

Case Report

Surgical management of a distal tibial fracture in a calf: A clinical case report

*Bibek Chandra Sutradhar**, *Ondrila Akter*, *Labannya Dutta Tithi*, *Arifa Akter*, *Ankon Das*, *Ummay Khaer Fatema* and *Tuli Dey*

Faculty of Veterinary Medicine, Department of Medicine and Surgery, Chattogram Veterinary and Animal Sciences University, Khulshi, Chattogram 4225, Bangladesh.

ARTICLE INFO

Article history:

Received:13/03/2025

Accepted:02/04/2026

Keywords:

Surgical management, tibial fracture, calf

ABSTRACT

Distal tibial fractures in bovine calves are uncommon but can present significant challenges due to the weight-bearing nature of the limb. This case report describes the successful surgical management of a distal tibial fracture in a three-month-old calf. Diagnosis was confirmed through radiographic examination. The case was clinically managed by internal fixation using dynamic compression plate. Postoperative care including pain management, antibiotic therapy and restricted weight-bearing facilitated uneventful healing. This report highlights the importance of early intervention and appropriate surgical techniques for achieving favorable outcomes in bovine orthopedic cases.

*Corresponding author:

Cell:

E-mail:bibeksd@yahoo.com

To cite this paper: *B. C. Sutradhar, O. Akter, L. D. Tithi, A. Akter, A. Das, U. K. Fatema and T. Dey, 2025. Surgical Management of a Distal Tibial Fracture in a Calf: A Clinical Case Report. Bangladesh Journal of Veterinary and Animal Sciences, 13(1& 2): 149-154.*

1.INTRODUCTION

Fractures of the tibia in cattle, particularly in young calves, are relatively uncommon but can have severe consequences due to the weight-bearing nature of the limb and the challenges associated with fracture stabilization in large animals. The distal tibia is particularly vulnerable to injury due to its anatomical position and lack of surrounding musculature. This region is prone to both simple and comminuted fractures following traumatic events such as falls, kicks, or accidents with farm equipment (Fretz and Barber, 1996). Conservative management of tibial fractures in calves is often inadequate due to the high biomechanical forces acting on the limb, leading

to poor fracture healing and complications such as angular limb deformities, joint contractures, and nonunion (Denny and Butterworth, 2008). Therefore, surgical stabilization is the preferred approach for distal tibial fractures to ensure proper apposition, alignment for early weight-bearing and optimal functional recovery. Various fixation techniques have been employed, including external skeletal fixation, intramedullary pinning, and bone plating, depending on the fracture configuration, animal size, and economic considerations (Auer and Stick, 2018). The management of distal tibial fractures typically involves a combination of non-surgical and surgical approaches, with surgical fixation being the preferred method in cases of displaced fractures or fractures with

significant soft tissue involvement (Baird et al., 2014). Among the various fixation techniques available, bone plating has become a widely accepted and reliable method for achieving stable fixation, promoting bone healing, and minimizing complications (Martens et al., 1996). The dynamic compression plates, locking plates, and intramedullary devices have been used commonly for improved fracture stabilization, particularly in complex or comminuted fractures of the distal tibia (Martens et al., 1998). In this case report, we describe the successful surgical management of a distal tibial fracture in a calf using dynamic compression plate (DCP), highlighting the surgical technique, postoperative care, and clinical outcome. This case contributes to the growing evidence supporting surgical intervention as a viable option for fracture stabilization in production animals, ensuring both welfare and economic viability for livestock owners.

2. CASE PRESENTATION

A 3-month-old male calf, weighing 65 kg, was presented to the SAQ Teaching and Veterinary Hospital at Chittagong Veterinary and Animal Sciences University with a history of sudden lameness and non-weight bearing on the left hind limb. The owner reported that the calf sustained an injury after accidentally slipping on a concrete floor two days before presentation. No previous treatments were given.

Diagnosis

A definitive diagnosis was established through routine latero-medial radiographs, which revealed a complete transverse diaphyseal fracture of the distal tibia, accompanied by cranio-medial displacement of the bone relative to the talus (Figure 1A). Considering the calf's value and the severity of the injury, clinical management through surgical intervention with internal fixation using bone plating was decided.

