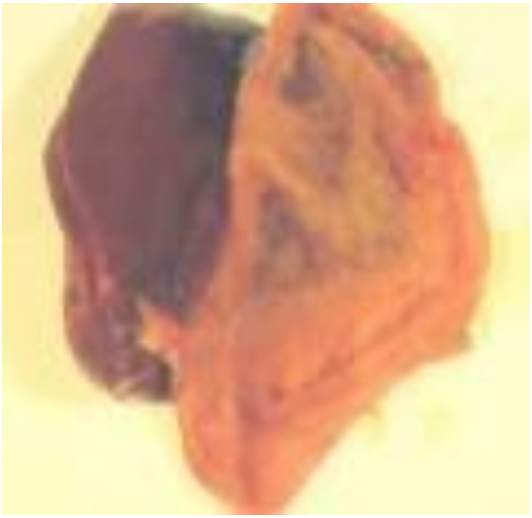
Cholangitis: is inflammation of bile ducts .

Grossly: the lumen of the bile ducts is dilated & its wall is thickened due to fibrous tissue proliferation around it.

Microscopically:

- The mucosa is thickened & forms papillary projections into the lumen.
- Infiltration of the wall by macrophages, lymphocytes & esinophils is common.

Cholecystitis: is inflammation of gall bladder



Gall bladder showing acute cholecystitis.

Cholelithiasis: stone formation of the gall bladder or bile duct.

Peritonitis: inflammation of the peritoneum.

Pathological condition affecting Pancreas

Exocrine Disorder: In animals, diseases of the pancreas are not common.

Acute Pancreatic necrosis (acute haemorrhagic pancreatitis, Necrotising pancreatitis): this condition found in dog, Cat, swine & horses. Ruminants are believed to be not affected.

Macroscopically:

- There is small quantity of fluid in the abdominal cavity.
- Haemorrhages may be present in the omentum.
- In the mesentery & around the pancreas, whitish areas or nodules of fat necrosis with an inflammatory zone surrounding them are found.
- The pancrease is swollen & soft, yellowish or slightly haemorrhagic.

Microscopically:

- Necrosis of the parenchymatous cells & fat, edematous swelling.
- Infiltration of few leukocytes.
- Hemorrhages & thrombosis of vessels are seen during microscopically.
- Crystals of fatty acid and bluish calcium soap are found in the necrotic areas.