

Tétano em cavalo de raça mista do Município de Jataí, Goiás: Relato de caso
Tetanus in a male mix breed horse from Jataí Municipality, Goiás: Case report
Tétanos en un caballo de raza mixta del Municipio de Jataí, Goiás: Caso clínico

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Resumo

O tétano é uma doença infecciosa causada pela toxina do *Clostridium tetani*, bactéria anaeróbica gram-positiva que acomete os animais domésticos e humanos. No dia 17 de fevereiro de 2019, foi solicitado atendimento médico veterinário em uma propriedade localizada no município de Jataí, Goiás, para atender o caso de um equino macho sem raça definida de aproximadamente 15 anos de idade, pelagem alazã e de peso 400 kg. Durante o atendimento, a queixa principal foi claudicação e prolapso de terceira pálpebra. No exame clínico o animal apresentava espasticidade, andar rígido, membros posteriores afastados, prolapso de terceira pálpebra, hiperestesia, pescoço estendido, cauda afastada do corpo, leve dispneia, sudorese intensa, narinas distendidas e orelhas eretas e imóveis. Com base no exame físico do animal, bem como os sinais clínicos apresentados, o diagnóstico final de tétano foi estabelecido e então, o tratamento foi imediatamente instituído com soro antitetânico por via intravenosa e terapia com antibióticos. Com base no exposto, este trabalho tem como objetivo relatar um caso de tétano em equino, evidenciando os principais sinais clínicos e o tratamento implementado.

Palavras-chave: *Clostridium tetani*; Clostridioses; Penicilina; Toxinas.

Abstract

Tetanus is an infectious disease caused by the toxin of *Clostridium tetani*, a gram-positive anaerobic bacterium that affect domestic animals and humans. On February 17, 2019, veterinary medical care was requested at a property located in the city of Jataí, Goiás to attend

the case of an undefined breed male horse of approximately 15 years of age, chestnut hair, weighing 400 kg. During the consultation, the main complaint was lameness and prolapse of third eyelid. At the clinical examination, the animal showed spasticity, rigid walking, distant hind limbs, third eyelid prolapse, hyperesthesia, extended neck, tail away from the body, mild dyspnea, intense sweating, distended nostrils and erect and immobile ears. Based on the physical examination of the animal, as well as the clinical signs presented, the final diagnosis of tetanus was established and therefore, the treatment was immediately instituted with intravenous anti-tetanus serum and antibiotic therapy. Hence, this paper aims to report a case of tetanus in equine, elucidating the main clinical signs and implemented treatment.

Keywords: *Clostridium tetani*; Clostridiosis; Penicillin; Toxins.

Resumen

El tétanos es una enfermedad infecciosa causada por la toxina de *Clostridium tetani*, una bacteria anaerobia grampositiva que afecta a animales domésticos y humanos. El 17 de febrero de 2019, se solicitó atención médica veterinaria en una propiedad ubicada en el municipio de Jataí, Goiás, para atender el caso de un caballo macho de raza mixta de aproximadamente 15 años de edad, pelaje castaño y peso 400 kg. Durante la atención, la queja principal fue la cojera y el prolapso del tercer párpado. En el examen clínico, el animal presentó espasticidad, marcha rígida, extremidades posteriores distantes, prolapso del tercer párpado, hiperestesia, cuello extendido, cola extraída del cuerpo, disnea leve, sudoración intensa, fosas nasales distendidas y orejas erectas e inmóviles. Con base en el examen físico del animal, así como los signos clínicos presentados, se estableció el diagnóstico final de tétanos y, luego, el tratamiento se instituyó inmediatamente con tétanos intravenoso y terapia con antibióticos. Con base en lo anterior, este estudio tiene como objetivo informar un caso de tétanos en caballos, mostrando los principales signos clínicos y el tratamiento implementado.

Palabras clave: *Clostridium tetani*; Clostridiosis; Penicilina; Toxinas.

1. Introduction

In a historical context, the motion and rhythm of the equine animal have always fascinated humankind and still continues to enchant society in recent times (Lawrence, 1998). Since then, horses have been used in many different activities, such as transportation and traction, public safety and even for the treatment of human diseases through therapeutic riding (Anderson; Meints, 2016). From an economic perspective, equine farming has been

increasing considerably, which provides an exploitation of great economic interest, involving animals of high zootechnical value and so, a large amount of money counted in billions of Brazilian currency (Almeida; Silva, 2010).

