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LAMPIRAN

LAMPIRAN 1. ENGLISH VERSION

Management of Short Oblique Os Tibia and Os Fibula Fractures Using Intermedullary Pin and Wire in Domestic Dogs at Doc Pet Clinic

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ABSTRACT.

A tibia and fibula fracture is a break in the continuity of the tibia and fibula that can occur due to a fall in a flexion position or a violent twisting motion. The purpose of writing this case study is to find out how to diagnose and treat fractures of the tibia and fibula. The methods used to diagnose a tibia and fibula fracture are anamnesis, clinical examination, and x-ray. The results of the clinical examination showed that the dog had a limp when walking, difficulty lifting the left hind leg, and tended to rest on the right side when walking or sitting. The follow-up examination in the form of an x-ray revealed that the dog has a short oblique fracture of the os tibia and os fibula. The treatment given was surgery in the form of installing an intermedullary pin with a diameter of 2.0 mm and a wire with the cerclage wire method in dogs. Postoperative treatment was antibiotic injection, anti-inflammatory powder, and antibiotic powder, with a dose administered twice a day. Animals then showed wound healing on the eighth day, which was characterized by the surgical wound that had dried up and the dog's effort to stand up and try to walk even though it was limping.

Keywords : Fracture, tibia fibula fracture , dogs

Introduction

A fracture is a complete or incomplete break in the continuity of bone or cartilage. Fractures are accompanied by varying degrees of damage to the surrounding soft tissues, including damage to the blood supply and impaired movement function. The examiner dealing with a fracture must consider the local and overall condition of the patient (Piermattei et al., 2006). A tibia and fibula fracture is a break in the continuity of the tibia and fibula bones that can occur due to a fall in a flexed position or a violent twisting motion. Traffic accidents such as being hit by a motor vehicle, fighting, falling, or tripping when the animal is moving quickly are factors in the occurrence of tibia and fibula fractures in pet animals such as dogs or cats.

In general, there are two types of fractures: simple fractures (close fractures), which are closed fractures with no wound complications and usually no

bleeding, but if left unchecked, there will be damage to the blood vessels and nervous system around the fracture, which can endanger the animal's life. A compound fracture (open fracture) is an open fracture in which the broken bone can be seen and can cause infection (Pierrmattei et al., 2006). Based on the shape of the fracture line, fractures are divided into transverse, oblique, spiral, impaction, comminuted, epiphyseal, and condyllus fractures (Fossum et al., 2019).

Fractures are accompanied by varying degrees of damage to the surrounding soft tissues, including damage to the blood supply and impaired movement function. The bones in the extremities of the hind legs are the most commonly fractured. Handling of dogs with fractures must be done quickly and precisely; if the treatment is too late, a callus will form that will envelop the fractured bone, making it difficult to treat the fracture (Mahpuz et al., 2021).

Case Report

A rescue dog named Ince from Yayasan Sahabat Satwa Makassar was brought to Doc Pet Clinic on February 6, 2023. The dog was female and estimated to be 3 years old. Body weight: 7 kg, black color. The dog had a swollen and limping left hind leg.

The present status of the case dog was as follows: rectal temperature 38.6°C, heart rate 120 beats/min, pulse rate 112 beats/min, respiration frequency 32 breaths/min, and capillary refill time (CRT) value less than two seconds. Examination of the oral mucosa and eye conjunctiva found no signs of abnormality, and the respiratory and cardiovascular systems were found to be normal. Clinical signs observed were that the dog had a limp when walking, difficulty lifting the left hind leg, and tended to rest on the right side when walking or sitting. When palpated, there was swelling of the left medial hind leg, and crepitation was heard during palpation.

