# Endoscopy of the guttural pouches

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## Overview

Direct endoscopy of the guttural pouches is essential for a complete and comprehensive evaluation for clinical signs consistent with respiratory or cranial nerve dysfunction in horses.

The guttural pouches are unique to equids and few other species and are a paired extension or diverticulum of the auditory tube connecting the nasopharynx to the middle ear. These structures are of particular clinical importance due to the presence of numerous cranial nerves and major blood vessels within them. Disorders of the guttural pouch can present with a wide array of neurologic and upper respiratory tract signs. Anatomical knowledge of the guttural pouches, diagnostic modalities, and endoscopic examination techniques are essential for diagnosis and treatment of these commonly encountered diseases.

The guttural pouches are located ventral to the base of the skull, lateral to the pharynx, and deep to the parotid salivary glands. Their unique structure and contents make them critical in both normal function and disease processes involving respiration, swallowing, and neurologic control of the head and upper airway.
Each pouch holds approximately 300 to 600ml of air and is divided by the stylohyoid bone into:

- Medial compartment: ~2x the size of the lateral.
- Lateral compartment: smaller and located more laterally and dorsally.

The proximity of key cranial nerves (CN IX–XII) and vascular structures (the internal, external carotid and maxillary arteries) places the horse at risk of life-threatening complications if disease affects this region. The stylohyoid bone articulates with the petrous temporal bone to form the temporohyoid joint. Cranial nerves VII and VIII exit the cranium at this location but don't enter the guttural pouch. Arthropathy of this joint however (temporohyoid osteopathy) can cause clinical signs relating to dysfunction of these nerves.

## Clinical indications for examination

Indications for guttural pouch examination include, but are not limited to:

- Nasal discharge: especially unilateral, mucopurulent, or haemorrhagic.
- Dysphagia: difficulty swallowing, food or water coming from nostrils.
- Respiratory noise and dysfunction: e.g. roaring or stridor.
- Exercise intolerance.
- Horner's syndrome: unilateral ptosis, miosis, enophthalmos, and sweating.
- Head shaking or facial nerve paralysis.
- Vestibular signs: head tilt, ataxia, nystagmus.
- Coughing
- Swelling or pain in the parotid region or upper neck.
- Resistance to bit or bridle contact.
- History of head trauma or recent strangles outbreak.

Early identification of guttural pouch disease can significantly reduce complications such as permanent nerve damage or fatal haemorrhage.

## Diagnostic methods

A stepwise diagnostic approach is advised, escalating as clinical signs or initial findings dictate.

## Initial assessment

- **Palpation:** external swelling or asymmetry in parotid region.
- **Endoscopy:** gold standard for direct visualisation.

## Imaging modalities

- **Ultrasound:** best for evaluating fluid or soft-tissue masses within the pouch or surrounding lymph nodes
- **Radiography:** can identify air-fluid lines, chondroids, or bony abnormalities (hyoid apparatus)
- **Computed Tomography (CT)** and **Magnetic Resonance Imaging (MRI):**
  - Provide detailed cross-sectional views
  - Useful in cases of trauma, mycosis, neoplasia, or surgical planning.

## Endoscopic examination technique

Endoscopic evaluation is performed on standing horses, ideally in stocks. Sedation (e.g. detomidine or xylazine in combination with butorphanol or methadone) facilitates the procedure, but some horses will tolerate this well without sedation and a nose twitch applied. Topical local anaesthesia (gel or direct application of 10-20mL 2% mepivacaine or lidocaine via scope or nasal catheter) can be applied to the ventral meatus and nasopharynx to improve tolerance and comfort of the patient. Having one person passing the scope, and another driving the scope and the biopsy instrument improves ease of scope passage into the guttural pouches.

### Steps

1. Insert a 1.3m flexible endoscope via the ventral nasal meatus into the nasopharynx.
2. Identify and assess the pharyngeal orifice of each guttural pouch, located on the left and right dorsolateral wall of the nasopharynx.
3. Examine for:
   - Nasopharyngeal opening – discharge (clear, purulent, or haemorrhagic) or deformity of the cartilage flap of the opening.
   - Dorsal compression of the nasopharynx – the floors of the guttural pouches are directly above the dorsal wall of the nasopharynx therefore fluid or air accumulation or enlarged retropharyngeal lymph nodes result in compression of the nasopharynx on the affected side/s.
   - Bruising of the dorsal or lateral nasopharyngeal walls – trauma such as rectus capitus/longus capitus muscle rupture, fracture of basisphenoid bone or stylohyoid bone.
4. A biopsy instrument or similar semi-rigid device is fed through the biopsy channel of the scope. A Chamber's catheter can also be introduced up contralateral nostril to elevate or adduct the cartilage flap of the guttural pouch opening to facilitate passage of the scope into the pouch.
5. Position the scope rostral to the cartilaginous flap and adjacent to the ipsilateral nasopharyngeal wall of the nostril that the scope was introduced. The biopsy instrument is then fed along the wall of the nasopharynx under the cartilage flap and into the pouch. The guttural pouch entrance runs rostral to caudal and slightly dorsally from the entrance through the canal to the pouch. The canal is also funnel shaped, and narrows caudally. For these reasons it helps to introduce the biopsy instrument in the dorsal aspect of the flap, or 'look up' dorsally with the scope as it enters.
6. Once the biopsy instrument is through the canal, the scope can follow. The biopsy cannel on most scopes is eccentric, therefore rotation of the scope as it goes under the flap is sometimes required to prevent one edge of the scope 'catching' on the cartilage flap. Determining which way to rotate is obvious when visualising, one direction will move the scope away from the entrance and close the flap, the other way will roll the biopsy instrument axially to adduct the flap and allow passage of the scope without catching. Once the scope is in the canal visualisation of following the biopsy instrument allows seamless entry into the pouch. The biopsy instrument should be withdrawn once in the pouch to avoid inadvertent iatrogenic trauma to the structures within the pouches.