Surgical procedure

The calf was sedated using diazepam at a dose of 0.5 mg/kg body weight intravenously (Inj. Sedil®, Square Pharmaceuticals Ltd., Dhaka,

Bangladesh). Following sedation, the entire left hind limb, from the stifle to the mid-metatarsal region, was clipped and aseptically prepared for surgery. The surgical site was first cleansed with soap and water and then scrubbed three times using povidone-iodine solution followed by 70% alcohol. General anesthesia was induced with ketamine at a dose of 2 mg/kg body weight (Inj. Kain®, Renata Ltd., Dhaka, Bangladesh) and maintained by administering half of the initial dose twice during the procedure. Additionally, a ring block was performed using 2% lidocaine hydrochloride (Inj. Jasocaine® 2%, Jayson Pharmaceuticals Ltd., Dhaka, Bangladesh) proximal to the incision site to ensure effective local anesthesia (Figure 2A). The calf was positioned in left lateral recumbency with the affected limb placed downward, and the contra-lateral limb was drawn caudally to facilitate a medial approach to the distal tibia. Skin incision was made along the cranio-medial aspect of the fracture site, and the bone was exposed by incising and retracting the crural fascia (Figure 2B). Tissue debris, blood clots, and necrotic muscle were meticulously removed. The fracture was reduced by applying traction to the limb and manually manipulating the distal end of the tibia (Figure 2C). A Dynamic Compression Plate (DCP) was selected for fracture fixation. The appropriate plate and screw sizes were determined based on the tibia's dimensions. After carefully contouring the plate to match the curvature of the tibia, it was placed on the medial aspect of the distal tibia and talus. Screws were inserted by drilling 4.2 mm holes through the cortical bone, and the screws were tightened to stabilize the fracture. A total of six screws were used to secure the plate in place (Figure 2D). Once the plate was in place, the movement of the tarso-crural joint was carefully checked to ensure that the implant did not restrict joint function. The muscles and fascia were sutured with absorbable Vicryl 2/0 suture material, and a subcuticular closure was performed. The skin was closed using horizontal mattress sutures with nylon (Figure 3A).

To immobilize the operated limb, a half-limb padded fiberglass cast was applied, leaving a window bandage over the wound site for monitoring and dressing changes (Figure 3B).

Prior to discharge, postoperative orthogonal radiographs were taken to assess limb

alignment, fragment positioning, and implant placement (Figure 1B).

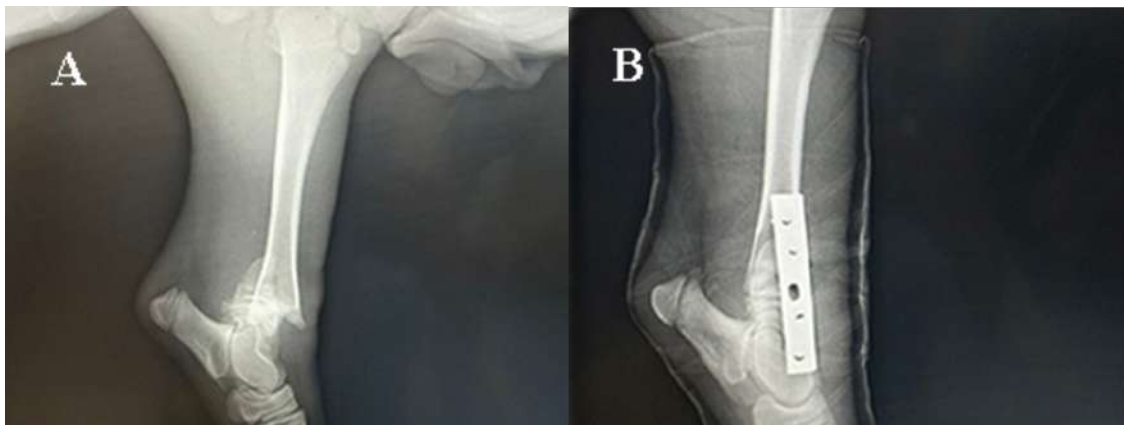


Figure 1: A) Preoperative lateral radiograph of the tibia showing a complete transverse diaphyseal fracture of the distal tibia, with cranio-medial displacement of the tibia relative to the talus. B) Latero-medial radiograph taken immediately after surgery.

