

Large Animal VETERINARY Rounds™

MARCH 2004
Volume 4, Issue 3

AS PRESENTED IN THE ROUNDS OF THE DEPARTMENT OF LARGE ANIMAL CLINICAL SCIENCES
OF THE WESTERN COLLEGE OF VETERINARY MEDICINE, UNIVERSITY OF SASKATCHEWAN

Dysphagia in horses

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Dysphagia is a relatively common disorder encountered by equine practitioners. It can be congenital or acquired, the main problem or part of a multi-systemic condition, and it may be associated with muscular or neurological diseases. The diagnosis of dysphagia can be challenging and proper management is important.

This issue of *Large Animal Veterinary Rounds* covers the definition, etiological classification, pathophysiology, clinical signs, diagnosis, management, and treatment of dysphagia in horses. Special reference is given to esophageal obstruction (choke) in adult horses.

Definition

The origin of "dysphagia", as a word, is from the Greek *dys* (disordered, painful, or difficult) and *phagein* (to eat).^{1,2} Equine clinicians usually use dysphagia to describe a set of clinical signs rather than a mechanism or a location of the problem.¹ Dysphagia has several, slightly different definitions in the veterinary literature. Some define it as "difficulty in, or the inability to, swallow;"³⁻⁶ others as "difficulty in eating;" while some clinicians use both definitions.⁷ It is also important to note that it is the inability and not the unwillingness to eat.⁷ The definition of dysphagia used in this article is "difficulty in prehension, mastication, or swallowing."^{8,9}

Pathophysiology

Prehension

Horses with prehension problems are usually able to swallow, but unable to grasp feed and move it aborally.^{1,4,7} Clinical signs of dysphagia associated with a problem in prehension include drooling of saliva, feed dropping from the mouth, attempts at prehension by grasping the feed with the teeth and tossing the head to try to move the feed to the oral cavity, and submerging the nose to the level of the pharynx when drinking.^{1,7} Loss of sensation of the lip, droopy lip, or accumulation of feed in the buccal cavity may also occur if there is dysfunction of cranial nerves V and VII.^{7,10}

The lips have a major role in prehension. They are well-innervated, highly vascular, and move constantly, and they are able to grasp the feed, which is then severed by the incisors.⁷ They have sensory innervation from the trigeminal nerve (V) and motor innervation from the buccal branch of the facial nerve (VII).^{7,10} The cerebral cortex and basal nuclei control the voluntary effort of prehension centrally.⁷ Therefore, the inability to prehend feed may be associated with lips, incisors, jaw, buccal muscles, central or peripheral nervous system lesions (Table 1).^{4,7,8,11}

Mastication

Signs of dysphagia due to abnormal mastication include prehension with no attempts to chew, refusal to open the mouth, excessive salivation, and sometimes a fetid odour to the breath.^{1,5,7} The horse is interested in feed when offered, takes it to the mouth, but hesitates and allows the feed to fall.^{5,7}

Premolars, molars, and the muscles of mastication are required for mastication,⁷ and the muscles of mastication are innervated by cranial nerves V and VII.^{7,10} The buccinator muscle prevents feed from accumulating in the buccal pouches and the salivary glands produce saliva for softening the feed and initial digestion.⁷ Saliva is produced in response to rhythmic mandibular motion.⁷

Dysphagia due to a problem in mastication is usually related to an abnormality in the teeth (most commonly), tongue, jaws, or temporomandibular joint (Table 2).^{1,4,7,10} Pain, neurological or muscular



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The Canadian Veterinary Medical Association recognizes the educational value of this publication and provides support to the WCVM for its distribution.

