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Use of cortical screw for arthrodesis of tibiotarsal joint luxation in dogs

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Abstract
The objective of the present research was to study the efficacy of cortical screws for inducing arthrodesis in dogs with tibiotarsal luxation. The study was conducted in six clinical cases of dogs with tibiotarsal luxation presented to the Department of Veterinary Surgery and Radiology, with a complaint of hindlimb lameness. The dogs with tibiotarsal luxation showed non-weight bearing lameness, severe pain, swelling and laxity of joint. The luxation of joint was confirmed by radiograph. The affected joints were subjected for arthrodesis using cortical screw and immobilized with Robert Jones bandage reinforced with metal splints for a period of four weeks. Radiographic evaluation revealed bony union of the treated joints by 45 to 60th postoperative day. By the end of the study period four dogs showed normal weight bearing pattern and two dogs showed partial weight bearing. Hence, arthrodesis of tibiotarsal joint using cortical screw was effective for stabilizing the joint, which was simple to perform, less expensive, does not need expensive equipments for surgical procedure and requires minimal postoperative care.

Keywords: Tibiotarsal luxation, cortical screw, arthrodesis

Introduction
Ligament rupture and joint instability of tibiotarsal joint have been reported in 50% of traumatic joint luxations (Schaeffer *et al*., 1999) [11]. Due to lack of soft tissue musculature, the tarsocrural joint was susceptible to the fractures and shear injuries and reported that injuries typically occurred after road collisions, resulted in injuries to the skin, muscle, ligaments and bone (Diamond *et al*. 1999) [5]. The treatment modalities include combinations of primary ligamentous repair, prosthetic ligament reconstruction, external coaptation, transarticular external skeletal fixation, arthrodesis and amputation (Sjostrom and Hakanson, 1994) [12]. The tibiotarsal arthrodesis is as a salvage procedure in restoration of functional use of the joint. Arthrodesis can be achieved by number of surgical methods such as use of external cooptations, Steinmann pin combined with figure of eight tension band wire, external skeletal fixation or plating. These methods require extensive surgical procedure and also time consuming. The present study was planned with the aim of cost effective means of providing stability to the tibiotarsal joint with minimal postoperative care and complications.

Materials and Methods
The present study was carried out in six clinical cases of dogs with tibiotarsal luxation presented to Department of Veterinary Surgery and Radiology, Bengaluru and were selected irrespective of breed, age and sex. The dogs were pre-medicated with Atropine Sulphate @ 0.04 mg/kg BW, S/C and Xylazine hydrochloride at 1 mg/kg BW, I/M. After 15 min, induction of anaesthesia was done by 2.5% Thiopentone Sodium and maintained with same to effect. Preoperatively, all the animals recieved Ceftriaxone @ 20 mg/kg, BW, IV and tramadol @ 2 mg/kg, IV as pre-emptive analgesic. The dogs with infected wounds were subjected for wound treatment to clear the infection few days preoperatively.
The dogs were positioned in lateral recumbency with affected limb downwards. The surgical approach to expose the tibiotarsal joint and basic principles for inducing arthrodesis was followed as per the procedure described by Piermattei (2014) [9]. An assorted sized cortical screw was driven from body of calacneous bone into medullary cavity of tibia via talus through the predrilled hole. Postoperatively the affected limb was immobilized with Robert Jones bandage reinforced with metal splints for four weeks. Post-operatively course of antibiotics and analgesics were given. On preoperative day and on 0th, 7th, 14th, 28th, 45th and 60th day after surgery, the joints undergoing arthrodesis were radiographically inspected, and

gait was measured and graded according to Vasseur *et al*., (1995) [13]. Lameness grading was assessed as, normal weight bearing on all limbs at rest and while walking – grade 1, normal weight bearing at rest, favors affected limb while walking – grade 2, partial weight bearing at rest and while walking – grade 3, partial weight bearing at rest but does not bear weight when walking – grade 4, and does not bear weight on limb at rest or while walking – grade 5.

Results

In the present study, tibiotarsal luxation was found to be prevalent in non-descriptive dogs aged 1 to 4 years old, accounting for 8% of all joint diseases. Cases with tibiotarsal luxation were presented with non weight bearing lameness with severe pain, swelling and laxity of tarsal joint. Few cases showed extensive shearing injury from proximal end of tibia to tarsal joint due to road accident and dog bite.

The bone fixation methods were well tolerated by all the animals, with restoration of limb functionality. The rigid callus formation was noticed by 45 to 60th postoperative day radiographically, suggesting a bony union. With respect to the degree of lameness, case 1 and 3 showed grade I, cases 2 and 4 showed grade II, while cases 5 and 6 showed grade III.

Discussion

Arthrodesis is a salvage procedure when other stabilization methods had failed (Beardsley and Schrader, 1995) [3]. Initially, infected wounds were treated preoperatively and supported with Robert Jones bandage reinforced with metal splints till healthy granulation tissue was achieved (Diamond *et al*. (1999) [5]. Ayyappan *et al*. (2011) [2] and Frame *et al*. (2017) [8] used type II external skeletal fixation and calcaneotibial screw for stabilization of tarsocrural joint, respectively. The similar treatment protocol was followed in our study and stabilization of joint was achieved using cortical screw. Fettig *et al*. (2002) [7] and Anne (2019) recommended immobilization of affected limb postoperatively for four weeks to neutralize cycling and bending forces acting on the joint and to prevent screw bending.

