

## Non-surgical Treatment of Guttural Pouch Empyema with Presence of Chondroids in a Filly

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### ABSTRACT

**Background:** Guttural pouch empyema in horses is a disease described by the accumulation of purulent/mucopurulent exudate, which with chronification of the disease can become chondroids, affecting horses of any age and not presenting breed predisposition. The main cause of empyema is upper respiratory infection, associated or not with failure in the defense mechanisms, as well as drainage to the guttural pouch of retropharyngeal lymph node abscesses; the main pathogen related to this condition is *Streptococcus equi*. This paper aims to describes a case of a filly that presented a mucopurulent nasal discharge, five months of evolution, and irresponsive to antibiotic therapy.

**Case:** A 2.5-year-old quarter filly was referred to the veterinary hospital presenting a 5 months evolution mucopurulent nasal discharge, irresponsive to gentamicin and ceftiofur, and later doxycycline, acetylcysteine and clenbuterol that were instituted on the farm. Throw the endoscopic examination of the upper respiratory tract, was observed the presence of mucopurulent content and chondroids inside the right guttural pouch. This material was collected and sent for culture and antibiogram tests. *Streptococcus equi* was isolated, and was only sensitive to ceftiofur. The treatment included the guttural pouches flushes with warm saline solution (0.9%) associated with Lauryl Diethylene Glycol Ether Sulfate Sodium (28%) and acetylcysteine (10%). In addition to topical treatment, 5 mg/kg of ceftiofur was administered intramuscularly daily for 7 days. After 10 flushes of the guttural pouch, was observed a total absence of chondroid and mucopurulent contents.

**Discussion:** The treatment of the guttural pouch empyema can be performed either by conservative methods or by the surgical drainage. Among the benefits of the conservative treatment are the absence of the risks related to the surgical procedure and the possibility of doing the treatment without a surgical facility. On the other hand, it usually presents a longer time to the remission of the clinical signs compared with the surgical drainage, since the mucopurulent content and the chondroids have to be disassembled and dissolved before being able to be drained from the guttural pouch. Even though, the conservative treatment is effective to a large number of cases, and with the utilization of agents to dissolve the chondroids can be performed with success in cases with a large number and size of chondroids. The surgical treatment is considered the gold standard in chronic cases, due to the difficult of removal of the chondroids with the conservative methods. The main complications related with the method are the iatrogenic lesions to noble structures present inside the guttural pouches, as cranial nerves and arteries. The decision of the treatment, surgical or conservative, must consider the risks to the patient, the facilities, and the costs of the procedure. The present study demonstrates that agents as lauryl-diethylene-glycol-ether sodium sulfate (28%) and acetyl cysteine can be effective as diluents for thick secretions and organic contents, and for that reason, increase the success of the conservative treatment of guttural pouch empyema. Consequently, improving the outcome and the rate of remission in cases of guttural pouch empyema that have a large number of chondroids, and are located remotely from referring veterinary hospitals or that cannot afford the surgical procedure.

**Keywords:** acetyl cysteine, chondroids, equine.

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## INTRODUCTION

The integrity of guttural pouch is of great importance because this structure contains a large number of blood vessels and nerves [3,7,10]. Besides, it is intended that guttural pouch has an active role in brain cooling [2].

Guttural pouch empyema is determined by the presence of mucopurulent exudate with or without chondroids [6,7,10,11]. This condition occurs due to infection of the upper respiratory system, being the *Streptococcus equi* the main etiologic agent responsible for this disorder. Although, guttural pouch contamination may occur due to other bacteria, or through drainage of abscesses at the retropharyngeal lymph node to the guttural pouches [4,5,10]. In addition, the process of inspiration of the purulent exudate results in the formation of oval masses, with a thickened consistency, called chondroids [1,10].

The empyema non-surgical treatment can be performed by flushing the guttural pouch with rinsing solutions, such as 0.9% sodium chloride solution. This procedure can benefit from the addition of acetyl cysteine (10%), which breaks the disulfide bonds of the mucoproteins; allied with lauryl-diethylene-glycol-ether sodium sulfate (28%) and the physical maceration of the chondroids using the biopsy forceps of the endoscope. This therapeutic alternative is recommended since it presents a lower risk to the animal compared to the surgical approach, and presents a lower cost to the owner [10,11].

This paper aims to report the non-surgical treatment of a guttural pouch empyema with the presence of chondroids, by flushing the guttural pouches with mucolytics solutions and physical maceration of the chondroids with the biopsy forceps of the endoscope.

## CASE

A 2.5-year-old Quarter Horse filly was referred to the veterinary hospital presenting nasal mucopurulent exudate, predominantly in the right nostril when resting; occasionally during exercise it would be bilateral. The filly did not present respiratory distress.

