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Studies on physiological, haematological and biochemical changes during supra-cutaneous plating for repair of traumatic tibial fractures in sheep and goats

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Abstract

In six clinical cases of small ruminant, a supra-cutaneous plating technique was used to treat tibial fractures. The variations in the physiological, haematological and biochemical parameters were recorded pre-operatively and post-operatively on regular intervals. Based on statistical evaluations of the recorded data, the physiological and haematological parameters were within the normal range, indicating less surgical stress and minimal blood loss during the surgery. Whereas, the biochemical studies revealed a non-significant decline in the serum calcium from the 7th to the 45th post-operative day and an increase in the serum alkaline phosphatase up to the 15th day, followed by a drop between the 30th and the 60th post-operative day. Serum phosphorus, on the other hand, showed no significant variations in all six small ruminants.

Keywords: Small ruminants, supra-cutaneous plating, physiological, haematological and biochemical parameters

1. Introduction

Long bone fractures are prevalent in small ruminants and require either conservative treatment or deliberate surgical intervention depending on the severity and owner affordability (Aithal *et al.*, 1998) [1]. Supra-cutaneous implants have recently been used in veterinary medicine to treat open fractures in dogs and goats, with good results in bone healing and postoperative care (Klos *et al.*, 1995) [6]. Supra-cutaneous plating may be considered as an alternative to ESF for the treatment of long-bone fractures in the future (Nicetto and Longo 2019) [8]. The current study sought to assess physiological, haematological, and biochemical parameters in small ruminants undergoing supra-cutaneous plating for the repair of traumatic tibial fractures.

2. Materials and Methods

The current study was carried out on six clinical cases of tibial fractures in small ruminants presented to the Department of Veterinary Surgery and Radiology, Veterinary College, Bangalore. All of the animals were sedated 15 minutes prior to surgery with Inj. Xylazine hydrochloride @ 0.05 mg/Kg BW IM. The hanging limb method was used to reduce the fractured fragments to their normal anatomical positions. After applying a tourniquet above the stifle joint, 5ml of 2% Lignocaine hydrochloride was injected into the lateral superficial saphenous vein to induce intravenous regional analgesia. Supra-cutaneous plating was used to stabilise the tibial bone fractures. Physiological parameters like rectal temperature (°F), heart rate (beats per minute), and respiration rate (breaths per minute) were recorded on the 1st, 3rd, 7th, 15th, 30th, 45th, and 60th post-operative days, and haematological and biochemical estimations were done on the 1st, 7th, 15th, 30th, 45th, and 60th post-operative days during the study period. To reach a conclusion, the data were statistically analysed with a paired T-test using the computer-based statistical programme SPSS 20 and interpreted according to the procedure described by Snedecor and Cochran (1980) [9].

3. Results and Discussion

The mean preoperative rectal temperature was 102.93±0.071 (Mean±SE) °F while the post-operative rectal temperature ranged from 102.77±0.13 °F to 103.08±0.12 °F.

The mean preoperative heart rate was 75.50 ± 1.02 (Mean \pm SE) beats/min and the post-operative heart rate ranged from 73.00 ± 0.51 beats/min to 75.50 ± 1.02 beats/min. The mean preoperative respiratory rate was 22.16 ± 0.90 (Mean \pm SE) breaths/min while the post-operative respiratory rate ranged from 22.16 ± 0.90 breaths/min to 24.00 ± 0.51 breaths/min. All the physiological parameter variations were within the normal range with statistically insignificant fluctuations. This could be attributed to less surgical stress during surgery and no systemic reaction by the fixator frame, indicating that the frame did not interfere with vital physiological function. Similar observations were reported by Unni (2017)^[11], Athira (2018)^[2], Jahangirbasha (2019)^[5] and Manjunath (2021)^[7].

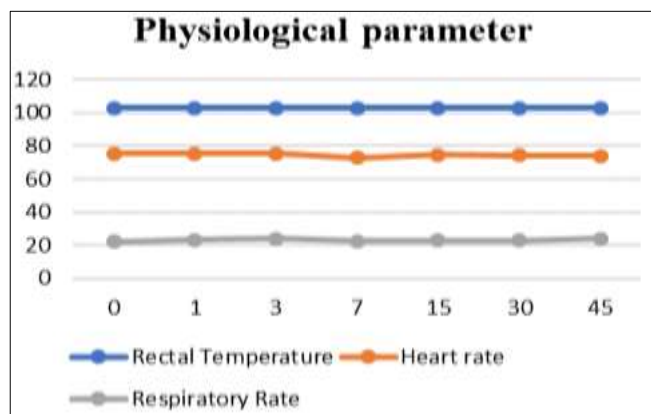


Fig 1: Variations in rectal temperature, respiratory rate and heart rate

The preoperative haemoglobin level was 10.72 ± 0.44 (Mean \pm SE) g% while the post-operative haemoglobin level ranged from 10.85 ± 0.37 g% to 11.80 ± 0.55 g%. The mean preoperative level of total erythrocyte count was 10.06 ± 0.20 (Mean \pm SE) $\times 10^6$ Cells/mm³ and the post-operative total erythrocyte count values varied from 10.00 ± 0.16 $\times 10^6$ Cells/mm³ to 10.28 ± 0.51 $\times 10^6$ Cells/mm³. The mean

