Case Report

PUERPERAL TETANUS IN CROSSBRED DAIRY CATTLE – A CASE REPORT

Kanwarpal Singh Dhillon[1]* and Bikramjit Singh[2]

Krishi Vigyan Kendra
Punjab Agricultural University,
Amritsar
Ludhiana-141 004, Punjab.

ABSTRACT

The case was presented with a history of dystocia and retention of the placenta, and the placenta along with the fetus required manual removal. Clinical signs indicated an anxious and alert expression marked by erect ears, high rectal temperature (105 °F), general muscular stiffness and dilated nostrils, along with reduced rumination and bloat. The prolapse of the third eyelid was noticed and the tail exhibited stiffness with a pump-handle posture and limited movement. The treatment plan included penicillin, methocarbamol, human tetanus immunoglobulin, meloxicam and fluids. After three days of treatment, slight signs of improvement were noted, with complete recovery achieved after ten days of treatment.

Keywords: cow,tetanus, post-partum, dystocia, penicillin

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INTRODUCTION

Tetanus is a sporadic and ubiquitous neurologic disease that manifests globally (Smith and George, 2002). It is caused by *Clostridium tetani* in all the farm animals. The case-fatality rate for young animals is above 80%, but adult cattle have a better recovery rate. Tetanus is more prevalent in humans as well as horses in the hotter regions of the world. It is comparatively uncommon in cows, but studies in various parts of the world found it in 30 to 40% of the soil samples collected (Radostits *et al.,* 2007). This gram-positive bacterium produces spores that have a distinctive "drumsticks" appearance in blood smears and can remain in soil for many years (Radostits *et al.,* 2007). Spores are resistant to various disinfectants, including 'acidified phenol', which requires around two hours to destroy them. The organism enters the body through deeply perforated wounds. These wounds may arise during castration, dehorning, disbudding, tattooing, ear tag installation, shearing, docking, hoof trimming, administration of pharmaceuticals, surgical procedures, vaccinations, penetrating objects like nails and wires, bacterial infections during calving or manual handling of reproductive organs, retention of the placenta, and

[1]Assistant Professor
*Corresponding Author E-mail: kanwardhillon55@pau.edu
[2]Associate Director

prolapse (Smith and George, 2002; Radostits *et al*., 2007; Upadhyay *et al*., 2013; Wahab *et al.*, 2021). These injuries are contaminated with the spores of bacteria and dust. As anaerobic bacteria, the *C. tetani spores* cannot proliferate in healthy tissues or even in an injured tissue that maintains an oxidation-reduction potential similar to that of healthy blood. In damaged tissues, necrosis and decreased oxygen levels both create an adequate anaerobic environment for the growth of bacteria that produce potent neurotoxins, such as tetanospasmin (Bizzini, 1986). Usually, the toxin enters the motor nerves in the affected area and travels along the nerve pathway to the spinal cord, leading to ascending tetanus. When the concentration of toxins is elevated, they enter the bloodstream and the lymphatic system and then reach the 'central nervous system', where they inhibit the release of neurotransmitters, resulting in all of the muscle groups contracting simultaneously, causing descending tetanus (Smith and Williams, 1984). Even slight stimulation of the affected animal can initiate the typical muscular spasms. These spasms can be intense enough to result in bone fractures. In the most commonly observed form, the spasms start in the jaw area and subsequently spread to other areas of the body. Spasms that involve the larynx, diaphragm, and intercostal muscles can result in respiratory failure. Each episode of spasms lasts for a couple of minutes and can happen over and over again for a duration of about three to four weeks (Atkinson *et al*., 2012). The involvement of the autonomic nervous system causes cardiac arrhythmias, tachycardia and hypertension.