The inflammatory process had been present for approximately 5 months before admission to the hospital. During this period, the treatment was performed using clenbuterol and acetyl cysteine, as well as antibiotic therapy using ceftiofur, gentamicin, and doxycycline (manufacturers and doses not informed by the horse's owner).

Upon arrival at the hospital, the filly had a normal physical evaluation, complete blood count, and fibrinogen levels. In the endoscopic evaluation, with the animal under xylazine sedation (Equisedan® 0.5 mg/kg)<sup>1</sup>, the presence of mucopurulent content in the right guttural pouch was revealed. Next, samples for bacterial culture and antibiogram and cytology were collected.

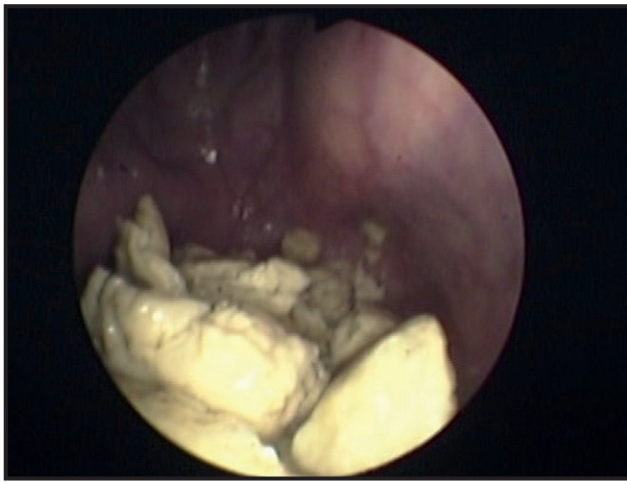
From the sample sent for bacterial culture, a strain of *Streptococcus equi* was identified, sensitive only to ceftiofur; 8 different antimicrobial agents were tested, including rifampicin, penicillin G, florfenicol, erythromycin, enrofloxacin, clarithromycin, azithromycin, and amoxicillin with clavulanic acid. During the cytology exam, the content presented abundant granular basophilic material and a small number of hypersegmented and degenerated neutrophils.

Considering the physical and laboratorial exams and the endoscopic evaluation, treatment with ceftiofur (Microflud CEF® 5 mg/kg)<sup>2</sup> was performed. After 7 days of antibiotic therapy, the endoscopic evaluation was repeated. Due to the presence of mucopurulent content, the guttural pouches were flushed with warm saline solution (0.9%), revealing, after removal of the content, the existence of chondroids.

Due to the presence of chondroids, lavage of the guttural pouches was performed every three days, with the filly under sedation, and with the assistance of the endoscope. Each lavage used approximately 4 L of warm saline solution (0.9%) associated with 60 mL of lauryl-diethylene-glycol-ether sodium sulfate 28% (Tergenvet®)<sup>3</sup>, and after the lavage, 30 mL of acetyl cysteine<sup>4</sup> were infused in the guttural pouches. During each procedure, the chondroids were macerated using the biopsy forceps of the endoscope.

During the treatment, a change in the characteristics of the content was noted. At the beginning, the chondroids presented a regular surface (Figure 1), while later, at an advanced phase of the treatment, they were smaller in size and number, and presented an irregular surface (Figure 2). Complete resolution of the process occurred after 10 lavage procedures, when chondroids and mucopurulent content were no longer present (Figure 3).

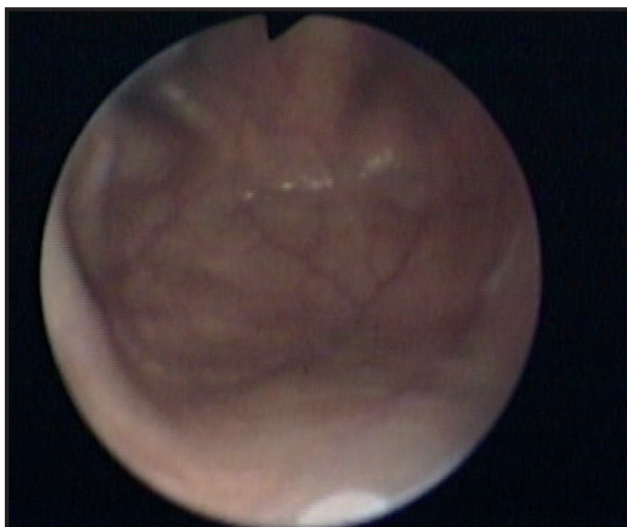
The complete resolution of the case was determined by a new evaluation 30 days after discharge. At this moment, the owner did not complain of the reappearance of clinical signs, and the endoscopic evaluation revealed healthy guttural pouches.