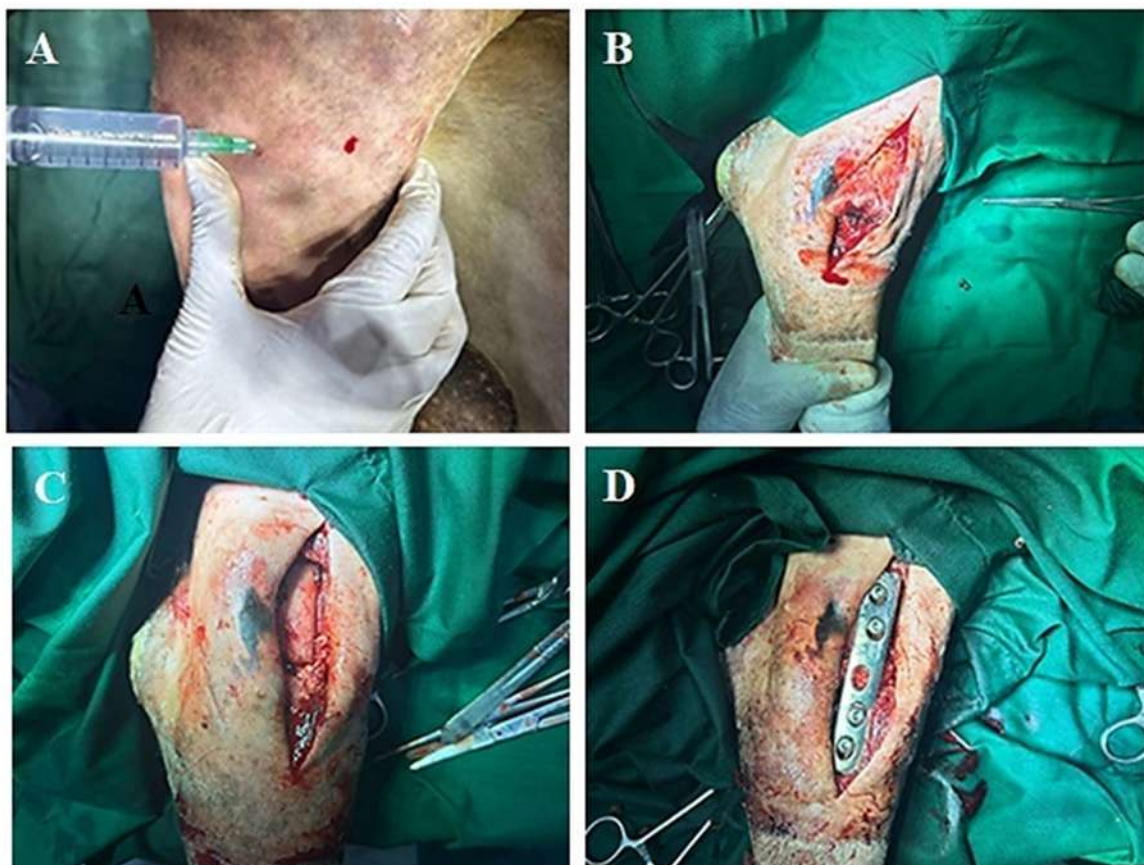


Figure 2: Surgical management of the fracture. A) A ring block using 2% lidocaine hydrochloride was performed above the fracture site. B) Fractured bones were exposed after incision. C) The bones were properly positioned through traction before plating. D) The position of the DCP and screws were verified before closing the muscles and skin.

Postoperatively, the calf was given antibiotics (Inj Streptopen®, 1 ml per 20 kg body weight) for 5 days to prevent infection and a non-steroidal anti-inflammatory drug (NSAID) (Meglunix-vet® 2.2mg/kg body weight) for 5 days to manage pain and reduce inflammation.

The surgical wound was protected with a medical dressing. The operated limb was immobilized with a fiberglass cast for 60 days to allow for proper healing and fracture stabilization.

