



Latin Comparative Pathology Group

The Latin Subdivision of the CL Davis Foundation

Diagnostic Exercise

Case #: 62 Month: November Year: 2015

Answers

Contributor: Santiago Diab, DVM, Dip ACVP. Assistant Professor, University of California, Davis. California Animal Health and Food Safety Laboratory system.

Clinical History: One year old Angus heifer presented with a history of poor appetite, coughing, runny nose, dehydration, and wobbly steps.

Necropsy Findings: The right middle lung lobe was focally adhered to the thoracic wall by a band of connective tissue. There was moderate, cranioventral, well-demarcated, bilateral pulmonary consolidation. Small- to mid-size airways were ectatic (bronchiectasis) and filled with abundant tan to yellow, caseous exudate. The total area of lung affected by these alterations was approximately 20%.

Gross and/or microscopic image:

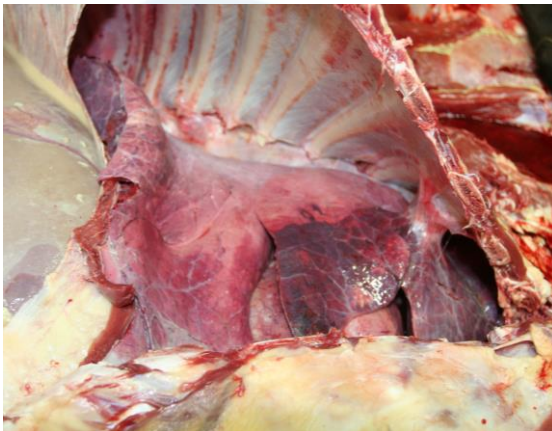


Figure 1.



Figure 2.

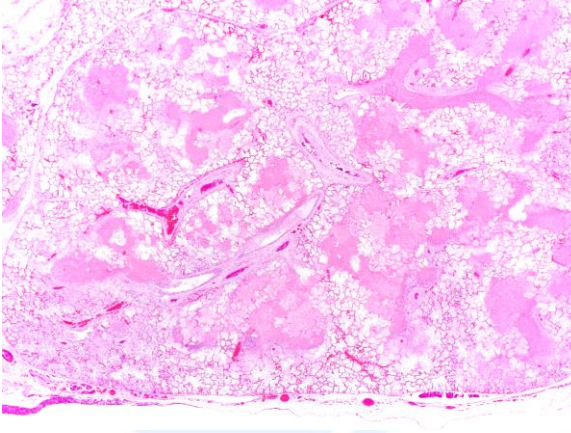


Figure 3. HE, 2x.

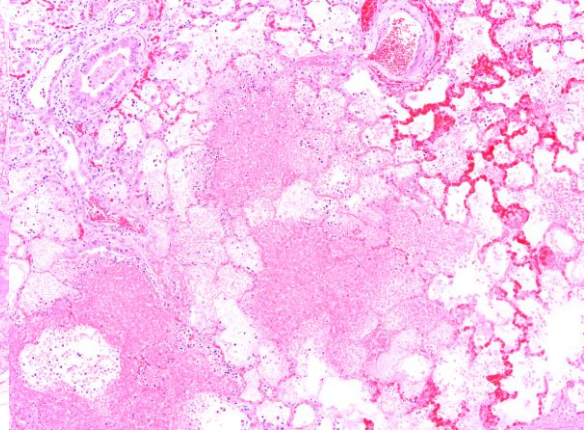


Figure 4. HE, 4x.