Considering the economic relevance of horses, farmers have to be aware of diseases that can affect these animals and so, be able to require animal care when needed. According to Santos *et al.* (2019), among the group of diseases that affect horses, clostridiosis are important causes of livestock losses. These authors refer to clostridiosis as several diseases caused by bacteria of the *Clostridium* genus or by their toxins. These diseases show high mortality rates, especially in developing countries where vaccination is not a usual prophylactic measure (Ribeiro *et al.*, 2018). Horses for example, show a higher susceptibility to the disease when compared to cattle and so, necessary attention has to be given to it. The same authors pointed that clostridial diseases can be divided into three major types, which are neurotoxic diseases, histotoxic diseases and enteric diseases, being the tetanus included in the neurotoxic group.

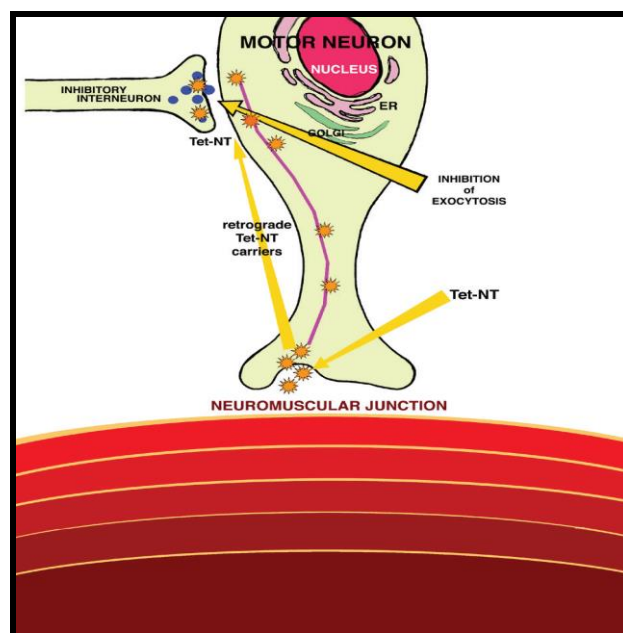
Clostridium spp. enters the body in the sporulated form, through contaminated food, wounds or by inhalation. The toxins are ingested pre-formed or produced in the animal's body. When there is a wound, as usually happens on horses' hooves, the local environment provides anaerobic conditions to the microorganism, allowing it to switch to its vegetative and infectious form, leading to toxin production (Gračner *et al.*, 2015). These toxins are: tetanolysin, tetanospasmin and a non-spasmogenic toxin (Radostits *et al.*, 2010). Tetanolysin is a hemolysin responsible for causing local tissue necrosis, favoring the multiplication and dissemination of *C. tetani* (Lobato *et al.*, 2013). Tetanospasmin is an exotoxin lipoprotein that reaches the nerve endings of the peripheral nervous system, migrates retrograde to the central nervous system and reaches the presynaptic areas of the motor plates, interfering with the release of neurotransmitters such as glycine and gamma aminobutyric acid (GABA), causing hyperexcitability (Adamantos; Boag, 2007). On the other hand, the non-spasmogenic toxin acts on the autonomic nervous system causing a hyperstimulation of the sympathetic nervous system (Avante *et al.*, 2016).

Tetanus is a non-contagious infectious disease caused by exotoxins produced by *Clostridium tetani* affecting domestic animals, wildlife and humans. This causing agent is a gram-positive spore forming anaerobic bacterium (Ribeiro *et al.*, 2018). According to Popoff (2020), *C. tetani* is a ubiquitous organism commonly found in soil sample from all parts of the world and many factors influence their presence in the soil. The soil factors are pH, temperature, moisture and organic material. Considering these factors, Ribeiro *et al.* (2018)

said that warm temperatures, humidity plus neutral pH of soil are favourable conditions to this organism what increase the prevalence of the disease in tropical countries, as Brazil. Additionally, epidemiological studies revealed a higher occurrence of tetanus in horses, especially in developing countries and places where vaccination is not a habit, with mortality rates ranging from 59% to 80% (Silva *et al.*, 2010). The vaccination point was confirmed in a study, in which among 70 animals studied, none of them had been vaccinated against tetanus (Ribeiro *et al.*, 2018).

To Santos *et al.* (2019), the outbreak occurrence is associated to poor hygiene of facilities used during animal handling that leads to the contamination of the skin and through a port of entry, causes the disease to develop. Usually, the bacteria or spores enter the organism through a perforating or cutting wound, contaminated by soil or faeces containing them. As they enter the body, a retrograde transportation occurs and the motor neuron is reached, being transferred to the inhibitory neurons in the spinal cord and brain stem where the toxin compromises the release of neurotransmitters at the synapse, resulting in spasticity (Figure 1). Therefore, to reinforce, Constable *et al.* (2016) say that the worldwide distribution of *C. tetani* and the ability to live in organic matter, make poor hygiene of facilities and utensils used in animals' handling essential facts to outbreaks onset.