Table 1: Conditions associated with difficulty in prehension

Condition	Other possible signs
Trauma of the lips or buccal muscles <ul style="list-style-type: none">• laceration or ulceration	History of trauma, traumatized skin
Inflammation of the lips or buccal muscles <ul style="list-style-type: none">• Photosensitization (Figure 1)• Snake bite	Limited to the white areas in the body Systemic signs, depending on the species, weakness, syncope, nervous signs, respiratory distress
Teeth or jaw disorders <ul style="list-style-type: none">• Fractured or loose incisors,• Malocclusion or loss of muscle control• Congenital defects: brachygnathia (parrot mouth) or prognathia, deviated maxilla, supernumerary incisor	
Central nervous system damage <ul style="list-style-type: none">• Yellow star thistle poisoning• Russian knapweed poisoning	Facial expression shows characteristic grimace
Peripheral nervous system <ul style="list-style-type: none">• Direct or indirect nerve dysfunction secondary to trauma	Evidence of trauma or inflammation

Figure 1: Photosensitization causing severe inflammation of the lips



deficits that inhibit normal occlusion and grinding movements of the mandibular and maxillary teeth can cause difficulties in mastication.^{1,7,8,10}

Deglutition (act of swallowing)

In most cases with an inability to swallow, the condition progresses gradually over hours or days.⁷ At the beginning, the horse may try to eat or drink,⁷ but restlessness, gagging, paroxysms of coughing, saliva and feed falling from the mouth, and nasal reflux of saliva, ingesta, or feed can be seen.^{3,4,7,11,12} Feed can become impacted in the pharynx and can sometimes cause stridor; in chronic cases, oral fetor and weight loss can be observed.⁷

Swallowing is divided into oral, pharyngeal, and esophageal stages. It is initiated when material is delivered to the pharynx.^{7,12} The feed bolus forms in the oropharynx and is moved by the tongue through the pharynx; respiration is suspended, the soft palate is elevated, sealing off the nasopharynx,

and the epiglottis apex retroverts.^{7,12} The combined process protects the larynx and the lower airways. The caudal musculature of the pharynx contracts rostral to the bolus and the upper esophageal sphincter relaxes to receive the bolus and then contracts rostral to it, to prevent the bolus from returning to the pharynx.^{7,12} In the esophageal phase of swallowing, the passage of the bolus to the proximal part of the esophagus initiates primary peristaltic waves.¹² These primary peristaltic movements carry the bolus to the cardia.

The tongue is suspended on the hyoid apparatus and innervated by the hypoglossal nerve (XII).^{10,12} The larynx and pharynx are primarily controlled by the nucleus ambiguus and solitarius, in the caudal brain stem, through the glossopharyngeal (IX), vagus (X), and accessory (XI) nerves.^{7,10} Inability to swallow is caused mainly by neurological, mechanical, or iatrogenic conditions (Table 3).^{3,5-7,10-17}

Clinical evaluation and diagnosis

Taking a complete and accurate history is important.^{5,7} A systematic clinical examination of the horse, particularly of the head, oral cavity, and throatlatch area, should be performed.⁷ The pharynx, larynx, and esophagus along the course of the neck should be palpated.⁵ Nasal discharge caused by dysphagia is usually bilateral and contains saliva and feed.⁵ Foul-smelling nasal discharge indicates long-standing dysphagia, the presence of necrotic tissue, or aspiration pneumonia.^{5,7} Following a close examination, the horse should be offered feed and observed while eating.⁷ Based on this information, the clinician should try to attribute the dysphagia to difficulty in prehension, mastication, or swallowing.⁷ Inserting a nasogastric tube is helpful for detecting physical obstructions. A general neurological examination including examination of the cranial nerves, especially cranial nerves V, VII, IX, X, and XII, should be performed.⁷

Endoscopic examination is useful in dysphagia attributed to a difficulty in swallowing.⁷ The pharynx, epiglottis, soft palate, guttural pouches, and esophagus can be evaluated.⁷ Pharyngeal paralysis with subsequent permanent displacement of the soft palate can be observed when swallowing is stimulated by flushing water through the endoscope into the nasopharynx.⁵ Sometimes normal horses are reluctant to swallow and it is not uncommon to find the soft palate displaced; however, in pathologic soft palate displacement there is usually feed material on the soft palate, around the larynx, and in the trachea.⁵ In cases of rostral displacement of the soft palate, the palatopharyngeal arch is usually seen rostral to the corniculate processes of the arytenoid cartilages and sometimes the cranial esophagus can be visualized.⁵

The opening of the guttural pouches can be observed and any discharge detected. In guttural pouch mycosis, there are usually fungal plaques in the pouches and sometimes blood. Mucopurulent materials (pus) or chondroids (dried pus) are usually visualized in cases of empyema. Abnormal temporohyoid joint or stylohyoid bone (Figure 3) can also be visualized during examination of the guttural pouches.

