Case # YN12-746
Diaphragmatic Hernia in an adult Chimpanzee (*Pan troglodytes*)

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Signalment

• Multiparous (3 babies)
• 30 year old, socially-housed chimpanzee
• Born at Yerkes National Primate Research Center
• Behavioral study

History

• Left stifle surgery
• Degenerative joint disease
• Extensive subcutaneous lipomas
• Overweight

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Clinical History

December 2012

• 12/20, Reported for mild lethargy and inappetence
  • Suspected arthritis, treated with anti-inflammatories
• 12/26, Sedated exam:
  • Hypothermia, hypotension, nasal discharge
  • Diagnostic test
• 12/27, Non-sedated exam:
  • Recumbent, nasal discharge, expiratory crackles and loud stridor
  • Supported with oxygen but succumbed to cardiac arrest
  • Suspected pneumonia

12/26
CBC: Mild neutrophilia with 1% bands
Chemistry Panel: Severe hypoproteinemia and hypoalbuminemia, mild pre-renal azotemia; mild decrease in electrolytes
Gross Pathology Findings

- BCS – 4/5
- Liver margins rounded
- Left/mid side and right side of diaphragm herniated liver nodules
- Gallbladder markedly distended
- Femoral condyle osteophytes, tibial plateau roughened
- Multiple lipomas
- Pulmonary edema
- Jejunum to colon mucosa diffusely congested
- Lower colon and rectum mucosa black
Gross Pathology

Thoracic view

gallbladder

diaphragm
Gross Pathology

Abdominal view
Gross Pathology

diaphragm reflected

hyperplastic nodule protruding into thorax
Histopathology of Herniated Liver Nodule

Well differentiated hepatocytes
few double hepatic cords
Histopathology of Herniated Liver Nodules
Special stains highlight disorganized hepatic lobules

Reticulin stain

Masson Trichrome stain
Morphologic Diagnosis

- Hepatic diaphragmatic herniation with hepatic regenerative nodular hyperplasia
- Other findings:
  - Septicemia
  - Fibrinopurulent pneumonia and hemorrhagic pneumonia
  - Hemorrhagic colitis, diffuse, marked
  - Lipomas
  - Degenerative osteoarthritis, stifles, bilateral
Diagnosis

Differential diagnosis for hepatic diaphragmatic herniation

• Congenital diaphragmatic hernia\textsuperscript{5, 7, 11}
  • Bochdalek hernia
  • Morgagni’s hernia
• Hiatal hernia
• Iatrogenic diaphragmatic hernia
• Traumatic diaphragmatic hernia
Bochdalek’s Hernia

- Visceral herniation through post lateral aspect of diaphragm, typically left side\textsuperscript{2, 4-5, 8}

- Etiologies\textsuperscript{2, 4-5}
  - Congenital herniation
  - Blunt or penetrating trauma
  - Physical exertion
  - Pregnancy/delivery
  - Sneezing or coughing
  - Ingestion of large meal

- Most common manifestation of congenital hernias

- Occurrences
  - Humans, squirrel monkeys, baboons\textsuperscript{7}

- Recent review incident in 0.17% of adults\textsuperscript{4}

- Rare and asymptomatic\textsuperscript{2, 4-5}
Summary

Bochdalek’s hernia with hepatic regenerative nodular hyperplasia

- Bochdalek’s hernia
  - Causes: multiparous, congenital
- First case report in chimpanzee
  - Rare occurrence in humans
References

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Questions

http://www.worldmag.com/2012/04/chimpanzee