Figure 1. The action of *C. tetani* toxins in the motor neuron causing spasticity through the inhibition of neurotransmitter release.



Source: Santos *et al.* (2019)

By knowing how the causing agent acts, Avante *et al.* (2016) pointed the main clinical signs seen in horses with tetanus, which include the prolapse of the third eyelid, muscle stiffness accompanied by tremor, mandibular trismus and rigid tail positioned away from the body. In addition to the mentioned clinical signs, there are erect positioning of the ears, dilation of the nostrils, as well as hyperesthesia. These clinical manifestations are correlated to the toxins produced by *C. tetani* that can cause from a tissue necrosis (tetanolysin) to spasticity (tetanospasmin). Additionally, Popoff (2020) mentioned dyspnea due to respiratory muscles compromising, sweating, eating and swallowing difficulties.

Considering the clinical signs presented by the animals, the diagnosis of tetanus can be reached, mainly by the identification of spastic paralytic signs (Popoff, 2020). Thus, for an effective treatment it is essential to eliminate the source of bacteria and toxins from the animal organism by evaluating and identifying the site of infection entry (Gračner *et al.*, 2015). Additionally, the control of muscle spasms and supportive treatment, such as hydration and nutrition are essential for an effective treatment (Avante *et al.*, 2016). According to Ribeiro *et al.* (2018), the prognosis is reserved, existing a variation according to the time of evolution and intensity of clinical signs. It is essential to maintain adequate control and prophylaxis, being immunization through first doses plus an annual vaccination schedule the most appropriated method of control, mainly in areas where there is a high incidence of the disease (Santos *et al.*, 2019). Therefore, as a manner of a better understanding of diseases that affect horses farms in tropical areas, this paper aimed to report a case of tetanus in a horse attended in a rural property located in the city of Jataí, Goiás, Brazil.

2. Case Report

On February 17, 2019, veterinary medical attention was requested at a property located in the city of Jataí, state of Goiás to attend the case of a mixed breed male horse of approximately 15 years of age with chestnut hair, weighing 400 kg. The main complaint of the owner was that the animal presented lameness and prolapse of the third eyelid.

In the anamnesis, the owner reported that approximately fifteen days ago the animal had presented claudication of the left thoracic limb. A few days later was observed the bilateral prolapse of the third eyelid and limb stiffness. The horse did not receive any type of vaccine or undergo surgical procedures. The animal has always fed, defecated and urinated normally.

During physical examination, the animal showed a heart rate (HR) of 96 beats per minute (bpm), respiratory rate (RR) of 60 movements per minute (mpm), capillary filling time (CFT) of 2 seconds, and rectal temperature (RT) of 38 ° C. The pulse was strong and regular, and intestinal motility was normal in all abdominal quadrants. Throughout the physical examination of the animal, clinical signs as spasticity, rigid gait, distant hind limbs, prolapse of the third eyelid, hyperesthesia, neck extended, tail away from the body, mild dyspnea, intense sweating, distended nostrils and erect and immobile ears were observed (Figure 2). The hooves were inspected, as well as the entire body of the animal and no injuries were found.

Figure 2. Horse with clinical signs of tetanus treated in a property located in the city of Jataí - Goiás, animal with distant hind limbs, prolapse of the third eyelid, neck extended, tail away from body and ears erect and immobile.



Source: Authors.

Based on the physical examination of the animal, as well as the clinical signs presented, the diagnosis of tetanus was established. Immediately, the venipuncture of the left jugular was performed with catheter n° 14 and 50,000 IU of anti-tetanus serum diluted in 1000 mL of lactated ringer's solution was administered. Antibiotic therapy was performed

using benzathine penicillin at a dose of 40,000 IU/kg, once a day (SID), intramuscularly (IM) for eight days. The antiseptics of the injection site was recommended to be done with alcohol 70% before any application, as well as, to keep the animal in a paddock with easy access to fresh water and pasture quality.

From the treatment beginning to the sixth day on, a reduction in the third eyelid prolapse, stiffness and hyperesthesia could be observed. Therefore, the veterinary clinical medical team returned at the property fifteen days after the implementation of the treatment and the animal had already recovered and could carry out its work activities normally.