Radiographic examination of the head, throatlatch, and the course of the esophagus (cervical and thoracic) is helpful and informative in some types of dysphagia. Teeth or bone fractures,

Table 2: Conditions associated with difficulty in mastication

Condition	Other possible signs
Teeth or jaw disorders <ul style="list-style-type: none">• Fractured teeth or jaw• Tooth root abscess• Sharp teeth points and hooks	External skin swelling over the affected area of the jaw Sinusitis Laceration of the tongue and buccal mucosa
Temporomandibular joint disorders <ul style="list-style-type: none">• inflammation	Joint is swollen and painful
Mastication muscles disorders <ul style="list-style-type: none">• Atrophy – cauda equine neuritis• Spasm – tetanus (Figure 2)• Atrophy or inflammation	Decreased anal or tail tone, bladder paresis Generalized stiff gait, prolapsed third eyelid
Tongue disorders <ul style="list-style-type: none">• Inflammation (mycotic or bacterial)• Foreign body	
Stomatitis <ul style="list-style-type: none">• Rough feed or plant awns (fox tail)• Drug toxicity (eg, NSAID)• Viral ex vesicular stomatitis• Foreign body	Signs of colitis
Neurological or muscular deficits <ul style="list-style-type: none">• inhibit normal occlusion and grinding	

NSAID = non-steroidal anti-inflammatory drug

Figure 2: Spasm of the mastication muscles caused by tetanus



or abnormal joints may be detected by radiology. Dorsal and rostral displacements of the soft palate, the position of the epiglottis, presence of a subepiglottic cyst, guttural pouch, and other soft tissues abnormalities (eg, retropharyngeal mass) can also be evaluated. Guttural pouch tympany and empyema can be easily diagnosed. If there is excessive swelling of the soft tissues, a barium contrast study can be used to outline the anatomy of the area of interest.⁷ In the case of pharyngeal paralysis, barium usually leaks into the nasopharynx, larynx, and trachea.⁵ In palatal defects in foals, barium usually leaks from the oropharynx into the nasopharynx through the defect.⁵

A complete blood count can be helpful in identifying an inflammatory condition (eg, retropharyngeal abscessation) and in assessing anemia, a potential sequela of guttural pouch mycosis.⁵ The most common complication of dysphagia in horses is aspiration pneumonia; in such cases, bacterial culture and sensitivity of a tracheal wash can be useful in treatment. Dysphagic horses lose saliva, which is high in chloride and low in bicarbonates and, as a result, may suffer from metabolic alkalosis that can be detected by measuring serum bicarbonate concentrations or by performing a blood gas analysis.⁸

Table 3: Conditions associated with difficulties in swallowing

Condition	Other possible signs
Neurological disorders	
Central <ul style="list-style-type: none">• Rabies• Viral encephalitides• Moldy corn poisoning• Brain abscess• Botulism	Abnormal behaviour and vocalization, ataxia, progressive paralysis Depression, ataxia Progressive symmetrical, diffuse muscular weakness
Peripheral <ul style="list-style-type: none">• Chronic lead poisoning• Guttural pouch mycosis• Guttural pouch empyema• Fractured stylohyoid or temporal bones	Weight loss, proprioceptive deficits, laryngeal paralysis, or anemia Epistaxis, head tilt, anemia, soft palate displacement Purulent nasal discharge, history of strangles History of head-shaking, head tilt, facial asymmetry, sequela to otitis media /interna or trauma
Rupture of the rectus capitis ventralis muscle	
Mechanical disorders	
Space-occupying lesion <ul style="list-style-type: none">• Neoplasia (squamous cell carcinoma)• Retropharyngeal lymph node enlargement• Distended guttural pouches	
Congenital defects <ul style="list-style-type: none">• Sub-epiglottic or pharyngeal cyst• Cleft palate• Fourth branchial arch defect	Milk regurgitates from the nose Air swallowing, permanent opening of the esophageal sphincter
Inflammatory reaction of the pharynx <ul style="list-style-type: none">• Rostral displacement of the soft palate• choke	Breathing from the mouth
Iatrogenic disorders <ul style="list-style-type: none">• Balling gun injury• Nasogastric tube injury• Excessive surgical resection of the soft palate to correct dorsal displacement	History of surgery