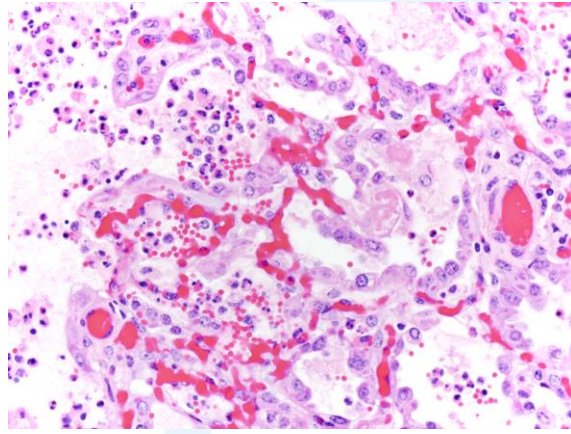


Figure 5. HE, 40X

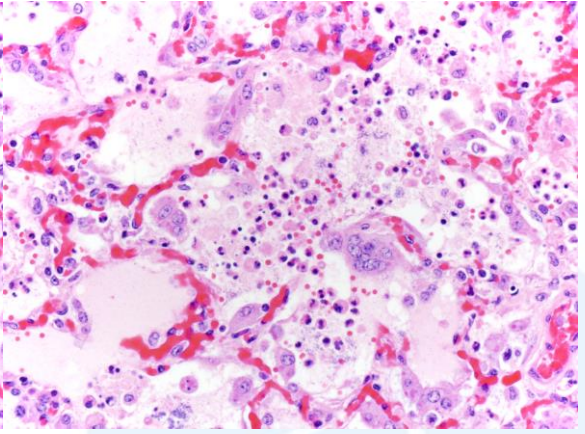


Figure 6. HE, 40X

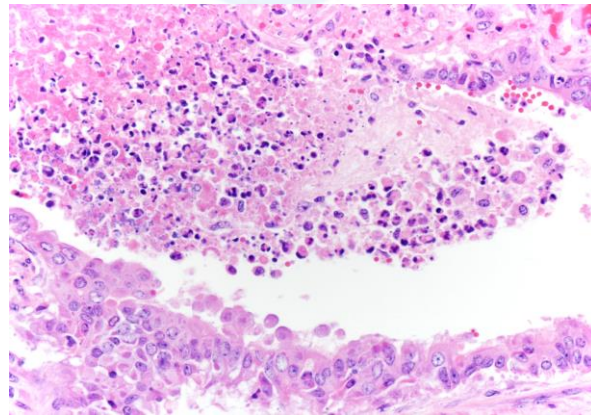


Figure 7. HE, 40X

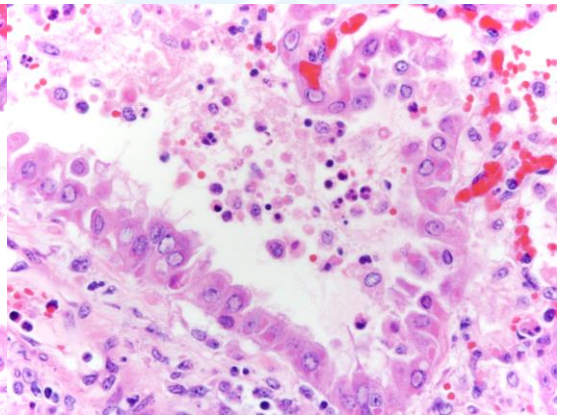


Figure 8. HE, 60X

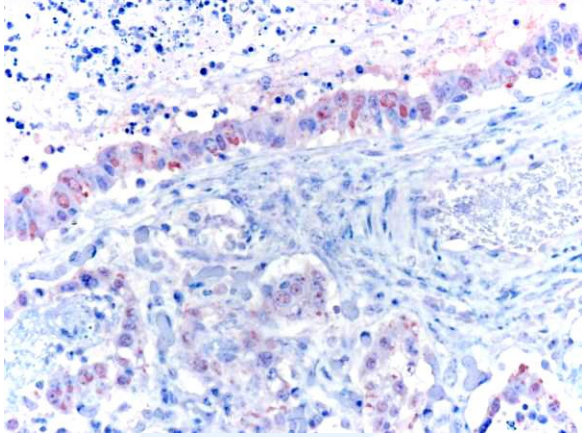


Figure 9. Positive IHC for PI-3 virus

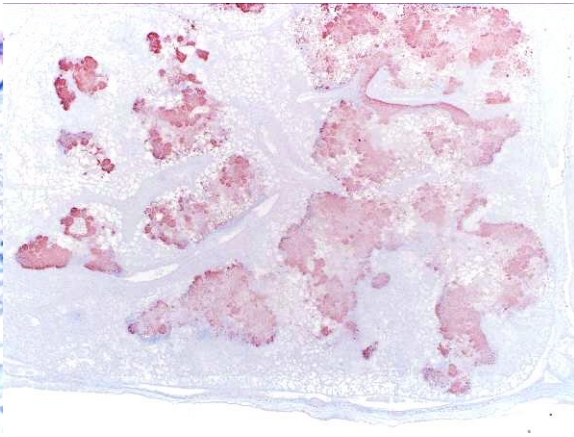


Figure 10. Positive IHC for *Mycoplasma bovis*

Morphologic Diagnoses:

1. Bronchopneumonia, subacute, fibrinosuppurative and necrotizing, with bronchiectasis and acute coagulative necrosis of alveolar septa; cause *Mycoplasma bovis*. Figures 3 and 4.
2. Bronchointerstitial pneumonia, subacute, suppurative, locally extensive, severe, with bronchiolar epithelial necrosis, syncytia formation and intracytoplasmic eosinophilic viral inclusions; cause PI-3 virus. Figures 5-8.

Differential diagnoses:

Pasteurella multocida, *Mannheimia haemolytica*, *Mycoplasma bovis*, bovine respiratory syncytial virus (BRSV), infectious bovine rhinotracheitis (IBR), bovine viral diarrhea virus (BVDV), bovine coronavirus, parainfluenza-3 (PI-3).

Typical Gross findings:

- Cranioventral consolidation of the lung with severe bronchiectasia (*Mycoplasma bovis*)
- Cranioventral or diffuse increased consistency and pulmonary distention (PI-3)

Typical microscopic findings:

For *Mycoplasma bovis*:

- Bronchopneumonia, suppurative and necrotizing, with severe bronchiectasis (dilated airways filled with tan, cheesy material).

For PI-3:

- Bronchiointerstitial pneumonia with bronchiolar epithelial necrosis, intracytoplasmic eosinophilic viral inclusions in bronchiolar or alveolar septal epithelium, and syncytia formation.

Discussion:

