Liver Pathology – Lab 1

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http://people.upei.ca/smartinson/
Signalment:
• 10 year old MC DSH cat

History:
• Inappetence and weight loss
• Fluid in the abdomen noted on US
• Esophageal feeding tube placed and treated with ampicillin, ursodiol, denosyl
• Began wandering aimlessly, drooling, and seizures - owners opted to euthanize
Case 1

**Description**

- The liver is diffusely pale yellow, soft, greasy, and markedly enlarged with prominent rounding of the margins
- There is a faint reticular pattern
Case 1

Morph Diag

- Hepatic lipidosis, diffuse, severe

How would you confirm your diagnosis?

- Histology
  - Hepatocytes contain single to multiple clearly delineated cytoplasmic vacuoles
- Oil Red O stain
  - For lipid
- Sudan black stain
  - For lipid
Case 1

Morph Diag

- Hepatic lipidosis, diffuse, severe

How could this have lead to neurologic disease?

- Hepatic encephalopathy
  - Decreased hepatic function can lead to decreased conversion and excretion of ammonia and other toxic compounds
  - Hyperammonemia, altered NTs can result in neurologic dysfunction

Image: Dr. L. Ross

Fatty liver – Oil-red-O stain
Case 1

What are some causes for this change (sheep, cattle, cats, dogs, and horses)?

**Sheep**
- Ketosis
- Cobalt deficiency
- Dietary excess
- Toxins

**Cattle**
- Ketosis
- Fatty liver syndrome
- Toxins
- Dietary excess

**Feline**
- Dietary excess
- Fatty liver syndrome
- Diabetes
- Toxins

**Dog**
- Dietary excess
- Diabetes
- Hypothyroidism
- Toxins

**Equine**
- Equine hepatic lipidosis
- Dietary excess
- Toxins
Case 2

Signalment:
- 2 month old, F, GS puppy

Clinical History:
- Runt of the litter
- Intermittent seizures and aggressive behavior for 2 days
  - Occurs following meals
- Presented recumbent, seizuring, and pyrexic
- Treated with pentobarbital – cardiac arrest 15 minutes later
Case 2
Case 2

The portal vein is markedly reduced in diameter and is connected to the caudal vena cava via a large (1 cm diameter) vessel.
Case 2

• Extrahepatic portosystemic (portal-caval) shunt

Morphologic Diagnosis
Case 2

Do you think this is a congenital lesion or an acquired one and why?

- Congenital
  - A single connection rather than multiple
  - There is no convincing evidence of significant hepatic fibrosis
  - The young age of the dog
Case 2

What are common clinical pathologic findings associated with congenital PS shunts?

- Hyperammonemia
- Decreased urea
- Increased bile acids
- Ammonium biurate crystals in urine
Case 2

Compare and contrast congenital and acquired variants of PSS?

Congenital Intrahepatic PSS

- Patent ductus venosus
- Generally large breed dogs

Congenital Extrahepatic PSS

- Usually a single vessel connecting the portal vein to the caudal vena cava or the azygous vein
- Most often small breed dogs

Acquired PSS

- Multiple tortuous vessels connecting the portal vein and vena cava
- Occur secondary to portal hypertension – may see ascites
- Often due to cirrhosis
Case 3

Signalment:
• 8 year old, FS, Lab Retriever dog

Clinical History:
• ~ 20 day of vomiting and inappetence and orange tinged urine
• Progressed despite supportive treatment
• PE: Marked icterus of the mucous membranes and sclera
• US: Liver small and nodular and fluid present in the abdomen
• Blood work: ↑ALT, ↑AST, ↑ALP
• Owners opted to euthanize
Case 3

**Description**

- The liver is small and has abosselated surface with diffuse replacement of the normal architecture by numerous nodules (2 – 20 mm diameter)
- Fibrous connective tissue bands separate the nodules and impart a firm texture to the organ.
Case 3

Morphologic Diagnosis

- Hepatic fibrosis with nodular regeneration, diffuse, chronic, severe
- Cirrhosis (end-stage liver)

What 3 histologic components are characteristic of cirrhosis

1. Nodular regeneration
2. Fibrosis
3. Bile duct hyperplasia
Case 3

Can you determine the underlying cause?

- No

Possible causes

- Chronic toxicity
- Chronic cholangitis
- Biliary obstruction
- Right sided heart failure
- Inherited metabolic disease
  - Copper associated hepatopathy
- Chronic hepatitis
- Idiopathic
Case 3

Manifestations of hepatic failure?

- Hepatic encephalopathy
- Icterus / hyperbilirubinemia
- Hemorrhagic diatheses
- Intravascular hemolysis
- Hypoalbuminemia
- Portal hypertension
- Acquired PSS
- Ascites
- Photosensitization
- Hepatocutaneous syndrome
Signalment:
• 3 month old, male, farmed mink

Clinical History:
• Alive and healthy in the morning and found dead in the afternoon
• No treatments given
Case 4
Case 4

- The left lateral lobe of the liver is markedly enlarged, dark brown (red), with a roughened irregular surface and is twisted ~ 360 degree around its base.
- Indentations are present on the capsular surface of many lobes (artefact).
Morphologic Diagnosis

- Torsion and infarction of the left lateral liver lobe
Could this be the cause of death?

- Yes

How would this lesion cause death?

- Torsion of the liver lobe may result in infarction of the tissue which can lead to congestion/hemorrhage, rupture, shock and death

Chronic liver lobe torsion in a rabbit – torsed caudate lobe is necrotic and walled off from the rest of the liver.
Signalment:
• 1.5 month old calf

Clinical History:
• The calf was found dead suddenly
• Was at AVC at one month of age with respiratory signs and was diagnosed with pneumonia and a possible heart defect
  • Treated for pneumonia at that time - Doing well ever since
The liver is enlarged with rounded margins and has a reticular appearance with alternating dark brown and tan regions on section.
Case 5

Is the lesion random or patterned?
- There is enhanced reticular pattern
- Compatible with zonal injury

Kinds of damage that cause a reticular pattern?
- Metabolic Disease
- Toxic injury
- Hypoxia / Anemia

Infectious agents tend to result in random multifocal lesions
On postmortem examination, abundant fluid is present within the abdomen (ascites) and the heart is markedly enlarged with a large VSD.

Morphologic Diagnosis?

- Passive hepatic congestion, centrilobular, subacute (chronic), moderate to marked
Case 5

- The sinusoids are dilated and congested
- There is atrophy and necrosis (loss) of hepatocytes

Zone 3 (centrilobular)
- The sinusoids are dilated and congested
- There is atrophy and necrosis (loss) of hepatocytes

Zone 2 (midzonal)
- Hepatocytes have lipid vacuoles in the cytoplasm (fatty degeneration)

Zone 1 (periportal)
- Normal hepatocytes
Signalment:
- 6 day old calf

Clinical History:
- Calf was born as a twin and was doing well. Overnight it was unable to stand and died before morning. No clinical signs were noted.
Case 6

- A large multiloculated cystic sac containing clear fluid arises from the capsular surface on the caudal aspect of the left lobe.
- The cyst wall is thick, tan and fibrous.
Case 6

Morphologic Diagnosis

- Congenital hepatic cyst, multiloculated
Case 6

- Incidental – this calf died as a result of dehydration due to scours
Case 6

Parasitic cysts – Cysticerci (*Taenia* spp) or hydatid (*Echinococcus*) cysts

Differential for hepatic cysts?

- Parasitic cysts – Cysticerci (*Taenia* spp) or hydatid (*Echinococcus*) cysts