Treatment and prognosis of dysphagia is highly variable and depends on the inciting cause. Treatment can be medical, surgical, through management, or in some instances, no treatment is applicable.

Esophageal obstruction (choke)

Choke is defined as the inability to move ingesta to the stomach due to partial or complete obstruction of the esophagus lumen.¹¹ Choke is the most common esophageal disorder seen in horses;^{8,18,19} it can be partial or complete and either primary (simple choke) or secondary to other disease processes.^{8,11,19}

Primary choke

Primary choke is usually caused by feed, particularly leafy alfalfa, coarse grass, hay, grass, improperly soaked sugar beet, or foreign bodies (eg, stones, bedding, medicinal boluses, carrot, apple, corncobs, potato, wood fragments).^{8,19} Other predisposing factors are dental abnormalities causing poor mastication, previous trauma to the esophagus, and gulping or wolfing of rough-

Figure 3: Thickened temporohyoid joint detected by endoscopic examination of the guttural pouch

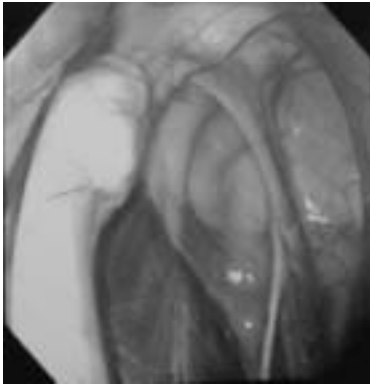
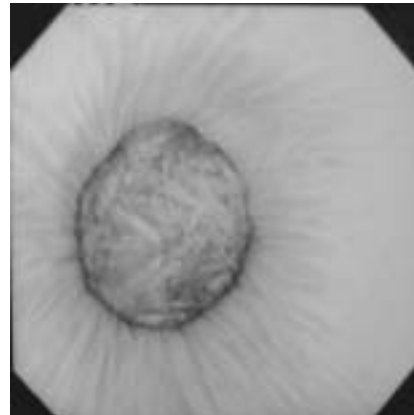


Figure 5: Endoscopic view of an esophagus obstructed by feed material



age.^{8,20,21} Choke is more common in old horses.²⁰ There are 4 anatomical areas of narrowing where primary choke usually occurs;^{7,8,11} these are the postpharyngeal area, thoracic inlet, base of the heart, and the cardia of the stomach (terminal esophagus; Figure 4).

Clinical signs: Clinical signs depend on the location, nature, duration, and extent of the obstruction.¹⁹ They are usually acute in nature and include anxiety, standing with the head and neck extended, gagging or retching, painful repeated attempts at swallowing, bilateral frothy nasal discharge containing feed material and saliva, and coughing and drooling of saliva.^{8,19} Other clinical signs of choke include dehydration, signs of electrolyte and acid-base disturbance, weight loss, aspiration pneumonia, halitosis, fever, and other respiratory signs. The esophagus may rupture resulting in cellulitis or crepitus. There may be a palpable or visible mass on the left lateroventral aspect of the neck if the obstruction is in the cervical area of the esophagus or the obstruction leads to feed accumulation in the cervical esophagus.^{8,19}