This case was interesting because it was an unusual co-infection of PI-3 and *M. bovis*. PI-3 was confirmed by virus isolation from the lung and positive PI-3 IHC (figure 9). *M. bovis* was confirmed by culture and *M. bovis* IHC (figure 10). No other bacterial microorganisms were cultured from the lung and none were seen histologically in lung sections; however, this animal had been heavily treated with antibiotics, so the possibility of other bacterial pathogens implicated in the development of this bronchopneumonia cannot be entirely ruled out. BRSV, BVDV, Bovine coronavirus and IBR virus were ruled out by negative PCR (all of them) and negative IHC in lung sections (BRSV, BVDV and Bovine coronavirus).

The combination of PI-3 and *M. bovis* co-infection is unusual because PI-3 is typically found in the very acute stages of respiratory disease, whereas *M. bovis* is found mainly in the more chronic stages. Although the above mentioned respiratory viral pathogens predispose and/or cause respiratory disease alone or in combination with bacteria, viral loads in the lung are either very low or the virus is gone by the time that the bacterial bronchopneumonia is well established and the animals are submitted for necropsy. In this case, the viral load of PI-3 was very high in the lung, even in the subacute to chronic stage of the disease.

This animal was very deficient in copper and selenium, which may have compromised its immune status and predisposed to disease. Moderate enteric coccidiosis was another significant concurrent disease process found.

Please send your comments/questions to the whole LCPG list by hitting "reply to all".

A final document containing this material with answers and a brief discussion will be posted on the C. L. Davis website by the end of the current month (http://www.cldavis.org/lcpg_english.html).