Diagnostic Exercise

From the CL Davis/ Foundation

Case #: **167** Month: **June** Year: **2021**

Title: Periodontal disease in sheep

Contributors: Fábio S. Mendonça[1], DVM, MSc, PhD. Silvio M. C. Fonseca[1], DVM, MSc student. Givaldo B. Silva-Filho[1], DVM, MSc student. Hisadora A.S.C. Bom[1], DVM, MSc student. Nathalia S. Wicpolt[1], DVM, MSc, PhD. Laboratory of Animal Diagnosis, Federal Rural University of Pernambuco. mendoncafs@yahoo.com.br

Clinical History: A 3-year-old Santa Ines sheep presented loss of condition, pale mucous membranes, opaque and bristly hair and an increased volume of the right mandible. The owner said that a purulent secretion was coming out through the mass, but after an antibiotic therapy, there was improvement and partial regression of the lesion. At clinical examination, the mass was firm and the sheep showed signs of pain when examined physically. No purulent content was observed at the site of the lesion, but there was a scar in the skin, which was interpreted as a consequence of an abscess. The sheep was euthanized and a necropsy was performed.

Figure 1

Figure 2

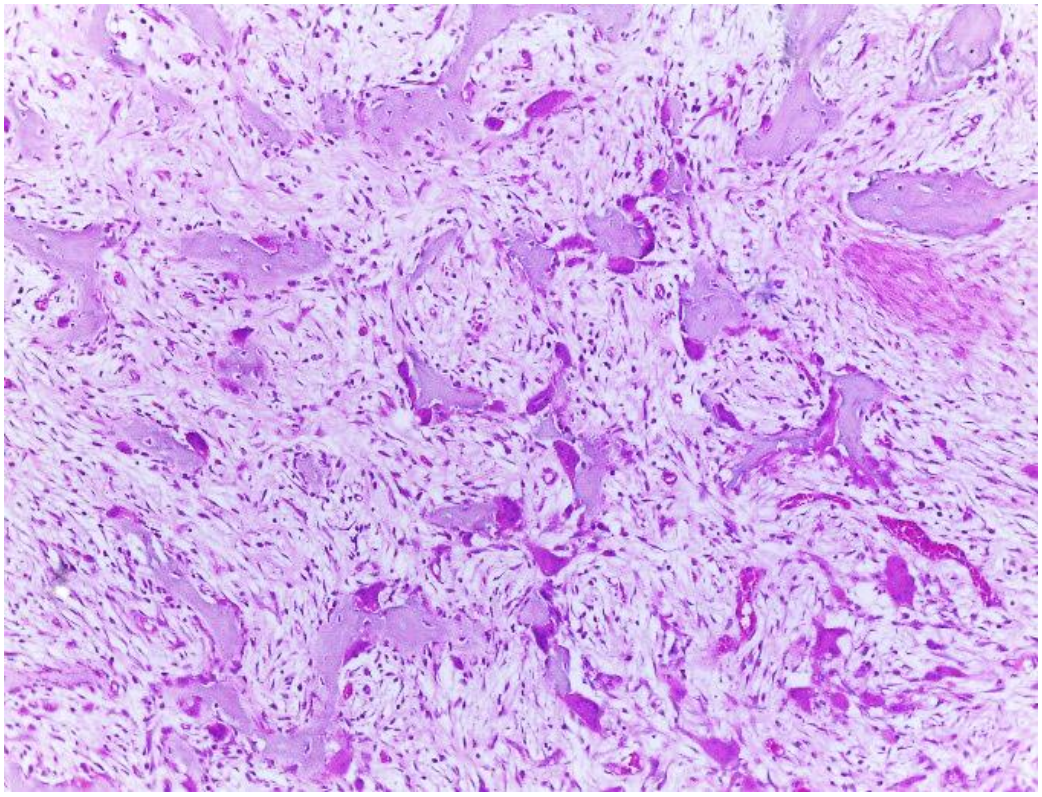

Figure 3

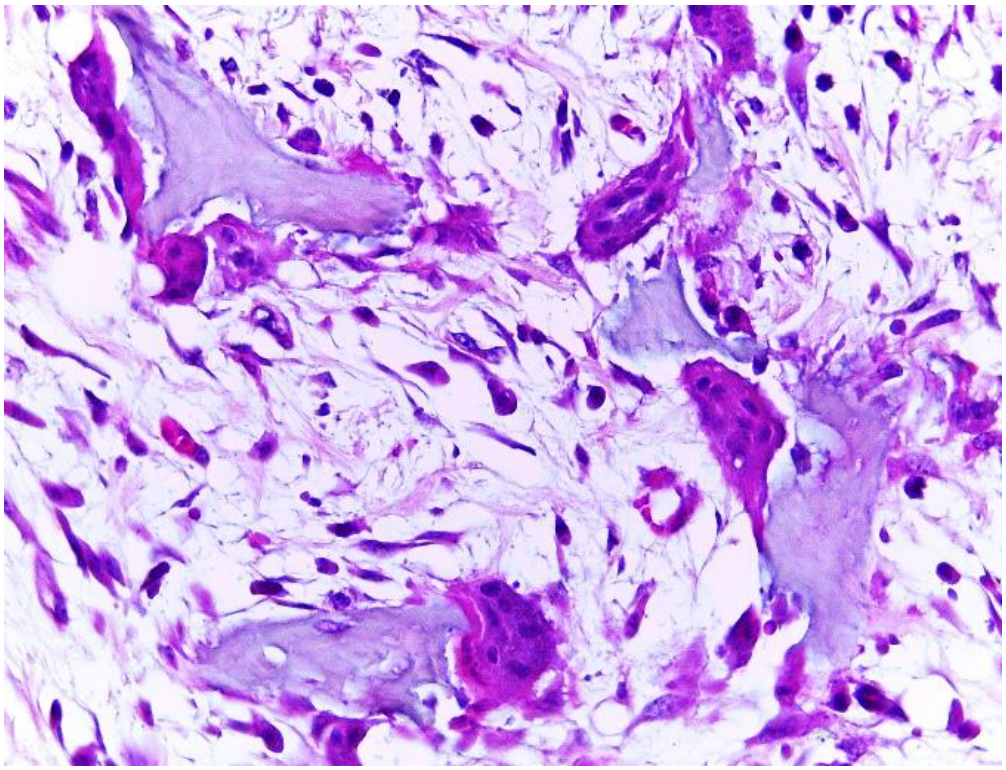

Figure 4

Gross description: At the vestibular view**,** there is dental malocclusion characterized by severe dental wear and formation of acute irregular tips, which is pronounced between the second and third maxillary molars. Irregular tips are also observed in the premolars. There is a severe diffuse gingival retraction, and dark plaques of biofilm cover the maxillary and mandibular teeth. At the occlusal view, there is an increased volume of the right mandible with the significant intrusion of the second and the third mandibular molars that is accompanied by periodontal pocket formation filled by grass. Mild intrusion of the left third mandibular molar, loss of the left second premolar, and the right second premolar's loosening is observed.

Microscopic description: Alveolar bone: There is an abundance of osteoclasts and remarkable resorption of bone trabeculae. Diffusely, there is severe fibrosis, characterized by large numbers of fibroblasts and collagen fibers and mild infiltration of lymphocytes, plasma cells, and histiocytes.

Morphologic diagnosis: Periodontitis, severe, diffuse, lymphoplasmacytic and histiocytic, chronic, with severe osteolysis and fibrosis.

Name of the condition: Periodontal disease.

Pathogenesis: Periodontal disease in sheep is a multifactorial disorder caused by a complex of bacterial species. Begin as a localized bacterial plaque-induced gingivitis followed by periodontitis, damage of the periodontal ligament attachments, and is aggravated by resorption of alveolar bone and tooth loosening. If the inflammation continues, the lesions are aggravated by the apical recession of the tooth-gingiva junction, loss of alveolar bone, and collagen destruction within the periodontal ligament. These alterations may be accompanied by bacterial infection, osteomyelitis of the jaw, and fistulation with oozing of pus. The destruction of the periodontium, periodontal ligament and severe resorption of alveolar bone, cementum, and root dentin, lead to exfoliation of teeth.