preoperative total leukocyte count was 11.80 ± 0.43 (Mean \pm SE) $\times 10^3$ Cells/mm³ and post-operatively it ranged from 11.14 ± 0.26 $\times 10^3$ Cells/mm³ to 11.90 ± 0.17 $\times 10^3$ Cells/mm³. The variations recorded were statistically insignificant and the results were within the normal range which could be due to the minimal blood loss during the surgical procedure and regular dressing of the surgical site along with course of antibiotic which avoided infection. The observations were in accordance with Unni (2017)^[11], Athira (2018)^[2] and Manjunath (2021)^[7].

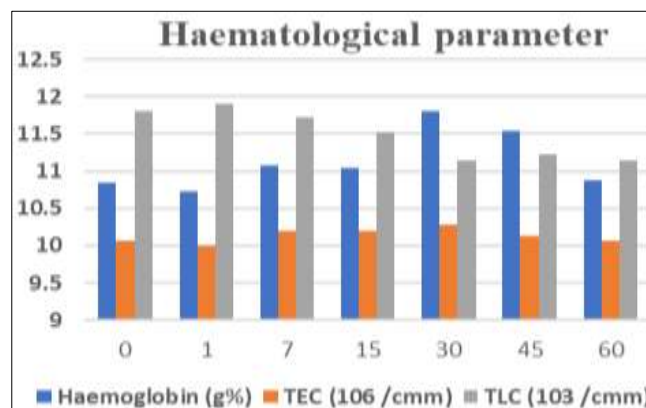


Fig 2: Variations in haemoglobin, total erythrocyte count and total leukocyte count

The mean Differential leucocyte count (DLC) (%) i.e., neutrophils, lymphocytes, monocytes, eosinophils and basophils count ranged from 36.20 ± 0.46 to 37.30 ± 0.24 , 58.31 ± 0.19 to 59.45 ± 0.46 , 2.41 ± 0.60 to 2.83 ± 0.15 , 1.35 ± 0.67 to 1.50 ± 0.10 , and 0.51 ± 0.06 % to 0.61 ± 0.05 respectively and the mean values of the different leucocytes varied non-significantly. The findings were consistent with those of Unni (2017)^[11], Athira (2018)^[2] and Manjunath (2021)^[7].

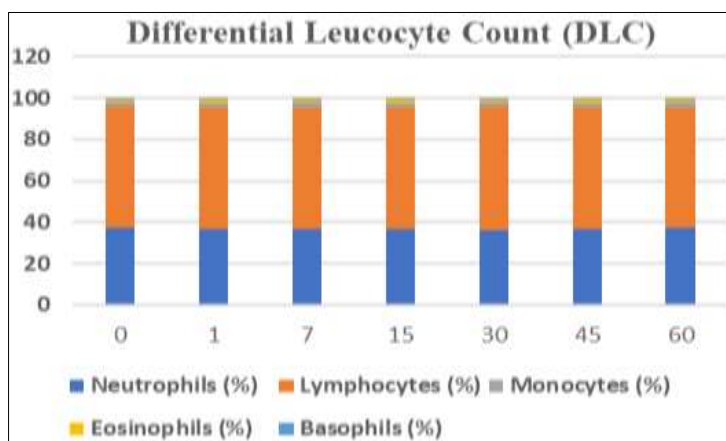


Fig 3: Variations in differential leucocyte count

The mean preoperative serum calcium level was 8.74 ± 0.15 (Mean \pm SE) mg/dL. The mean postoperative serum calcium levels varied from 8.74 ± 0.15 mg/dL to 9.14 ± 0.24 mg/dL. The mean preoperative serum phosphorus value was 6.66 ± 0.17 (Mean \pm SE) mg/dL. Post-operative serum phosphorus levels ranged from 6.48 ± 0.19 mg/dL to 6.92 ± 0.25 mg/dL. The mean serum calcium levels declined non-significantly from the 7th to the 45th post-operative day, which increased non-

significantly up to the 60th day. The increased serum calcium utilization at the fractured site may reflect the slight reduction in serum calcium during the early post-operative days. The observations were in accordance with Manjunath (2021)^[7]. However, Umarani and Ganesh (2002) discovered a considerable reduction in serum calcium levels on the seventh post-operative day, followed by a marked rise from the 15th to 60th day in goats treated for fracture.

The mean preoperative serum alkaline phosphatase level was 309.18 ± 21.37 IU/L, while the post-operative level ranged from 283.88 ± 9.07 IU/L to 341.11 ± 25.43 IU/L. There was a consistent increase in the level up to 15 days, followed by a drop in the level between 30 and 60 days post-operatively

with statistically insignificant variations. The observation was in accordance with Gupta (2015)^[4] and Manjunath (2021)^[7], whereas Dhandekar (2007) recorded significant increase in alkaline phosphatase from the preoperative day to the 15th day then dropped to normal by the 60th day.