3. Discussion

Considering the clinical signs, data from the anamnesis and physical examination of the patient, the diagnosis of tetanus was established. According to Avante *et al.* (2016), hyperesthesia, spasticity, ear position, flag tail, extended neck, third eyelid prolapse, muscular stiffness of the head and neck, mandibular trismus and intense sweating are signs of tetanus and some of them could be observed in the mentioned animal. The clinical signs occur due to the *C. tetani* toxins which are generated by the creation of an anaerobic environment in wounds, abscesses caused by injection, punctate wounds in hooves or soft tissues (Avante *et al.*, 2016; Ribeiro *et al.*, 2018).

The horse in this report had the hooves and the entire body inspected, however no wounds were found. The fact that the source of toxins production was not found has great value in the prognosis of each animal, as the elimination of the bacteria that produce these toxins is possible (Mackay, 2009). After the clinical case conclusion, it is valid to point out that the inspection of oral lesions, which can be a port of entry for the bacteria was not performed. In a clinical study in tetanus in horses, carried out by Reichmann *et al.* (2008), horses were inspected and when the wound was not found, the animals' mortality reached 100%, differently from the animal in the present report that, after the onset of the treatment was able to recover and maintain its normal life. According to Radostits *et al.* (2002), there is the possibility of tetanus outbreaks of idiopathic cause that occur without evidence of apparent wounds, usually associated with the consumption of coarse foods, having the production of toxins in wounds in the mouth or in the gastrointestinal tract.

The efficiency of the treatment consists of eliminating the causative bacteria, neutralizing the residual toxin, controlling muscle spasms, wound dressings if present,

maintaining nutrition, hydration and also providing supportive treatment such as stalls with a high bed, absent of noises and darkness (Smith, 2006; Reichmann *et al.*, 2008). Due to poor structural conditions in the property, it was not possible to house the animal in a dark stall without noise, but the owner was asked to keep the horse in a pasture with easy access to water, good quality forage and isolated from other animals.

Smith (2006) indicates for the treatment of tetanus, the use of penicillin G potassium (22,000 - 44,000 IU/kg, IM) TID (3 times a day) or QID (4 times a day), or penicillin G procaine (22,000 IU/kg, IM), BID (2 times a day). In the present report, antibiotic therapy was performed by using benzathine penicillin at a dose of 40,000 IU/kg, SID, IM, for eight days. At the end of this period, there was a significant improvement of the animal. Smith (2006) also recommends the use of acepromazine in the dose of 0.05 to 0.1 mg/kg, intravenously (IV) at intervals from 4 to 6 hours, to promote muscle relaxation. Due to the financial conditions of the owner, the use of acepromazine was not possible. The use of this muscle relaxant is important because the main cause of death in horses with tetanus is asphyxiation due to chest muscles contraction (Mackay, 2009).

Some studies report the efficiency of the administration of anti-tetanus serum intrathecally in the atlanto-occipital space, or in the lumbosacral region to neutralize the free toxin in the central nervous system (Cynthia *et al.*, 2015). In the present report, the intrathecal application of tetanus antitoxin was not performed, and the animal recovered promptly. Intrathecal administration requires general anaesthesia and may cause complications. The neutralization of the circulating toxin was performed with 50,000 IU of tetanus serum IV. The dosage choice was empirical, once there are no controlled studies that suggest the appropriate dosage for each patient (Reichmann *et al.*, 2008).

The treatment for this animal was viable. The prognosis of the disease is directly linked to the time and speed of evolution, considered unfavourable when there is a rapid evolution and favourable when the evolution is slow or mild (Radostits *et al.*, 2002; Smith, 2006). In this report, despite the rapid evolution, the animal began to respond on the sixth day of treatment, as mentioned by the owner, according to whom, the first sign of improvement was the disappearance of the third eyelid prolapse.

Considering the horse susceptibility to the disease, it is of great relevance, the education of horses' owners regarding the disease once active immunization is a crucial tool of prevention (Ribeiro *et al.*, 2018). Santos *et al.* (2019) reinforced this tool as the preferred

method of control. In the reported case, the animal did not receive vaccine against tetanus, but the instruction and recommendation was passed to the owner, to make sure that other animals would get vaccinated and so the occurrence of the disease do not happen again.

4. Conclusion

Tetanus is an infectious disease that requires good attention of owners and veterinarians, not only for compromising the animal's life, but also for causing significant losses in an economic aspect. The disease has to be well investigated that so, the diagnostic can be accomplished. For this, the history of the animal and a detailed anamnesis has to be performed. Understanding the clinical signs is crucial to reach to diagnosis and so, to implement the treatment once the disease is treatable. The treatment must include the wound identification and debriding whenever possible, neutralization of toxins through tetanus serum to avoid further complications, animal's hydration and protection from sunlight. With all these points coming together, the animal clinical signs tend to improve and a better prognosis may be reached.

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