7. When entering the right side, because of the eccentrically located biopsy channel, the driver and passer need to turn the scope upside down so the biopsy instrument can run along the nasopharyngeal wall under the flap, and this avoids the scope catching on the edge of the cartilage flap.

## Anatomical structures of clinical relevance

### Medial compartment

- Cranial nerves IX, X, XI, XII course ventrolaterally:
  - IX (Glossopharyngeal): lateral to internal carotid artery, and it's pharyngeal branch runs rostrally across the ventral aspect of stylohyoid bone.
  - X (Vagus): courses adjacent to internal carotid artery, and gives off the pharyngeal branch, seen coursing rostroventrally to wall of dorsal pharynx.
  - XI (Accessory): obscured by internal carotid artery.
  - XII (Hypoglossal): lateral to internal carotid artery.
- Internal carotid artery: enters pouch ventrally and courses dorsally within the pouch, adjacent to CN IX–X.

### Lateral compartment

- External carotid artery and its maxillary branch.
- Maxillary vein lateral to and slightly deep to external carotid artery.
- Digastric muscle: visible on ventrolateral wall.

### Temoporohyoid joint

- Cranial nerves VII and VIII exit cranium at articulation of stylohyoid bone and petrous temporal bone but do not enter the pouches.
- Associated with otitis media/interna causing temporohyoid osteopathy.

## Common diseases of the guttural pouches

### Empyema

- Usually secondary to *Streptococcus spp* following respiratory tract infection.
- Characterised by accumulation of pus or chondroids (inspissated exudate).
- Mucopurulent nasal discharge and swelling in the parotid region.
- May cause pharyngeal compression or dysphagia.

### Tympany

- Typically affects foals up to one year of age.
- Air becomes trapped in one or both pouches due to neuromuscular dysfunction of adduction of the opening to the pouches or a one-way valve effect trapping air in the pouches.
- Clinical signs include throat swelling, respiratory distress, and dysphagia.

### Mycosis

- Most commonly caused by *Aspergillus* spp.
- Fungal plaques causing erosion of the internal carotid artery, external carotid artery or maxillary artery cause epistaxis which can be severe.
- Plaques can be isolated over vessels or extensive within pouch affecting other structures and erosion of the septum of the guttural pouches can cause bilateral disease.
- Clinical signs relate to the structures involved but most commonly epistaxis with blood observed from the affected guttural pouch opening. Other signs include mucopurulent nasal discharge, cranial nerve deficits causing dysphagia, Horner's syndrome, or parotid pain/swelling and head shaking.

### Otitis media/interna

- Can result in vestibular disease, facial nerve paralysis, headshaking and pain at base of ear palpation.
- Endoscopy of guttural pouch allows visualisation of temporohyoid articulation (petrous temporal and stylohyoid bone) can develop osseous proliferation secondary to otitis media/interna.
- Osseous proliferation impinges on the cranial nerves VII and VIII causing the clinical signs.

### Trauma

- Fracture of the stylohyoid bone or basisphenoid bone fracture (avulsion fracture of longus capitus muscle), and rectus capitus muscle rupture can also cause guttural pouch haemorrhage or pharyngeal wall bruising.
- May present as pharyngeal bruising, neurologic deficits, or ataxia.
- History of head trauma or a fall.

### Neoplasia

- Rare, but includes squamous cell carcinoma and lymphosarcoma.
- May cause persistent swelling, discharge, or cranial nerve dysfunction.

## Clinical implications

Diseases of the guttural pouch can cause multiple clinical presentations, some of which can be permanent or life threatening due to involvement of nerves, vessels, and adjacent structures. Potential complications include:

- Dysphagia and aspiration pneumonia.
- Upper airway obstruction or collapse.
- Severe haemorrhage due to vessel erosion (especially internal carotid artery).
- Permanent cranial nerve damage IX–XII, and VII and VIII.

## Summary

The guttural pouches are complex anatomical structures that play a pivotal role in equine head and neck pathology. A sound understanding of their anatomy and diagnostic technique is essential for equine practitioners. Endoscopy remains the cornerstone of evaluation, guiding further diagnostics and treatment planning. Recognition of clinical signs and anatomical involvement is critical for effective case management and surgical intervention when indicated.

## References

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