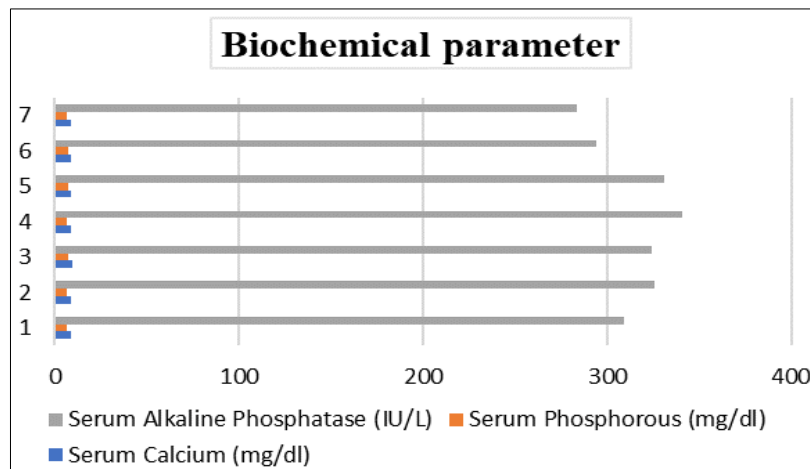


Fig 4: Variations in serum calcium, phosphorus and alkaline phosphatase

4. Conclusion

In all the six small ruminants treated with supra-cutaneous plating technique for tibial fractures, the physiological, haematological and bio-chemical parameters were studied on regular intervals. The physiological and haematological parameters were within the normal range indicating less surgical stress and minimal blood loss during the surgery. Whereas, the biochemical studies revealed that serum calcium declined non-significantly from the 7th to the 45th post-operative day, while serum alkaline phosphatase increased non-significantly up to the 15th day, followed by a drop between the 30th and the 60th day postoperatively. Serum phosphorus, on the other hand, showed no significant variations in all six small ruminants. Supra-cutaneous plating for tibial fracture in sheep and goats had satisfactory outcomes since the technique was simple to use, offered great stability to the fractured fragments. The procedure is minimally invasive, it neither requires incision at the time of plating for fracture repair nor at the time of plate removal after healing with negligible complications.

5. References

- Aithal HP, Singh GR, Bist GS. Incidence of fractures in different domestic animals. A twenty-year survey analysis. Paper presented in XXII Annual congress of Indian Society for Veterinary Surgery, convention, Bhubaneswar, Orissa, India; c1998. p. 5-7.
- Athira VP. Uniplanar bilateral acrylic external skeletal fixation for the treatment of long bone fracture in goats. M.V.Sc. Thesis, Kerala Veterinary and Animal Sciences University, Pookode, Kerala, India; c2018.
- Dandekar SV. Study on the efficacy of external fixation technique to repair lower limb fractures in goats. M.V.Sc. thesis, Maharashtra Animal and Fishery Sciences University, Nagpur, Maharashtra, India; c2007.
- Gupta S. Fracture healing using biphasic calcium phosphate with dynamic compression plating in goats. M.V.Sc. thesis, Nanaji Deshmukh Veterinary Science University, Jabalpur, India; c2015.
- Jahangirbasha D. Evaluation of different locking bone plates for fracture repair in goats. Ph.D. thesis, Karnataka Veterinary Animal and Fisheries Science University, Bidar, Karnataka, India; c2019.
- Klos Z, Ratajska-michalczyk K, Sterna J, Wisniewski D, Degorska B. Zespol stabilizer in the treatment of open fractures of the zeugopodium bones in dogs and a goat. In: *Advances in Materials Science and Implant Orthopedic Surgery.*, Springer, Dordrecht; c1995. p. 73-81.
- Manjunath G. Studies on percutaneous tibial fracture repair by intramedullary pinning in small ruminants. M.V.Sc. thesis, Karnataka Veterinary Animal and Fisheries Science University, Bidar, Karnataka, India; c2021.
- Nicetto T, Longo F. Supercutaneous plating for the treatment of traumatic injuries of the appendicular skeleton in dogs. *Veterinary and Comparative Orthopaedics and Traumatology.* 2019;32(2):149-157.
- Snedecor GW, Cochran WG. *Statistical Methods.* Edn. 6th. Iowa State University Press, Ames, Iowa; c1980.
- Umarani R, Ganesh TN. Study of serum calcium, phosphorus and alkaline phosphatase during fracture healing of femur in goats. *The Indian Veterinary Journal.* 2003;80:377-378.
- Unni AR. Minimally invasive plate osteosynthesis (MIPO) for the management of long bone fracture in goats, M.V.Sc. Thesis, Kerala Veterinary and Animal Sciences University, Pookode, Kerala, India; c2017.