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GRANDE SURPRISE IN THE GUTTURAL POUCH

The guttural pouches (GP) in horses are diverticulae of the left or right tuba auditiva (TA), each diverticulum able to hold between 300 and 600mL of air. As either TA connects the nasopharynx with the middle ear of the ipsilateral side, a key function of the TA is to regulate pressure differences between the outer and middle ear. A lack of middle ear decompression leads to discomfort and hearing compromise. Inflammation is a main cause for loss of decompression. Middle ear decompression is achieved by allowing valves at the nasopharyngeal end of the TA to open with each swallowing. While TA are present in all mammals, only equids, odd-toed mammals, rarely bats and few rodent species possess a TA that enlarges into a GP or diverticulum. The function of this anatomical curiosity is still up for debate. In the horse, current opinion focuses on cooling of arterial blood prior to entering the brain via the carotid arteries.
The GP is lined by a thin layer of mostly ciliated cuboidal epithelial or goblet cells similar to most parts of the upper respiratory tract. Also, spuriously distributed in both GPs are primary lymphoid follicles and M cells for antigen scavenging and processing. The actual GP cavity is divided by the tongue apparatus stylohyoid bone into 2 compartments, a lateral and medial division.

Endoscopic entry into the GP is through a cartilage-supported valve at the proximal TA. Advancing the endoscope into the GP always leads into the medial compartment, which opens ventrally to the examiner. For orientation, the stylohyoid bone (SB) is always lateral to the endoscope. The fold medial and dorsal to the SB is the actual TA continuing into the middle ear. The caudal end of the SB forms tongue skeleton part of the temporo-hyoid joint articulating with the temporal bone of the skull. Counter-clock-wise in the left GP medial compartment there are ample views of cranial nerve branches including the cranial cervical ganglion, branches of the internal carotid artery, as well as of the occipital vein. The retropharyngeal lymph node typically protrudes into the GP from ventral during lymphadenopathy. Further medial is the longus capitis muscle, which is situated close to the inter GP septum separating left from right medial compartment. The lateral compartment is smaller, and contains facial nerve (VII), external carotid artery and maxillary vein.

Thus, inspecting the GPs can provide unique views of arterial blood vessels, nerves, a joint capsule and more, and should always be pursued when cranial nerve damage is evident (especially VII, IX, X, XII); in case of a head tilt, or when horses present with hemorrhagic nasal discharge.

Conditions affecting areas or function of parts or the entire GP can be divided into conditions caused by dysplasia, trauma, degeneration, neoplasia or inflammation.
A malformation of the valve mechanism at the entrance to the nasopharynx can cause air trapping and tympany. Trauma can lead to skull fractures, basosphenoid, petrosal bone or stylohyoid bone fractures. Hemorrhage into the GP can be evident, and there also might be swelling. GP mycosis more commonly can be localized to the large arteries crossing through the pouch. The growth of Aspergillus fumigatus weakens the arterial wall and can cause exsanguinating hemorrhage. Rupture of the longus capitis muscle often leads to fatal hemorrhage, occurring typically retropharyngeally and outside of the GP, however, compressing the GP.

A degenerative arthropathy of the temporo-hyoid joint, situated caudally in the GP can initially be recognized in horses with eating and chewing disorders. Loss of joint movement by an increasing fusion in the joint is the cause for this presentation. However, with increasing arthropathy there is also likelihood for microfractures of the joint and temporal bone, leading to excessive inflammation and swelling which then could impact the facial nerve or the vestibular system. Neoplasia is the third most common diagnosis in the GP. Adenocarcinoma most commonly originates from various gland structures or goblet cells in the pouch. The occasional melanoma can extend into the pouch. Inflammation of the GP is the most common cause for GP dysfunction or of GP-associated structures. Viruses and bacteria infecting the upper respiratory tract will also involve and extend into the GP. Mild inflammation in the proximal portion of the TA will already lead to decompression mechanism difficulties, and will result in (temporary) tympany. Fungal organisms like A. fumigatus are opportunistic infections that can lead to aforementioned GP-mycosis. Colonization of the GPs with commensals can be the result of dysphagia of various reasons or due to a deformity of the (cartilaginous) valve system allowing access to the GP. A garden variety of organisms can be retrieved via culture. Streptococcus equi spp. equi (S.eq eq) has a different relationship with

the GP. During primary infection, S.eq eq can colonize the GP and establishes a chronic-persistent infection. The GP can also become infested with S.eq eq during retropharyngeal purulent lymphadenopathy, requiring lavages of the GPs to remove debris, exsudate and microorganisms.
Chronic inflammation can lead to deformities or partial closure of GP compartments, which can influence swallowing and chewing via a compromised tongue skeleton.

In summary, the GPs are important structures to include in an upper respiratory or neurological exam when cranial nerve dysfunction is present. Endoscopy of the GP is easy and often rewarding if particular clinical signs are present. GP endoscopy requires a certain skill set for the endoscope to enter the pouch, usually a guide-wire and the coordinated team-work of 2. It is highly recommended to do this procedure under sedation.