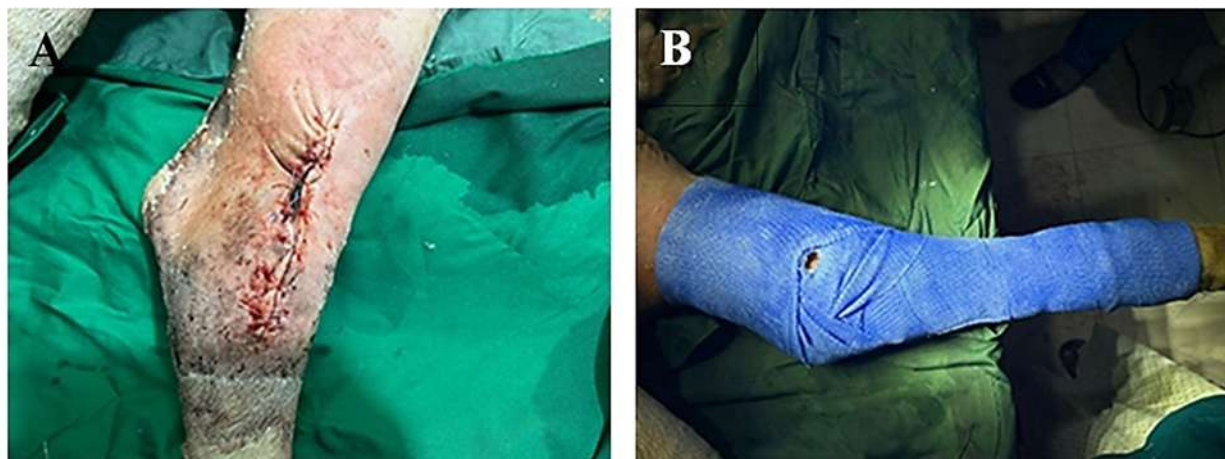


Figure 3: A) The skin incision was closed using nylon suture in cross mattress pattern. B) Fiberglass bandage was used keeping a window to provide protection and support postoperatively.

3. OUTCOME AND FOLLOW-UP

The calf was closely monitored throughout the recovery period. Eight weeks after surgery, the calf exhibited normal limb function (Figure 4A). The surgical site showed no signs of infection following a 5-day course of antibiotics and

NSAIDs, and the wound healing progressed without complication. The fiberglass cast successfully immobilized the affected limb, maintaining proper alignment and stabilization of the fracture. Orthogonal radiographs obtained after surgery demonstrated satisfactory fracture reduction and proper placement of the implant.

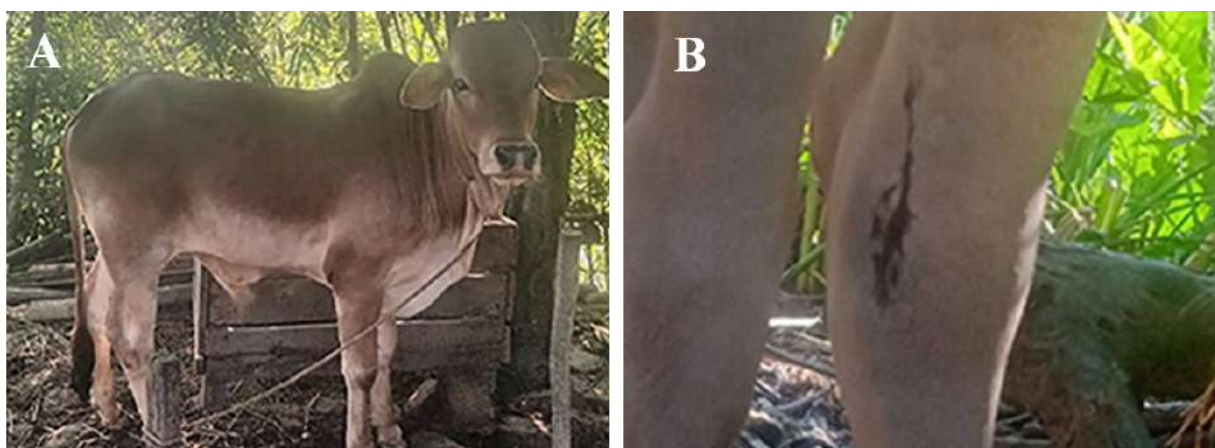


Figure 4: A) Complete weight bearing by the affected limb. B) The healing area 3 months after the bone plate removal.