The early diagnosis of tetanus by the practitioner relies primarily on identifying relatively subtle clinical signs. The interval between an infection and the onset of disease might be as little as two to three days or as long as four weeks. The initial signs of the disease, such as rigidity in the neck muscles along with an extended head, typically manifest after a period of 24 hours. Other clinical manifestations involve muscle twitching and tremors, firmly fixed both jaws (known as lockjaw), third eyelid protrusion, and lameness with alert facial expressions, hyperesthesia, erection of ears, and dilation of nostrils. Bloat may also occur when the rumen fails to function. Subsequent symptoms may involve collapsing, lying on the side with legs extended firmly, spasms, and ultimately death (Smith and George, 2002; Radostits *et al*., 2007). Nevertheless, isolating *C. tetani* is challenging due to the nature of anaerobic bacteria (Shea *et al*., 2018; Akbar *et al*., 2022). Recently, the identification of tetanospasmin in *C. tetani* through 'real-time Polymerase Chain Reaction (PCR)' has become feasible and it has been utilized for diagnosing tetanus in livestock (Nagao *et al*., 2007; Akbulut *et al.*, 2025). While numerous investigations have focused on diagnosing tetanus, there is a scarcity of research concerning its treatment (Smith and George, 2002; Popoff, 2020). As noted by Radostits *et al.* (2007), managing tetanus therapeutically has been described as challenging, time-consuming, costly and often ineffective, particularly when treatment is initiated late. It includes the administration of penicillin to inhibit the further proliferation of *C. tetani,* the use of antitoxin to neutralize the unfixed

neurotoxin, using muscle relaxants to initiate and maintain muscle relaxation and providing additional supportive care until all the neurotoxin has been either destroyed or excreted (Lotfollahzadeh *et al*., 2018; Wahab *et al*., 2021). Here, we present a case of tetanus that was effectively managed with penicillin, muscle relaxants, and tetanus antitoxin (Human Tetanus Immunoglobulin) in a crossbred cow with recent parturition.

HISTORY AND DIAGNOSIS

The case report was recorded in a four-year-old female Holstein Friesian (HF) crossbred cow during a field visit in the village of Ludhar, located in the Amritsar district of Punjab, India. The cow was presented with the history of difficulty in parturition and retained placenta, requiring manual removal of both the placenta and the fetus. According to the owner's account, the cow experienced difficulties in prehension and mastication after 15 days post-parturition, along with difficulty in sitting and rising due to stiffness in the hind legs, as well as issues with constipation and anuria. Treatment was administered by a local veterinarian using antibiotics and nonsteroidal anti-inflammatory drugs. The animal had found a bit of relief, but a relapse occurred once the treatment was stopped. Clinical manifestation revealed an anxious and alert expression characterized by erect ears (Fig. 1 and Fig. 2), high fever (105 ^{o}F), muscular stiffness and dilatation of nostrils along with reduced rumination and bloat. There was no additional evidence of any physical injuries on the body and no bad odor from the genital area. Prolapse of the 3rd eyelid was prominent (Fig. 1) and the tail was stiff, positioned like a pump handle and extended with restricted movements. The symptoms in this case corresponded with a case of tetanus detected in two cows with recent parturition (Gupta *et al*., 2018).

The blood sample was taken in EDTA coated vacutainer for examination. The haematological analysis revealed leukocytosis accompanied by neutrophilia, while other factors such as haemoglobin, packed cell volume, total erythrocyte count, lymphocytes, monocytes, eosinophils and basophils were within normal limits. A fresh smear was also made from the injection site to identify the organism. Following the gram staining, the smear showed gram-positive rod-shaped bacteria of *Clostridium tetani* that resembled "drumsticks." Based on the case history, clinical observations, and laboratory findings, the case was concluded as 'Puerperal Tetanus'.

TREATMENT AND DISCUSSION

The treatment began with high dosages of fortified procaine penicillin (FPP) @ 120 Lac I.U.intramuscularly twice daily for five days, followed by muscle relaxant methocarbamol (Robinex) @ 50 ml intravenously for three days. Daily administration of dextrose normal saline (DNS, 5%) @ 5 liters through intravenous infusion was provided for three consecutive days. Human tetanus immunoglobin (Tetglob) was administered intramuscularly at a dosage of 2500 I.U., with a repeat after three days. Meloxicam (Melonex) was given at a rate of 0.5 mg/kg of body weight

intramuscularly every 24 hours for three days. The genital tract was irrigated with a 3% hydrogen peroxide solution, as the likely entry point for the organism appeared to be the genital tract during parturition in this instance (Dolezel *et al*., 2010). The animal was isolated from the other animals and placed in the dark and calm environment with soft bedding of straw. Signs of mild improvement were observed after three days of treatment, with complete recovery achieved ten days post-treatment.