Comments: Periodontal disease is the most common dental problem of sheep and is considered one of the major causes for premature slaughter of animals in flocks with the problem (Uzal et l. 2016). However, lesions affecting the molar and premolar teeth has received minor attention in comparison with the disease of incisors, possibly due to the difficulties to examine the masticatory teeth of live sheep (West 2002). The formation of dental biofilm is the main risk factor leading to periodontitis[1]. The immune responses to subgingival plaque is one of the major causes for the release of inflammatory cytokines, chemokines, and mediators, which are accompanied by destruction of the periodontal structures, alveolar bone and periodontal ligament (Holt and Ebersole 2005). All these alterations are probably linked to the activity of prostaglandins and virulence factors such as collagenase, proteinase, endotoxin, hemolysins, and fibroblast inhibiting in the inflamed tissue that are associated with plaque bacteria, such as those from *Porphyromonas* and *Provotella* genera (Holt and Ebersole 2005). In a recent study, *Porphyromonas asaccharolytica*, *Porphyromonas endondotalis*, *Porphyromonas gingivalis*, *Provetella buccae*, *Provetella intermedia*, *Provetella melaninogenica* and *Provetella nigrescens* showed strong association with the lesions of sheep periodontitis (Borsanelli et al. 2017).

Among the putative periodontal pathogens, *Tannerella forsythia*,m *Treponema denticola*, *Fusobacterium nucleatum* were also isolated from sheep with severe periodontitis (Silva et al.

References:

Borsanelli A.C., Gaetti-Jardim E., Schweitzer C.M., Viora L., Busin V., Riggio M.P., Dutra I.S. 2017. Black-pigmented anaerobic bacteria associated with ovine periodontitis. Veterinary Microbiology 203:271–274.

Holt S.C., Ebersole J. 2005. *Porphyromonas gingivalis*, *Treponema denticola*, and *Tannerella forsythia*: the red complex, a prototype polybacteria pathogenic consortia in periodontitis. Periodontology. (38):72:122.

Silva N.S., Borsanelli A.C., Gaetti-Jardim J.E., Schweitzer C.M., Silveira J.A.S., Bomjardim H.A., Dutra I.S., Barbosa J.D. 2019. Subgingival bacterial microbiota associated with ovine periodontitis. Brazilian Journal of Veterinary Research 39:454-459.

Uzal F.A., Plattner B.L., Hostetter J.M. 2016. Alimentary System. In: Jubb K.V.F.V., Kennedy P.C. & Palmer N.C. (Eds). Pathology of Domestic Animal. 6th ed. Saint Louis: Elsevier, pp.1-257.

West D. 2002. Dental disease of sheep. New Zealand Veterinary Journal. 50(3):102–104.

The Diagnostic Exercises are an initiative of the **Latin Comparative Pathology Group** (LCPG), the Latin American subdivision of The Davis-Thompson Foundation. These exercises are contributed by members and non-members from any country of residence. Consider submitting an exercise! A final document containing this material with answers and a brief discussion will be posted on the CL Davis website http://www.cldavis.org/diagnostic_exercises.html Editorial Committee.