Diagnosis: Diagnosis of primary choke is based on a history of unsuitable feed, physical examination findings, attempts to pass a nasogastric tube, ultrasonography,

endoscopy, or radiography. A thorough physical examination should be performed including auscultation of the lungs with a rebreathing bag to check for possible secondary aspiration pneumonia or pleural effusion due to rupture of the thoracic esophagus.^{8,19} A nasogastric tube should be passed gently and no force applied if hindrance is encountered. This is helpful in determining the site of the obstruction, but of little value in determining the nature of the obstruction.^{8,19} Ultrasonographic examination is helpful in cases of obstruction of the cervical esophagus; particularly, in evaluating the wall of the esophagus and helping to confirm obstruction of the esophagus and its nature.⁸ Endoscopic examination of the esophagus is very helpful (Figure 5). A 1- to 2-meter scope should be used; the required length depends on the site of obstruction and the size of the horse. In large horses, even a 2-meter scope may not reach the cardia of the stomach.^{5,8} Endoscopy can also be used to retrieve foreign bodies. Endoscopy can be performed following resolution of the choke to determine if ulceration, perforation, masses, or strictures are present; this information is prognostically useful.⁸ Radiological examination can be very helpful in the diagnosis of choke. The cervical and thoracic esophagus can be viewed by portable equipment, but high powered equipment and a grid are required to view the esophagus at the level of the shoulder and thoracic inlet.⁵ Plain films may be helpful, but in most cases of esophageal obstruction contrast radiography is more informative (Figure 6).⁵ Contrast (60 mL or more of barium sulphate) can be administered orally and the horse given time to swallow.⁵ In cases of esophageal obstruction in the mid-cervical area or distally, a larger volume of contrast (100 mL to 1 L of barium sulphate with warm water) can be administered using a nasogastric tube passed into the cranial esophagus. Serial radiographs are then taken until the obstruction site is identified.⁵

Treatment, management, prognosis, and complications: Esophageal obstruction is an emergency and should be dealt with as soon as possible. Most cases of esophageal

Figure 4: The four common sites of primary choke correspond to areas of anatomical narrowing; 1- post pharyngeal area, 2- thoracic inlet, 3- the base of the heart, 4- the cardia of the stomach

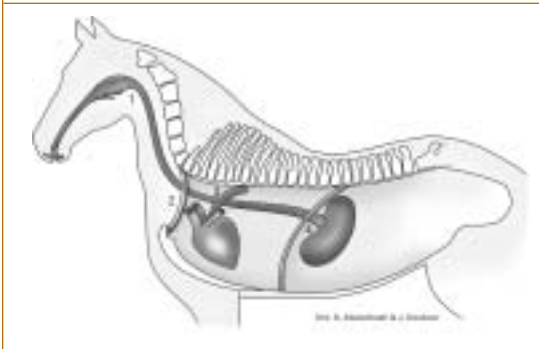


Figure 6: Contrast radiography of the esophagus in a case of esophageal obstruction



obstruction resolve either spontaneously or with medical management. The main treatment goals are sedation to reduce anxiety, esophageal muscle relaxation to reduce esophageal spasm and allow the passage of the impacted materials, analgesics to reduce pain, anti-inflammatory agents to reduce inflammation of the esophagus, correction of dehydration and acid base imbalances (especially important in chronic cases), and prevention or early detection and treatment of aspiration pneumonia.¹⁹

When the history and clinical signs are suggestive of choke, the owner should be asked to withhold feed and water until the horse is examined by a veterinarian. If the choke has a duration of <4 hours, the horse should be tranquilized using xylazine (0.25–0.5 mg/kg, IV) and acepromazine (0.05 mg/kg, IV). Oxytocin (0.11–0.22 IU/kg, IM) has been found to reduce the tone of esophageal musculature and used successfully to resolve uncomplicated choke in nonpregnant horses.^{20–22} Oxytocin treatment seems to be more successful if the obstruction is in the proximal two-thirds of the esophagus.^{20,21} If the choke does not resolve, a large bore nasogastric tube can be passed and advanced to the bolus, air blown in and the tube gently pushed, while gentle external massage is performed if the obstruction can be identified externally.^{7,8} If the previous steps are unsuccessful, esophageal lavage can be performed under general anesthesia or under profound sedation in the standing horse, in order to keep the head low and prevent aspiration.^{7,8} Warm water is pumped gently using a stomach pump through a cuffed or uncuffed tube into the esophagus cranial to the obstruction, while the tube is gently manipulated against the obstruction.⁸ The returning water and impacted material often comes out of the nose or mouth of the horse and should be examined to determine the causal nature of the impaction.¹⁹ In a long-standing obstruction where esophageal pain and spasm are present, 30–60 mL of lidocaine 1% or a mixture of 15 mL of lidocaine 2%, 15 mL of 5% diocetyl sodium sulfosuccinate (DSS), and 30 mL of water can be deposited on top of the obstruction using a