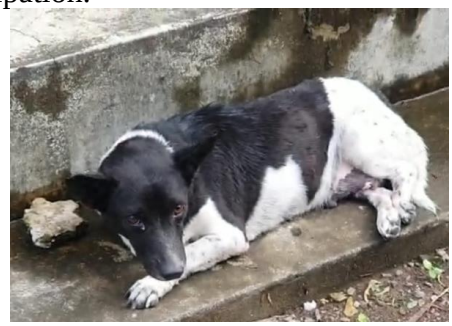

Figure 2. Dog's Physical Condition

Results and diagnosis

An x-ray radiological examination is performed to determine the type of fracture, the direction of the fracture fault line, and the location of the fracture. This facilitates diagnosis, treatment, and prognosis. A radiological examination was then performed in the lateral and ventral dorsal positions.

A fracture of the tibia and fibula was found on an x-ray, and a physical examination indicated a fracture. On x-ray examination, the images showed a lateral view of the tibia fibula (Figure. 2A), and in the ventrodorsal (VD) position, an oblique fracture of the tibia fibula was observed (Figure. 2B).

Figure 1. (A) Radiographic examination of the lateral view; (B) Ventrodorsal view radiograph (VD) showing a fracture mark on the tibia fibula (white arrow).

The diagnosis was made based on clinical signs and supported by a radiographic examination to determine the type of fracture and fracture management. Based on the clinical signs and radiographic examination, the case dog was diagnosed with an oblique diaphyseal fracture of the tibia fibula of the right hind leg with a prognosis of *fausta*.

Surgery and the installing of intermedullary pins and wires are used to manage dogs with tibia and fibula fractures. It is in accordance with Dewi and Pemayun (2020) that the management of fractures of the tibia and fibula is carried out by installing intramedullary bone pinning in the *os tibia*. Intramedullary pins are also fixators that are often used in handling diaphyseal fractures in the tibia, ulna, metacarpal humerus, femur, and metatarsal bones. In performing internal fixation using IMPs, there are advantages and disadvantages. The advantages are the level of resistance to bone bending and a circular shape similar to a tube that allows IMPs to withstand bone stability. The disadvantages of using IMPs are that the fixation is weak and cannot lock in the bone; this is due to friction between the IMP and the bone, so the IMP is unable to withstand the rotational movement of the fracture (Dewi and Pemayun, 2020).

In choosing the IMP used, it must also be adjusted to the diameter of the medulla diaphysis of the *os tibia* and *os fibula.* The diameter of the pin used when performing surgery is 2 mm. This is in accordance with the statement of Priyanka et al. (2019) that the dimensions of the intermedullary pin should be 70–80% of the *os tibia* and *os fibula.* If the pin is too small, it will not have sufficient strength to maintain bone stability.

Methods

Surgery is performed with prior animal preparation. Animals were kept fasted for 12 hours before surgery. Next, the animals were given premedication in the form of atropine sulfate at a dose of 0.0-0.04 mg/kg with a total administration of 0.7 ml intramuscularly and a combination of ketamine at a dose of 10-15 mg/kg with a total administration of 0.7 ml and xylazin at a dose of 1-3 mg/kg with a total administration of 0.7 mL given intramuscularly.

The procedure for installing intramedullary pins and wires is as follows:

1. Shaving is done on the forelegs to facilitate the installation of the IV catheter on the intravenous line for infusion. The infusion solution used is NaCl. The incision site is shaved, cleaned with 70% alcohol, and then smeared with povidone iodine.
2. The incision is made along the fracture area, approximately 15 cm from the fracture site. Once the skin was exposed, the muscles wrapping the *os tibia* and *os fibula*, such as *m. fibularis, m. flexor digitorum profundus*, and *m. gastrocnemius*, were incised and excised until the fractured parts of the *os tibia* and *os fibula* were exposed.
3. Afterwards, both fracture fragments were repositioned and fixed using bone pins, and the fracture segments were wire-tied using the cerclage wire method.
4. Once the os tibia and os fibula were fused and confirmed to be firmly fixed, the *m. fibularis* and *m. flexor digitorum profundus* were sutured carefully without moving the entire hindfoot to prevent dislodgement of the bone pins.
5. NaCl was used to clean the surgical area.
6. The incised muscle was sutured with a simple continuous pattern, then the subcutaneous tissue was sutured with a simple continuous pattern, and the skin was sutured with a simple continuous pattern using 2/0 Vicryl thread.
7. Post-operative management was performed with an antibiotic injection (Intramox 0.7 ml) and non-steroidal anti-inflammatory, as well as an analgesic (tolfedine 0.5 ml) and nebacetin powder given to the incision wound.

