A CASE STUDY ON TETANUS OF DOG

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Statement of Author

I, Md. Osman Khan, certify unequivocally that I have performed all the tasks detailed in this report. The data was gathered from Field, books, national and international periodicals, and other sources. All citations have been properly acknowledged. Consequently, I am solely responsible for collecting, manipulating, preserving, and publishing all data compiled in this report.

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ABSTRACT

Canine tetanus is a rare and potentially life-threatening neurological disorder caused by the bacterium *Clostridium tetani*, which elaborates tetanospasmin toxin. This case report describes an 8-month-old female dog that developed tetanus following ovariohysterectomy surgery. The dog exhibited classic signs of the disease, including muscular spasms, stiffness, exaggerated response to stimuli, and respiratory complications. Diagnoses were supported by the patient's clinical signs, history of recent surgery, and laboratory findings showing leukocytosis. Treatment included administering equine tetanus antitoxin, antibiotics such as penicillin, and supporting the patient with sedatives, muscle relaxants, and IV fluid therapy. Despite these measures, the animal could not survive for more than a day after treatment. Despite intensive care, the prognosis remains poor, hence the need for early diagnosis and timely intervention. This case further delineates the need for continued research into better diagnostic and treatment protocols for tetanus in dogs.

Keywords: *Clostridium Tetani,* Tetanus, Dog etc.

1.INTRODUCTION

Tetanus is an uncommon neurological problem in dogs (Greene 2005) and has rarely been reported in the literature. This case report describes the possible cause, clinical signs, treatment, complications and outcome of the treatment.

Tetanus is caused by an infection with the bacterium Clostridium tetani and the release of tetanospasmin toxin. Cl tetani is a Gram-positive anaerobic spore-forming bacillus that is widely distributed in the environment, especially in soil. Studies have shown that Cl. tetani spores can survive for long periods in the environment due to their resistance to heat, drying, and other harsh conditions (Bermudez et al., 2017). In anaerobic environments the spores vegetate and release their toxins. It releases two types of toxins, Tetanolysin and tetanospasmin. Tetanospasmin enters the peripheral nerves system (PNS) distally at the neuromuscular end and then moves to the central nervous system (CNS) where it binds with presynaptic sites and inhibits the release of Gamma-aminobutyric acid (GABA), leading to muscular spasms.

Recovery from tetanus depends on the production of new axonal terminals. Dogs are rarely susceptible to tetanus than other species; and are 600 times more resistant to tetanospasmin than horses (Greene 2005). This relative resistance is thought to be due to the natural immunity present in dogs, which may involve the blood-brain barrier and the higher levels of circulating immune cells (Brown et al., 2018) In some cases, the recovery may take several weeks to months, as the process of axonal regeneration is slow (Yun et al., 2015) Clinical cases may develop in two forms. These forms are localized muscle spasm and generalized muscle spasm. Generalized form seems to be more common in dogs.

Treatment protocol include administration of Tetanus antitoxin (Equine) to minimize further binding of toxin to nervous tissue, antibiotic therapy like Sodium or Potassium Penicillin to prevent clostridial growth and toxin production and supportive therapy like nursing, feeding, sedation and muscle relaxation. Ultimately, recovery depends on the successful managemental support of the animal until new axonal terminals form.

Risk factors for tetanus include open wounds, exposure to Cl. tetani from feces or the environment, particularly soil. A study conducted by Smith et al. (2021) showed that dogs that

sustain injuries in rural environments with frequent soil disturbances, such as farms, are at a higher risk for infection. Geographically, Cl. tetani is ubiquitous in the environment, and although there is no specific seasonality, tetanus cases tend to increase during the rainy season. This is due to soil erosion, which exposes animals to higher levels of C. tetani spores, making them more susceptible to infection. Moreover, increased flooding and heavy rainfall during the wet season can disrupt soil integrity and elevate the chances of direct contact with contaminated soil (Smith et al., 2021)..

2. MATERIAL AND METHODS

2.1 Case Representation

An 8-month-old rescued female dog was brought to Teaching and Training Pet Hospital (TTPHRC). Its body weight was 11.3 kg. According to clinical history, the owner said that the dog had a recent surgery for spaying 4 days earlier. 2 days after the surgery the dog started showing signs. It couldn't eat and showed muscular spasm. Initial examination reveals some clinical signs. The temperature was 101.3 F. Physical examinations showed stiffness of limb and jaw and lateral recumbency of the dog. Dyspnea and dehydration are also observed in the dog. The dog was showing an extremely exaggerated response to sound and touch. The ears were held erect, and the forehead was wrinkled. Blood Sample was collected for Hematological and Biochemical tests.

2.2 Hematological and Biochemical Analysis

For hematological analysis Hemoglobin (Hb%), RBC Count, HCT/PCV, MCV, MCH,MCHC, RDW CV, RDW SD, Total WBC Count, Neutrophils, Lymphocytes, Monocytes, Eosinophils, Basophils, Eosinophils Count, Platelet Count, MPV, PCT were performed. As a part of biochemical analysis Globulin, Alanine Aminotransferase (ALT/SGPT), Aspartate Aminotransferase (AST/SGOT), Alkaline Phosphatase (ALP), Blood Urea Nitrogen (BUN) were checked.