**Figure 1.** Chondroids presented a regular surface, at the beginning of the treatment.



**Figure 2.** Chondroids with smaller sizes and numbers, at an advanced phase of the treatment.



**Figure 3.** Absence of chondroids in the guttural pouch, after 10 lavage procedures.

The present case demonstrated that non-surgical treatment of guttural pouch empyema could be effective even in cases with a high number of chondroids, since these are macerated and mucolytic agents are used in the lavage procedures.

## DISCUSSION

There are divergent opinions regarding the non-surgical treatment of guttural pouch empyema. Some papers oppose the protocol established in the present case, since they indicate the low effectiveness of non-surgical treatment of guttural pouch empyema with chondroids. In addition, some authors report complications related to inflammation and rupture of the guttural pouch, originating from the accumulation of content in the guttural pouches or excessive distension during the lavage procedures [5,11].

On the topic of inflammation, there is evidence indicating that the utilization of antimicrobials and mucolytics could lead to an increase in the mucosal inflammation in the guttural pouches, as well as possibly injuring the nerves located inside the pouches, leading to complications like dysphagia [3,7,8]. Some studies also highlight complications related to the maintenance of the catheter/probe for a prolonged period of time, which includes irritation and necrosis of the guttural pouch ostia [1].

Non-surgical treatment is performed through lavage of the guttural pouches using 0.9% saline solution, antimicrobials, and mucolytic agents [10]. The lavage procedures can be performed using a Chambers' catheter, Foleys' catheter, or endoscope [5]. It is also advised that the catheter be placed with the aid of the endoscope, to ensure proper placement of the lavage system, and minimize possible injuries caused by the blind placement of the system [10].

Among the benefits of the use of antimicrobials and mucolytics during the lavage procedures are suppression of the pathogens and improvement in the drainage of the exudate and chondroids, respectively [4,8].

The endoscope can be used to macerate or remove the chondroids, by using the forceps via the work channel [5]. It is possible that maceration of the chondroids with the endoscope biopsy forceps was a significant factor in the dissolution of the chondroids and resolution of the present case.

The establishment of non-surgical treatment implies the absence of post-operative complications, such as hemorrhages, cellulitis, and dysphagia

originated through iatrogenic injury at the vagus, hypoglossal, and glossopharyngeal nerves; in addition, it also leads to lower cost to the owner, and substantially interferes with the horse's return to athletic activity [10,11]. Reports indicate the efficacy of the use of non-surgical treatment, and up to 80% success with the treatment of non-complicated guttural pouch empyema [10].

The guttural pouch lavage should be performed using 3 to 5 L of pressurized fluids to hydrate the contents, and dissolve and facilitate the movement of the chondroids [7,10]. In the present case, the lavage procedures using 4 L of warm solution contributed to the movement of the chondroids and drainage through the guttural pouch orifice.

Lauryl-diethylene-glycol-ether sodium sulfate is an anionic detergent that acts by reducing the superficial tension of the environment, which dissolves the thick exudates, improving drainage. Additionally, due to its capacity to reduce the superficial tension of the environment it could, theoretically, improve the action of other medicaments on the biofilm [9]. Zoppa *et al.* [12] utilized this product to treat animals with mucopurulent nasal exudate. The association of the use of lauryl-diethylene-glycol-ether sodium sulfate in the guttural pouch lavage in the present case may be one of the factors that improved the dissolution of the exudate and of the chondroids.

Acetyl cysteine is a mucolytic, anti-oxidant, and free radical scavenger, utilized in the treatment of the upper respiratory system, such as cystic fibrosis, asthma, and guttural pouch empyema, as well as in endometriosis [8,10]. Its main role in the treatment of cases of guttural pouch empyema is its capacity to break the disulfide bonds, reducing the viscosity of the mucus and dissolving the chondroids [8,10].

Regarding the adverse effects, Hardy and L  veill   [7], such as Perkins *et al.* [10] claim that acetyl cysteine leads to inflammation of the guttural pouch mucosa. Nevertheless, studies regarding the adverse effects of acetyl cysteine on the guttural pouch mucosa have not been performed, so all conclusions are based on clinical cases treated by the authors, and, therefore, it can be inferred that the mucosal inflammation could be a result of causes other than the acetyl cysteine.

In a controlled study with intrauterine irrigation with acetyl cysteine, small alterations were observed in the uterine mucosa, smaller than those found in the group that received irrigation with ringer lactate solution, which could indicate a possible anti-inflammatory effect of acetyl cysteine [8]. Evidence of mucosal inflammation in the present case was infrequent and discrete during the treatment.

In summary, even though the non-surgical treatment of guttural pouch empyema with the presence of chondroids is still not a well-established protocol, it can be effective, and could be applied in other cases. On the other hand, further studies are still necessary to properly establish a non-surgical treatment protocol, and, mainly, to assess the potential application of acetyl cysteine and lauryl-diethylene-glycol-ether sodium sulfate in the treatment of guttural pouch empyema.

#### MANUFACTURERS

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