The tibial fragments were well aligned, with the distal tibia and talus in their correct anatomical positions. The calf was gradually allowed to bear weight on the affected limb, and further

follow-up visits revealed progressive improvement in gait and limb function. The fiberglass cast was removed at 60 days of post-surgery, and the implant was removed at 90

days due to exposure outside the skin. Following implant removal, the surgical site was sutured, and healing occurred within 14 days (Figure 4B). Compared to conservative treatment options, surgical fixation allowed for earlier mobility, significantly reducing the risk of complications such as joint stiffness and muscle atrophy. There were no complications throughout the recovery period. Two months after surgery, the calf resumed normal activities, including grazing and interacting with the herd.

4. DISCUSSION

The surgical management of distal tibial fractures in juvenile livestock, particularly in calves, presents several unique challenges. Fractures of the distal tibia are relatively uncommon but can result in significant long-term consequences if not properly treated. In this case, a 3-month-old male calf presented with a comminuted distal tibial fracture following trauma. The calf was promptly evaluated and underwent surgical intervention, which is considered a reliable method for managing such fractures in young animals (Fretz and Barber, 1996). Distal tibial fractures in calves pose a significant challenge for veterinary surgeons due to the critical role of the tibia in weight-bearing and the potential for complications such as non-union, infection, and joint instability (Joveniaux et al., 2010). Effective management of these fractures requires careful evaluation of both the fracture characteristics and the overall health of the animal (Zama et al., 2015). In this case, a complete distal transverse diaphyseal tibial fracture was diagnosed, and internal fixation with a Dynamic Compression Plate (DCP) was selected for its ability to provide stable fixation, facilitate healing, and reduce the risk of complications (Watkins et al., 2019).

Internal fixation using bone plating, particularly Dynamic Compression Plates (DCP), is widely recognized as an effective technique for managing distal tibial fractures in large animals (Rakestraw et al., 1991). The selection of an appropriate plate and screw size is critical to achieving optimal stability and minimizing implant-related complications (Auer et al., 1993). In this case, the DCP was carefully

contoured to conform to the natural curvature of the tibia, and six screws were strategically placed to ensure secure fixation (Auer et al., 1987). This approach successfully restored alignment of the tibial fragments and facilitated the healing process. Studies have consistently shown that properly executed bone plating yields favorable functional outcomes with minimal complications in the management of distal tibial fractures in calves and other large animals (Tulleners et al., 1986; Auer et al., 1993; Martens et al., 1996; Denny et al., 2008). Effective postoperative care plays a crucial role in the successful management of fractures (Mohiuddin et al., 2018). In this case, the administration of antibiotics and NSAIDs was instrumental in preventing infection and controlling pain, contributing significantly to the calf's recovery (Vasseur et al., 1988). Immobilization with a fiberglass cast provided excellent stability, ensuring proper alignment of the tibial fracture during the healing process (Patel et al., 2012; Watkins et al., 2019). Regular monitoring, including radiographic assessments, allowed for early detection of potential complications such as infection, non-union, or implant failure (Bottlang et al., 2017). Fortunately, no such complications arose, with the implant remaining stable and the fracture healing as expected. The calf made a full recovery, exhibiting no residual lameness or functional deficits. Radiographic evaluation confirmed complete fracture healing with appropriate bone callus formation, and the animal successfully resumed normal weight-bearing activity by the 8-week follow-up (Belge et al., 2016). These results align with previous reports in veterinary literature, which demonstrate that calves with distal tibial fractures can achieve favorable functional outcomes when treated with appropriate surgical intervention and postoperative management (Belge et al., 2016; Bottlang et al., 2017). This case underscores the importance of meticulous surgical technique, careful selection of fixation methods, and comprehensive postoperative care in the management of distal tibial fractures. Given the economic and functional value of the calf, the decision to perform surgical intervention with bone plating was well justified. The successful outcome further

reinforces the effectiveness of this approach in similar cases.

This case reinforces the importance of early diagnosis and prompt surgical intervention for distal tibial fractures in calves. Additionally, it emphasizes the need for proper postoperative care, including pain management and monitoring for complications. Early weight-bearing exercises and rehabilitation were not pursued in this case due to the calf's young age, but such approaches could be considered in older calves to accelerate recovery.

In conclusion, surgical intervention for distal tibial fractures in young calves, when performed appropriately, offers a favorable prognosis with minimal risk of long-term complications. This case report will serve as a valuable contribution to the veterinary surgical literature on managing similar fractures in juvenile livestock.