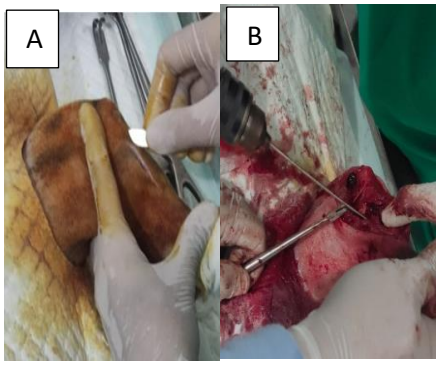

Figure 3. (A) Skin incision; (B) Intramedullary pin and wire placement

Post-operatively, dogs are given medication, namely the antibiotic amoxicillin, at a dose of 22–30 mg/kg PO q6–8h for 7–10 days (Plumbs, 2011). Amoxicillin is a semi-synthetic amino-penicillin B-lactam antibiotic that is effective against gram-negative and gram-positive bacteria (Dewi and Pemayun, 2020). Administration of non-steroidal anti-inflammatory Rimadyl® with 25 mg carprofen content at a dose of 2.2 mg/kg BW (0.5 tab) per day for 7 days (Plumbs, 2011). Administration of nebacetin powder on the incision wound is done twice a day. Giving nebacetin to an ulcer can prevent bacterial growth, so giving drugs can minimize the risk of infection (Plumbs, 2011).

The supportive therapy provided is calcium lactate (Fortan) as a source of nutrients needed during the postoperative bone formation and repair process. Calcium is the main mineral in bone structure and plays an important role in maintaining blood calcium levels in normal physiology. In addition, calcium also plays a role in bone remodeling (Dewi and Pemayun, 2020). Calcium has a major role in bone mineralization, which is also part of the fracture healing process (Claes et al., 2012).


Figure 4. The dog's wound condition has dried and closed.

On Sunday, February 10, 2023, the incision wound on the dog had closed, and the dog was eating well. The increase in nutritional intake is significantly influential in the healing process of postoperative wounds. According to Bohling et al. (2004), post-operative wounds in cats and dogs begin to improve after seven days and will close well after 14 to 21 days. The results of observation for eight days showed wound healing on day 7, namely on February 13, 2023, and the dog began to stand and walk. The dog showed continued improvement postoperatively.


Figure 5. The dog has started to stand up.

According to Bohling et al (2004) postoperative wounds in cats and dogs begin to improve after seven days and will close properly after 14 to 21 days. The results of observations for eight days showed that there was wound healing on the 7th day, namely on February 13, 2023 and the dog's efforts began to stand up and walk. The dog shows a condition that continues to improve postoperatively.

It can help accelerate healing in postoperative dogs. A stable fracture with a good blood supply will result in a complete bone callus within four weeks (Dewi and Pemayun, 2020).

Conclusion

Based on several examinations, such as anamnesis, clinical signs, and clinical examination, the dog was diagnosed with an os tibiae fibulae fracture with an oblique fault line and a fausta prognosis. The diagnosis was made by x-ray. Treatment was performed by the reduction method with the intermedullary pin and wire technique on the tibia bone. Treatment included infusion fluid therapy, antibiotics, multivitamins as supportive therapy, and supportive feeding therapy.

In fracture cases, the degree of surgical difficulty is high. In addition, the availability of diagnostic tools such as hematology and adequate equipment determines the success of

the surgery. Postoperative treatment is also very important to maintain the stability of the broken bones, and it is necessary to provide adequate nutrition to help recovery, such as homemade feed containing the main raw material, calcium.

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