

Case report

A CASE OF GENERALIZED TETANUS IN A CAT

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Summary

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A case of generalized tetanus observed in a cat with open fracture of the tibia during the period after the osteosynthesis is presented. The specific clinical symptoms of the disease – hyperextension of the muscles of the legs, neck, tail, facial muscle alterations (trismus, risus sardonicus, third eyelid prolapse), hypersensitivity to noise stimuli accompanied with tetanic convulsions of limbs, were followed out for a period of 8 days. The intensive medicamentous therapy did not result in a favourable outcome and consequently, the cat was euthanized.

**Key words:** cat, surgical intervention, tetanus

In dogs and cats, tetanus is rarely encountered because of their natural resistance to the toxin (De Risio & Gelati, 2003; Acke *et al.*, 2004). Cats are thought to be less susceptible and the localized form of tetanus is more frequent in this species (Greene, 1998). Compared to horses, dogs are 600 times and cats – 7200 times more resistant to the tetanus toxin tetanospasmin (Greene, 1998). In a 10-year retrospective study, Bandt *et al.* (2004) have diagnosed tetanus in 13 dogs and only 1 cat. Single cases of generalized tetanus have been reported in cats (Costa *et al.*, 2002; Tomek *et al.*, 2004). In dogs, there are reports for postoperative tetanus following ovariohysterectomy (Bagley *et al.*, 1994; Engels *et al.*, 1995; Ganssbauer *et al.*, 2000), and in cats – after orch-

ectomy (Costa *et al.*, 2002) with death occurring because of respiratory failure.

The diagnostics is based upon the clinical signs described by Acke *et al.* (2004): hyperextension of the muscles of limbs, neck, tail, the typical facial muscle abnormalities (trismus, risus sardonicus, third eyelid protrusion). The autonomic dysfunction in cases of generalized tetanus could result in respiratory failure, heart arrhythmias, seizures and death (Hsu & Groleau, 2001). In the early stages, when the typical manifestations of generalized tetanus are lacking, the diagnosis is difficult (De Risio & Gelati, 2003). The differential diagnosis should eliminate other states with similar clinical signs, such as hypocalcaemia, meningitis, strychnine poisoning (De Risio & Gelati, 2003; Low *et al.*, 2006). At the same

time, the timely diagnostics combined with proper treatment, could result in a favourable outcome (De Risio & Gelati, 2003; Low *et al.*, 2006). The clinical manifestations usually begin 4-12 days after infection (Greene, 1998). In dogs and cats, the infection could be localized in one or both forelimbs that are in the state of rigid extension and caudal displacement (elbow extension and carpal flexion or extension) (McKee, 1994).

The manifestations of tetanus are caused by the effect of a neurotoxin, released by the vegetative form of *Clostridium tetani* – an obligate anaerobic, spore-forming Gram-positive bacillus. Its spores are resistant and commonly found in the environment; they vegetate under anaerobic conditions (deep penetrating wounds, gastrointestinal operations, emergency surgical interventions) (Greene, 1998; Katz & Walmsley, 2000).

The treatment of generalized tetanus includes application of antitoxin, antibiotics, surgical management of the wound, general sedation, myorelaxation and cholinesterase reactivation (Arsov *et al.*, 1990). The antitoxin neutralizes free toxin and is administered as soon as possible after the onset of clinical signs. The antibiotic therapy aims to kill the vegetative microbial forms (Ahmadsyah & Salim, 1985; Reddy, 2002).

In order to overcome the muscle rigid-

ity, benzodiazepines (Reddy, 2002; Low *et al.*, 2006), acepromazine and barbiturates (Low *et al.*, 2006) have been successfully used.

The clinical cases of tetanus in dogs and cats are very rare. In the present case report, we present a case of generalized tetanus in a cat secondary to osteosynthesis of an open fracture of the tibia.

A female 1-year old cat was referred to the Small Animal Clinic to the Trakia University, Stara Zagora, Bulgaria with open fracture of the hindlimb and good general condition. The clinical parameters (core body temperature, heart and respiratory rates) were within the reference values for the species. The inspection of the left hindlimb showed open fracture of the tibia, and the proximal bone fragment protruded by about 1.5 cm over the wound. After radiography of the limb, an osteosynthesis of the tibia (with a plate and 4 cortical screws) was performed (Fig. 1).

After the post operative hour 48, the hyperextension and carpal flexion of thoracic limbs worsened. The operated animal could not move without help. The body temperature was 39.2 °C, the heart rate – 154 beats/min, respiratory rate – 48 beats/min. By the 72<sup>nd</sup> hour after the operation, the hyperextension involved the hindlimbs too. The cat could not stand on



**Fig. 1.** Entrance door of the infection. The operation wound 24 hours after surgery.



**Fig. 2.** The cat by the 6<sup>th</sup> day after the operation – carpal joint flexion, hyperextension of muscles of the limbs, neck and the tail.

its feet but accepted food and water.