ACKNOWLEDGEMENTS

The authors are grateful to the owner of the patient for his immense patience, cooperation, and valuable feedback. The authors are also thankful to the full surgical team and staff of the SAQ Teaching Veterinary Hospital, CVASU, for their immense help and support.

REFERENCES

- Auer, J. A., and Watkins, J. P. (1987). Treatment of radial fractures in adult horses: an analysis of 15 clinical cases. *Equine veterinary journal*, 19(2), 103-110.
- Auer J. A., A. Steiner, U. Iselin and C.Lischer (1993). Internal fixation of long bone fractures in farm animals. *Vet Comp OrthopTraumato*, 16, 36-41.
- Auer, J. A., and Stick, J. A. (2018). *Equine Surgery-E-Book: Equine Surgery-E-Book*. Elsevier Health Sciences, 1736-1746.
- Baird, A. N., and Adams, S. B. (2014). Use of the Thomas splint and cast combination, walker splint, and spica bandage with an over the shoulder splint for the treatment of fractures of the upper limbs in cattle. *The Veterinary Clinics of North America. Food Animal Practice*, 30(1), 77-90.
- Belge, A., Akin, I., Gulaydin, A., and Yazici, M. F. (2016). The treatment of distal metacarpus fracture with locking compression plate in calves. *Turkish Journal of Veterinary and Animal Sciences*, 40(2), 234-242.
- Bottlang, M., Tsai, S., Bliven, E. K., von Rechenberg, B., Kindt, P., Augat, P., and Madey, S. M. (2017). Dynamic stabilization of simple fractures with active plates delivers stronger healing than conventional compression plating. *Journal of orthopaedic trauma*, 31(2), 71-77.
- Denny, H., Butterworth, S. (2008). *A Guide to Canine and Feline Orthopedic Surgery*. 4th ed., Blackwell Science, 554-575.
- Fretz, P. B., and Barber, S. M. (1996). Fractures in cattle: A review of 51 cases. *Canadian Veterinary Journal*, 17(4), 101-105.
- Joveniaux, P., Ohl, X., Harisboure, A., Berrichi, A., Labatut, L., Simon, P., and Dehoux, E. (2010). Distal tibia fractures: management and complications of 101 cases. *International orthopaedics*, 34, 583-588.
- Martens, A., Steenhaut, M., Gasthuys, F., Vlaminck, L., Desmet, P., and Moor, A. D. (1996). Conservative and surgical treatment of tibial fractures in cattle. *The Veterinary Record*, 143, 12-16.
- Martens, A., Steenhaut, M., De Cupere, C., Gasthuys, F., De Moor, A., and Verschooten, F. (1998). Conservative and surgical treatment of tibial fractures in cattle. *Veterinary record*, 143(1), 12-16.
- Mohiuddin, M., Hasan, M. M., Shohag, M., Ferdousy, R. N., Alam, M. M., and Juyena, N. S. (2018). Surgical management of limb fractures in calves and goats. *Bangladesh Veterinary Journal*, 52(1-4), 46-56.
- Patel, T. P., Mistry, J. N., Patel, P. B., Panchal, K. N., and Gami, M. S. (2012). Clinical and radiographic evaluation of tibia fracture management using intramedullary pinning-a study in three calves. *IntasPolivet*, 13(2), 435-439.
- Rakestraw, P. C., Nixon, A. J., Kaderly, R. E., and Ducharme, N. G. (1991). Cranial approach to the humerus for repair of fractures in horses and cattle. *Veterinary Surgery*, 20(1), 1-8.
- Tulleners, E. P. (1986). *Compendium on Continuing Education for the Practicing Veterinarian* 8, 69.
- Vasseur, P. B., Levy, J., Dowd, E., and Eliot, J. (1988). Surgical wound infection rates in dogs and cats data from a teaching hospital. *Veterinary Surgery*, 17(2), 60-64.
- Watkins, J. P., and Sampson, S. N. (2019). Fractures of the tibia. *Equine fracture repair*, 648-663.
- Zama, M. M. S. E. A. (2015). *Handbook on Field Veterinary Surgery*. 7th ed. Daya Publishing House, 160-168.