Table 1: Hematology Report for Dog

Test Name	Result	Reference Value
Hemoglobin (Hb%)	9.4 g/dl	11.5-18.5 g/dl
RBC Count	4.44 m/ul	5.10-8.50 m/ul
HCT/PCV	27.6%	36.0-56.0%
MCV	62.3 fL	62.0-78.0 fL
MCH	21.1 pg	21.0-28.0 pg
MCHC	34.0 g/dl	30.0-38.0 g/dl

RDW CV	13.5%	11.0-19.0%
RDW SD	31.6%	35.2-45.3%
Total WBC Count	21,600/cumm	6,000-17,000/cumm
Neutrophils	92%	52-81%
Lymphocytes	2%	12-33%
Monocytes	5%	2-13%
Eosinophils	1%	1-10%
Basophils	0%	0-1%
Eosinophils Count	216/cumm	100-1200/cumm
Platelet Count	76,000/cumm	120,000-460,000/cumm
MPV	10.7 fL	5.0-15.0 fL
PCT	0.08%	0.09-0.50%

Table 2: Biochemical Report for Dog

Parameters	Reference Value	Test Results
Bilirubin	0.1-0.3 mg/dl	1.6
Alanine Aminotransferase (ALT/SGPT)	12-118 u/l	290
Aspartate Aminotransferase (AST/SGOT)	15-66 u/l	1642
Alkaline Phosphatase (ALP)	5- 131u/l	237
creatinine	0.5-1.6 mg/dl	0.8

2.3 Treatment:

Though diagnosis of tetanus was done by clinical history and clinical sign. Also, recent wounds or surgery were a major diagnostic factor here. After biochemical tests, these findings also

support the diagnosis. We noticed leukocytosis (Neutrophil with left shift). For treatment, Tetanus antitoxin(equine) with the trade name of Vaxitet IG 3000 IU/ml was given. First 0.1ml Tetanus antitoxin was administered s/c route to check the anaphylaxis and the animal had been kept in observation for 30 mins. After 30 minutes we didn't notice any anaphylactic shock. Then we administered the therapeutic dose @25IU/kg body weight in an intravenous route and kept for observation another 30 minutes. This antitoxin prevents further toxin binding with axons.

Fortified procaine penicillin@50,000 IU/kg body weight was prescribed in an intramuscular route for 5 days at a 12-hour interval to prevent further bacterial toxin production.

As supportive treatment, Diazipum @0.5mg/Kg body weight was administered in an intravenous route at a 12 hour interval to help enhance GABA inhibition. Hartmann's Solution 20ml/kg was administered to provide sufficient metabolic energy to the dog as it can't have food orally.

As a managemental suggestion, we suggested the owner to keep the animal in a quiet, sound-proof, dark area as much as possible. The case was rare, and the prognosis of the case was grave. The dog died the next day.

Fig: The affected Dog

3. RESULTS AND DISCUSSION

Tetanus is a potentially devastating disease that is uncommon in dogs. Tetanus toxin binds irreversibly to axonal terminals resulting in muscular spasms and disinhibition. Recovery depends on the synthesis of new presynaptic components and their transport to the distal axon, typically leading to a two-week delay before signs of clinical improvement (Bleck and Brauner 1997). In small animals two forms of the disease are recorded, a local form in which the signs are limited to a specific region, for example a limb. Generalized form, in which the entire body is affected. Development of localized or generalized form is determined by the site and route of entry of the toxin, whether it enters by intramuscular or subcutaneous inoculation, or hematogenous (Green 2005)

No definitive diagnostic test for tetanus is available. Some suggest serum antibody titers test. But serum antibody titers of tetanus toxin's reliability are questionable (Dewey 2003) Diagnosis must be done with clinical history, clinical sign and with some supporting biochemical tests. It is often not possible to isolate C tetani from wounds (Greene 2005). The portal of entry in our case may be ovariohysterectomy surgery. The dog had this surgery just 4 days before the clinical signs appeared. There have been several cases of tetanus after an ovariohysterectomy (Rubin et al., 1983, Bagley et al., 1994, Ganssbauer et al. 2000).The treatment of tetanus is controversial and not well defined. The efficacy of the antitoxin is yet to be proven as it acts by binding to unbound toxins; it is only likely to be useful in the per acute stage of disease. (Hsu and Groleau 2001). Intradermal testing is recommended before the administration of the antitoxin because it is derived from horses and may show a hypersensitivity reaction. The prevalence of hypersensitivity reactions in dogs is unknown. Antibiotic therapy is recommended in all cases of tetanus for the elimination of C tetani. Penicillin G has been recommended because it is effective against anaerobic gram-positive bacteria. Furthermore, penicillin has GABA-antagonistic properties that may reduce the effects of tetanospasmin.

Sedative and muscle relaxant drugs were administered in most cases. Extreme muscle spasms are painful and can be severe. (R. H.,2022)

We noticed respiratory complications like breathing difficulties. Complication may also include aspiration pneumonia, respiratory arrest and upper respiratory tract obstruction (Karunarathna,2024)

Though the prognosis is poor, early diagnosis and proper intensive managemental care can provide a positive outcome.

4. CONCLUSION

This case report reviews the importance of early diagnosis and timely aggressive treatment to increase survival rates.

There is no single diagnostic test available to confirm tetanus infection; diagnosis is based on clinical signs, history such as recent wounds, and supportive laboratory tests. Treatment includes administration of tetanus antitoxin to neutralize circulating toxin, antibiotics to eliminate the bacteria, and supportive care to deal with complications.

Despite early intervention, the prognosis of dogs with tetanus remains grave. The outcome is very much linked to the severity of the disease, the severity of neurotoxin damage, and the animal's overall health status. Future research will be needed to further enhance diagnostic protocol or kit and therapeutic interventions for tetanus in dogs.

LIMITATION OF THE STUDY:

1. diagnosis is based on only clinical signs, history such as recent wounds, and supportive laboratory tests
2. Proper management under the supervision of the owner might not be appropriate

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