The haematological and blood biochemical analysis on venous blood showed significantly higher activities of creatine kinase (1453 U/L by hour 72; 783 U/L by day 8), lactate dehydrogenase (201 U/L by day 8), slight elevation of alanine aminotransferase (36 U/L by hour 72 and 39 U/L by day 8), and aspartate aminotransferase (50 U/L by day 8), as well as of blood glucose (10.47 mmol/L by day 8). Red blood cell counts (4.02 T/L by hour 72 and 3.70 T/L by day 8), haemoglobin concentrations (62 g/L by hour 72 and day 8) and haematocrit (0.15 L/L on both hour 72 and day 8) were decreased.

By the 6<sup>th</sup> day after the operation, the specific signs in the region of the head were observed: trismus, risus sardonicus, enophthalmos, third eyelid protrusion, inability to eat and drink on the background of a preserved appetite.

By the 7<sup>th</sup> day, kyphosis and neck rigidity were observed, and by the 8<sup>th</sup> day, nonvoluntary hypersensitivity provoked by noise stimuli and accompanied by tetanic convulsions of limbs.

Daily infusions with physiological saline (Actavis, Bulgaria) were performed

at a rate of 20 mL/kg/h. Between the 1<sup>st</sup> and the 3<sup>rd</sup> post operative days, intravenous injections of Linco-spectin/Spectinomycin 5/10® (Alfasan Int. B.V., Holland) at 1 ml/5 kg and Penicillin G at 40 000 UI/kg (Actavis, Bulgaria) have been performed. Between 4<sup>th</sup>–8<sup>th</sup> post operative days, metronidazole (Flagyl®, Aventis Pharma Int. S.A., Germany) at 7.5 mg/kg was administered. Because the muscle rigidity was attributed to a postanaesthetic complication, during the 2<sup>nd</sup> and the 3<sup>rd</sup> post operative days, dexamethasone (Dexamethason®, Alfasan Int. B.V., Holland) at 0.1 mg/kg and sodium hydrogen carbonate (Natrium hydrogencarbonat einmolar Fresenius, Fresenius Kabi, Germany) at 1 mmol/kg were i.v. injected. In order to control muscle spasms, diazepam (Diazepam®, Alkaloid Skopje) was injected intravenously at 0.3 mg/kg at every 4-5 hours, but without effect.

Taking into consideration the severely worsened clinical status, the grave untreatable clinical signs of the disease (Fig. 2) and the owner's will, the cat was euthanized on the 9<sup>th</sup> day after the osteosynthesis.

The necropsy findings were not spe-

cific and therefore, not enough informative. The gross observations showed stiffening of the carcass and signs of operative intervention in the region of the left hindlimb. The inspection of the body showed signs of asphyxia – liquid blood, pulmonary and brain oedema, internal organ stasis with petechial haemorrhages on their serous coats, multiple haematomas of striated musculature. Microscopically, no specific morphological alterations were found out. In striated muscles, focal coagulation necroses were observed whereas in the lungs – morphological features of aspiration pneumonia.

The observed clinical manifestations were typical for generalized tetanus: hyperextension of muscles of limbs, neck, tail, the specific facial abnormalities (trismus, pulled aside corners of lips, third eyelid protrusion, enophthalmos), described by Hanson (1982), Bark (1980) and Edwards (1989).

Although the incubation period of tetanus is 4 to 12 days after the infection, the first signs in our patient appeared 12 hours after the operation. Tomek *et al.* (2004) observed clinical signs 2 days after the injury. Taking into consideration that the open fracture occurred about 7 days prior to referral of the patient, we assume that the anaerobic infection was in an incubation period by the time of osteosynthesis. This was probably the cause for the failure of improvement of rigidity after administration of benzodiazepines, as recommended by Reddy (2002). The fixation of the fracture with plate and screws created the anaerobic conditions, necessary for the development of the tetanus bacillus.

For a long time, penicillin was considered to be the best antibiotic, but according to Ahmadisyah & Salim (1985) and Reddy (2002), metronidazole was more

effective against anaerobic organisms and maintained higher concentrations in anaerobic tissues. In this case, the antibiotic therapy did not achieve the desired result.

The affected animals are hypersensitive to outer stimuli and under their influence, muscle spasms, tachycardia (Oduote & Sofola, 1976; Low *et al.*, 2006) could be observed. Such a hypersensitivity was observed in our patient by the 8<sup>th</sup> day after the operation.

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