The implant should be removed once bridging callus was evident at joint (Dorea *et al.*, 2012) [6]. In the present study, the cortical screws were removed by 45 to 60th postoperative day once the rigid callus was identified radiographically. With respect to the degree of lameness, four dogs showed normal weight bearing pattern and two dogs showed partial weight bearing by the end of the study period. While, Dorea *et al*. (2007) noticed normal weight bearing (excellent, 68%), intermittent weight bearing (good, 20%) and non-weight bearing (poor, 12%) by 60th postoperative day using type II external skeletal fixation in dogs. The most frequently observed post-operative complications using circular external fixator for tarsocrural arthrodesis in dogs were muscle atrophy, osteolysis, bone proliferation around the wires and pin tract inflammation (Rahal *et al.*, 2006) [10]. In the current study, no such postoperative complications were documented, except in one case where wound dehiscence was noticed due to automutilation. Hence, arthrodesis of tibiotarsal joint using cortical screw was effective for stabilizing the joint, which was simple to perform, less expensive, does not need expensive equipments for surgical procedure and requires minimal postoperative care.

Fig A: Debridement of articular cartilage using orthopedic burr for inducing arthrodesis

Fig B: Driving of cortical screw into medullary cavity of tibia through calcaneous *via* talus bone

Fig C: Preoperative radiograph showing tibiotarsal luxation

Fig D: Immediate postoperative radiograph showing cortical screw providing rigid stabilization

Fig E: 45th postoperative day radiograph showing bridging callus at the tibiotarsal joint

Fig F: 60th postoperative day radiograph showing rigid callus at the tibiotarsal joint indicating arthrodesis

References

1. Anne MS. Fracture Management for the Small Animal Practitioner. *Edt*, Anne, M. Sylvestre., 1st *Edn.* John Wiley and Sons publications, Inc 1994,183-197p.
2. Ayyappan S, Simon MS, Das BC, Suresh KR. Tibio-tarsal luxation and its management in a dog. Tamilnadu J. Veterinary & Animal Sciences 2011;7(6):295-298.
3. Beardsley SL, Schrader SC. Treatment of dogs with wounds of the limbs caused by shearing forces: 98 cases (1975-1993). J. Am. Vet. Med. Assoc 1995;207(8):1071-1075.
4. Benson JA, Boudrieau RJ. Severe carpal and tarsal shearing injuries treated with an immediate arthrodesis in seven dogs. J. Am. Anim. Hosp. Assoc 2002;38(4):370-380.
5. Diamond DW, Besso J, Boudrieau RJ. Evaluation of joint stabilization for treatment of shearing injuries of the tarsus in 20 dogs. J. Am. Anim. Hosp. Assoc 1999;35(2):147-153.
6. Dorea NFA, Oria AP, Padilha FJG, Regonato E, Moreno JCD, Canola JC. Use of a type IIb external skeletal fixator in experimental tarsocrural arthrodesis in dogs. Rev. Bras. de Saude e Prod. Anim 2012;13(2):541-549.
7. Fettig AA, Mccarthy RJ, Kowaleski MP. Intertarsal and tarsometatarsal arthrodesis using 2.0/2.7-mm or 2.7/3.5-mm hybrid dynamic compression plates. J. Am. Anim. Hosp. Assoc 2002;38(4):364-369.
8. Frame KR, Bridges JP, Worth AJ. Effect of a calcaneo-tibial screw on medial and lateral stability of the canine tarsocrural joint ex-vivo. Vet. Comp. Orthop. Traumatol 2017;30(5):331-338.
9. Piermattei DL. *In:* Piermatteis's atlas of surgical approaches to the bones and joints of the dog and cat. 5th *Edn*., Elsevier, St. Louis, Missouri 2014,440-444p.
10. Rahal SC, Volpi RS, Hette K, Teixeira NFJ, Vulcano LC. Arthrodesis tarsocrural or tarsometatarsal in 2 dogs using circular external skeletal fixator. Can. Vet. J 2006;47(9):894-898.
11. Schaeffer IGF, Wolvekamp P, Meij BP, Theijse LFH, Hazewinkel HAW. Traumatic luxation of the elbow in 31 dogs. Vet. Comp. Orthop. Traumatol 1999;12(1):33-39.
12. Sjostrom L, Hakanson N. Traumatic injuries associated with the short lateral collateral ligaments of the talocrural joint of the dog. J. Small Anim. Prac 1994;35(3):163-168.
13. Vasseur PB, Johnson AL, Budsberg SC, Lincoln JD, Toombs JP, Whitehair JG *et al*. Randomized, controlled trial of the efficacy of carprofen, a nonsteroidal anti-inflammatory drug, in the treatment of osteoarthritis in dogs. J. Am. Vet. Med. Assoc 1995;206(6):807-811.