stomach tube and left for 15 to 30 minutes.^{7,8} This will further relieve pain, wet the obstructing materials, and make lavage more successful.^{7,8} A few clinicians use 2 nasogastric tubes passed into the esophagus, one in each nostril for ingress and egress of the lavage fluids.⁸ If standing lavage is unsuccessful, the horse may be anesthetized with a general anesthetic to further reduce the risk of aspiration, produce better relaxation of the esophagus, and enable the use of larger volumes of water for lavage.^{7,8,19} After induction, a cuffed endotracheal tube is passed into the trachea and the horse is positioned in right lateral recumbency with the head and neck lower than the level of the thoracic inlet. A nasogastric tube is passed through the nose or the mouth into the esophagus and lavage performed.¹⁹ Once the impaction is cleared, the remaining materials should be flushed into the stomach and the nasogastric tube should pass to the stomach easily.¹⁹ The endotracheal tube is often removed with the cuff inflated.

In a few cases, medical management is unsuccessful and surgical removal is warranted. There are many potential complications of esophagotomy; therefore, it is considered as the last resort. The esophagus lacks serosa and it is usually difficult for the sutures to hold.⁷ Complications of surgical intervention include dehiscence, infection, and stricture formation.^{7,8,19} In refractory cases, intravenous administration of isotonic fluid, 50–100 mL/kg/day, may be warranted to correct dehydration and acid base imbalances created by salivary losses of chloride, sodium, and potassium.⁸

Complications of choke include esophageal ulceration, stricture, perforation, aspiration pneumonia, megaesophagus, and reobstruction.^{7,8,18,19} The lungs should be carefully examined for evidence of aspiration pneumonia, even in cases that resolve spontaneously; tracheal wash cytology and culture may be helpful.^{7,8,19} If pneumonia is present or suspected, the horse should be given broad-spectrum antibiotics, including metronidazole for anaerobes.⁸ Esophageal endoscopy and ultrasonography can be performed after choke has been resolved to detect complications.⁸ If esophageal ulceration or dilatation is found, the esophagus should be re-evaluated every 2–4 weeks.⁸ Recurrence or reobstruction occurs in as many as 37% of the cases.¹⁸ Reobstruction is more likely if esophageal dilatation, mucosal injury, or esophagitis secondary to the initial esophageal obstruction exist.⁸ The recurrence rate is particularly high for the first 24 to 48 hours, therefore, feed should be withheld during that time.⁸ After 48 hours, soft food (moistened pellets and bran mashes) can be fed for about 7 days.⁸ The horse can then be gradually returned to a high-quality diet over 7 to 21 days. Prognosis for survival is 78%, but some horses may require permanent dietary modification.¹⁸

Secondary choke

Choke secondary to other diseases is caused by intraluminal or extraluminal abnormalities that mechanically impede feed passage.^{8,19} Intraluminal abnormalities include esophageal stricture, diverticula, cysts, and tumours.

Mediastinal and cervical masses (tumour or abscess), and vascular ring anomalies may cause extraluminal obstruction by impinging on the esophagus.^{5,8,19}

The diagnostic work-up is similar to primary choke. Treatment, management, and prognosis depend on the primary conditions.

Summary

Dysphagia is a relatively common problem that should be considered an emergency. It is usually mechanical or functional in origin and the diagnosis and treatment can be challenging. Early detection of aspiration pneumonia and prevention of reobstruction through dietary management are important parts of successful treatment.

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This publication is made possible by an educational grant from

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