The use of Human tetanus immunoglobulin (tetanus antitoxin) can counteract the tetanus toxin present in the blood circulation, as antitoxins do not penetrate the 'blood-brain barrier' (Coetzer and Tustin, 2004). This treatment offers little benefit once symptoms have manifested (Radostits *et al*., 2007). In our cases, significant improvement was observed after the administration of tetanus antitoxin. The initiation of a regimen of penicillin given parenterally in high doses may eradicate the infectious bacteria. Methocarbamol relaxes muscular rigidity and skeletal muscle spasms, allowing the animal to breathe normally and stand properly. Meloxicam was used to relieve muscular pain and reduce temperature. Irrigating the genital tract with 3% hydrogen peroxide releases oxygen, potentially killing bacteria and reducing their multiplication. Providing intravenous hydration ensures the animal's maintenance when it cannot consume feed or water. These observations align with those reported by Radostits *et al.* (2007).

The diagnosis was based on the case history, observed clinical symptoms, and laboratory results (Radostits *et al*., 2007). The prolapse of the 3rd eyelid, as a clinical indicator, was noted in the later stages of tetanus in cattle (Barbosa *et al*., 2009). Timely diagnosis is crucial for effective tetanus treatment, as delays will ultimately lead to the death of the affected animal (Metzger, 1985). Reports by Boora *et al*. (2013) and Gupta *et al.* (2018) indicated that the deaths recorded were linked to late treatment initiation and lack of prior tetanus vaccination. Despite this, instances of recovery from tetanus in animals following standard treatment have been documented (Bhikane, *et al*., 2005; Das *et al.*, 2011; Kim *et al*., 2023). This case had a history of retained placenta and dystocia, and it happened after parturition. Within two weeks of parturition, clinical signs of tetanus emerged due to possible uterine damage and spore contamination during the removal of the fetus and placenta. It has been reported that handling postpartum metritis in a high-yielding dairy cow can introduce an organism that causes tetanus (Boora *et al*., 2013). Such tetanus cases linked to unsanitary conditions during parturition can be prevented through the implementation of hygienic practices and appropriate sanitation. The calving and castration have been noted as the two most common procedures related to the onset of tetanus (O'Connor *et al.*, 1993; NADIS, 2013). Surprisingly, due to less incidence of tetanus in cattle, vaccination against tetanus is generally not performed. Vaccination serves as the most effective measure for controlling infectious diseases in both humans as well as animals.

CONCLUSION

In conclusion, early diagnosis and aggressive treatment of bovine tetanus can lead to full recovery for cattle. Keeping in view the increased number of tetanus cases following parturition, the "tetanus toxoid vaccine" may be recommended in the pregnant dairy animals in order to ensure long-term immunity. Any suspected tetanus cases or conditions that could make an animal vulnerable to tetanus should be informed to the veterinarian for immediate action.

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CONFLICTS OF INTEREST

The authors of this article declare that they have no conflicts of interest.

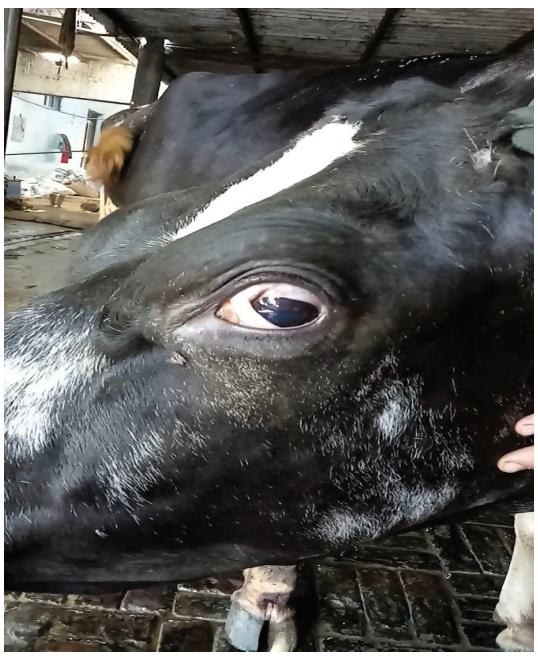

Fig. 1.Prolapse of third eyelid and anxious expression in a tetanus patient

Fig. 2.Tetanus patient with erect ears

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