Laser salpingopharyngostomy for management of guttural pouch disease

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Mycosis, empyema and tympany are the major diseases affecting the guttural pouch (Jukic *et al.* 2020). Laser salpingopharyngostomy was first described for guttural pouch tympany in 1995 (Krebs and Schmotzer 2007), however has more recently been described at the dorsal pharyngeal recess for treatment of empyema and mycosis (Koch *et al.* 2022, Watkins and Parente 2018).

Guttural pouch tympany is a congenital manifestation in foals proposed to be caused by either a dysfunction of the ostium mucosa or a malfunction of the pharyngeal musculature (Krebs and Schmotzer 2007) preventing a release of air from the guttural pouch. The disease is most commonly unilateral, and in these cases it is possible to create a fenestration in the septum, allowing air to escape through the contralateral guttural pouch. More rarely the disease can be bilateral, and the first published use of a transendoscopic laser to create a bilateral salpingopharyngeal fistulae was in 2007 (Krebs and Schmotzer 2007).

Mycosis is a life-threatening disease due to formation of fungal plaques within the guttural pouch. There is a predilection for the plaques to form within the dorsomedial compartment of the pouch, resulting in a fatal haemorrhage from the internal carotid artery (Watkins and Parente 2018). Medical treatment utilises antifungals; itraconazole is frequently chosen for its superior efficacy against filamentous fungi such as Aspergillus (Watkins and Parente 2018). Although Davis *et al.* demonstrated that 5mg/kg would result in systemic levels causing inhibition of fungal growth in horses, it is unknown whether the drug would reach the target dose within the guttural pouch when given systemically (Davis *et al.* 2005). Therefore, topical administration is frequently utilised, however frequent administration is required, causing substantial trauma to the opening of the guttural pouch (Watkins and Parente 2018, Koch *et al.* 2022).

Surgical treatment of guttural pouch mycosis aims to prevent fatal haemorrhage by obstructing at-risk vessels; this is achieved using ligation, trans-arterial coils or balloon catheters. These surgical methods also inhibit fungal growth; although the exact mechanism is unclear it is thought to be as a result of the change in the local microenvironment. Following this theory, Watkins and Parente (2018) found success treating a small case series of horses with guttural pouch mycosis with laser salpingopharyngostomy in 2018 (Watkins and Parente 2018), and a study by Jukic *et al.* in 2020 confirmed that laser salpingopharyngostomy alters the carbon dioxide and oxygen levels within the guttural pouch (Jukic *et al.* 2020). While not a novel technique, it has only recently been performed at the dorsal pharyngeal recess, which decreases the risk of collateral thermal damage and iatrogenic nerve damage (Watkins and Parente 2018). The tissue is thinner in this location, requiring less laser activation time, and avoids the pharyngeal branch of the vagus nerve and the cranial laryngeal nerve which run through the floor of the medial compartment – a previous described location for fenestration (Rowe *et al.* 2023, Koch *et al.* 2018).

Guttural pouch empyema is the local infection of the guttural pouch by bacteria leading to accumulation of purulent material, most commonly associated with *Streptococcus* equi equi. Medical treatment uses long-term lavage and topical antibiotic therapy, however, has a poor response rate against chronic cases where chondroid formation has occurred, which Judy *et al.* report can be up to 21% of affected strangles cases (Koch *et al.* 2022, Judy *et al.* 1999). Furthermore, distension of the guttural pouch causes mucosal inflammation which can result in

neuritis of the vagus nerve and ostium dysfunction. This, combined with ostium compression from overinflation by exudate, results in a self-perpetuation of the chronic disease state (Dixon and James 2018, Koch *et al.* 2022). Surgical drainage has been described via Viborg's triangle; creation of an external opening requires lengthy post-op wound care and has an increased risk of iatrogenic nerve damage. Unless very visibly distended this approach should be avoided (Dixon and James 2018, Koch *et al.* 2022). Laser salpingopharyngostomy allows drainage without creating an external wound, and combined with the alteration of the microenvironment hastens the resolution of inflammation and therefore the guttural pouch's ability to resolve the local bacterial infection (Koch *et al.* 2022). This is a relatively novel treatment approach for guttural pouch empyema and was first described by Koch *et al.* 2022.

This case study of a horse with recurrent unilateral retropharyngeal abscessation and purulent exudate within the guttural pouch describes how laser fenestration can be used to manage chronic guttural pouch empyema.

On initial presentation the abscessation was lanced and drained transcutaneously. A foley catheter was placed through the incision, and communication with the guttural pouch was confirmed. The abscess was lavaged for the following 11 days through the foley catheter. On the last day the foley catheter was removed, gelatin-penicillin antibiotic was instilled, and she was discharged on oral trimethoprim-sulfadiazine (TMPS) antibiotic.

She was readmitted a year later for recurrence of the retropharyngeal abscess and guttural pouch empyema. The retropharyngeal abscess was lanced transcutaneously, and laser salpingopharyngostomy was performed at the floor of the medial compartment of the guttural pouch. A foley catheter was placed through the fenestration from the pharynx and left in place for 48 hours before removal and discharge of the patient from the hospital.

The horse presented again three years later for recurrence of guttural pouch empyema. Endoscopic exam revealed scar tissue had sealed over the guttural pouch opening and the fenestration performed previously. Laser fenestration was performed at the dorsal pharyngeal recess using a 600nm diode laser transendoscopically. A mare AI infusion pipette was inserted through the opening to lavage with saline. After the initial lavage this was replaced with a foley catheter which was left in place for 48 hours to allow subsequent lavages. On the final day the catheter was removed and gelatin-penicillin was instilled. She was discharged three days after the procedure with cessation of clinical signs, on a course of oral TMPS.

The exact aetiopathogenesis of her empyema is unknown but is likely to recur again and require a repeat salpingopharyngostomy. However, a recurrence rate of three years is markedly improved on the literature for salpingopharyngeal fenestration, where they are reported to remain patent for 2-10 months (Watkins and Parente 2018). Unfortunately, due to financial constraints of this case, follow up endoscopy was not permitted.

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