RESEARCH ARTICLE
JIVA 17 (3) December 2019

Received: 17.12.2019
Accepted: 31.12.2019

HAEMATO-BIOCHEMICAL OBSERVATIONS ON TREATMENT OF LONG BONE FRACTURE USING ELASTIC STABLE INTRAMEDULLARY NAILING IN DOGS[#]

Prabhukumar M. D.[1*], Dileepkumar K. M.[2], Devanand C.B.[3], Syam K. Vengopal[4], Indu V. Raj[5], Anoop S.[2], Sudheesh S. Nair[2] and Laiju M. Philip[2]

[1]M.V.Sc. Scholar, [2]Assistant Professor, [3]Professor & Head, [4]Professor & Head (UVH Kokkalai), [5]Assistant Professor (Department of Veterinary Anatomy & Histology)
Department of Veterinary Surgery and Radiology,
College of Veterinary and Animal Sciences Mannuthy, Kerala

**Corresponding author: prabhugowda.117@gmail.com*

ABSTRACT

Six apparently healthy dogs of either sex with fracture of long bone were selected for the study. All the six dogs were treated by elastic stable intramedullary nailing technique under general anaesthesia. Haematological and biochemical evaluations were conducted preoperatively, on the day of surgery, postoperatively on second, fourth, sixth and eighth week. The variations from the normal physiological range could be seen in the level of granulocytes, haemoglobin, volume of packed cells and total erythrocytes count, but remaining haematological parameters were within the normal level during the observation period. Statistically significant variations could be seen in the findings of lymphocytes and granulocytes. A mild elevation in the serum phosphorus level could be noticed on the day of surgery and remaining biochemical parameters were within the normal physiological level throughout the observation period. Serum calcium level was significantly higher on the eighth postoperative week compared with that of the day of surgery. Statistically significant elevation in the level of alkaline phosphatase was noticed on preoperative day, day of surgery and second postoperative week when compared with that of eighth postoperative week.

Keywords: Fracture, Haematology, Serum biochemistry, Elastic stable intramedullary nailing.

INTRODUCTION

Fracture of long bones is one of the major orthopaedic conditions encountered in dogs. Elastic stable intramedullary nailing (ESIN) has been widely used for the treatment of long bone fractures in paediatric patients. Singh *et al.* (2014) reported that diaphyseal fractures of tibia, radius ulna and femur in dogs treated with intramedullary nailing using titanium elastic nails showed early fracture healing. Advantages of ESIN are minimal invasiveness, avoidance of growth plate injury in paediatric fracture treatment, early bridging of callus and rapid restoration of bone continuity which leads to early limb function

 # Part of MVSc thesis submitted by first author to KVASU

(Ligier *et al.,* 1988; Lascombes *et al.,* 2006; Sahu, 2012). The present paper reports the haemato-biochemical changes during repair of fracture of long bones in dogs (Patil *et al.,* 2017).

MATERIALS AND METHODS

Six clinical cases of long bone fractures in dogs presented to the Surgery unit of University Veterinary Hospital, Mannuthy and Kokkalai during the period from March 2018 to May, 2019 were included in the study. Apparently healthy dogs of either sex with fracture of long bones were selected for the treatment. Five dogs belonged to the age group of six to twelve months and one dog was 11 years old. In all the six dogs, fracture correction was done by elastic stable intramedullary nailing technique under general anaesthesia. Inj. Ceftriaxone sodium @ 30mg/kg body weight intravenously and inj. Tramadol @ 2 mg per kg intramuscularly were given perioperatively. Antibiotic therapy was continued with tab. Cephalexin @ 30mg/kg body weight orally twice daily for 7 days and tab. Carprofen @ 2 mg per kg orally for analgesia three days post operatively. The operated limb was immobilised with plaster of paris cast for 15 days postoperatively. Haematological and biochemical evaluations were conducted preoperatively, on the day of surgery, postoperatively on second, fourth, sixth and eighth week. Blood sample was collected from either cephalic or saphenous vein in an EDTA vacutainer tube for the evaluation of haematological parameters *viz*. haemoglobin concentration (Hb), volume of packed red cell (VPRC), total leukocyte count (TLC), total erythrocyte count (TEC), differential leukocyte count (DLC) and platelet count and in serum vacutainer tubes to evaluate the serum levels of calcium, phosphorus and alkaline phosphatase.

The data obtained during the study were subjected to statistical analysis by using SPSS 24.0 version (Repeated measures ANOVA).

RESULTS AND DISCUSSION

The data on mean ± SE of haematological and serum biochemical parameters at different time intervals are presented in Table 1 and Table 2 respectively.

The haematological parameters total leucocyte count, lymphocyte count, monocyte count and platelet count were within the normal physiological range throughout the observation period but granulocyte count was above the normal limit on the preoperative day and day of surgery, but came to normal physiological range in the upcoming observation periods. There was minute decrease from the normal physiological range in haemoglobin concentration and total erythrocyte count and remarkable reduction in the packed cell volume throughout the observation period. The level of lymphocyte was significantly lower ($P<0.05$) in preoperative day and day of surgery when compared with that of eighth postoperative week. Significantly higher

(P<0.05) granulocyte count was noticed in preoperative day and the day of surgery when compared with that of sixth postoperative week and eighth postoperative week. Mathai (2015) and Venkateswaralu (2006) also reported that most of the haematological parameters did not show statistically significant variation during the period of fracture healing in dogs. The serum calcium level was within the normal physiological range throughout the observation period. However, it was significantly higher on the eighth postoperative week when compared with that of the day of surgery. Patil *et al.* (2017) also reported that elevation in serum calcium level was statistically significant (P>0.05) on eighth postoperative week when compared to the initial period of fracture healing in dogs. The serum phosphorus level was within the normal physiological range throughout the observation period except a mild elevation on the day of surgery, similar to the findings reported by Chandy (2000). Statistically significant elevation (P<0.05) in the level of serum alkaline phosphatase was noticed on preoperative day, day of surgery and second postoperative week when compared with that of eighth postoperative week. Similar findings were reported by Mathai (2015) and Athira (2018).

Table. 1: Observations on haematological parameters (Mean ± SE) (n=6)

Sl. No.	Parameters and unit	Preoperative day	Day of surgery	2^{nd}week	4^{th}week	6^{th}week	8^{th}week
1	Haemoglobin (Hb) g/dl	11 ± 0.56	11.42 ± 0.69	10.45 ± 0.75	10.77 ± 0.51	10.65 ± 0.55	10.97 ± 0.58
2	Volume of packed red cells %	26.97 ± 2.88	27.83 ± 2.73	27.52 ± 2.80	28.23 ± 2.54	27.1 ± 2.68	29.72 ± 2.81
3	Total Erythrocyte count (10^6/µL)	4.71 ± 0.46	5.04 ± 0.55	4.91 ± 0.45	5.07 ± 0.36	4.81 ± 0.42	5.33 ± 0.39
4	Total Leukocyte count (10^3 /cu mm)	14.6 ± 2.37	12.68 ± 2.70	14.58 ± 2.36	15.57 ± 3.06	13.52 ± 3.45	12.37 ± 1.43
5	Lymphocyte (%)	15.95^a ± 1.20	15.97^a ± 2.06	20.07 ± 1.58	20.25 ± 2.59	20.2 ± 2.61	25.93^b ± 3.35
6	Monocyte (%)	6.23 ± 0.58	5.83 ± 0.36	6.48 ± 0.92	7.07 ± 0.95	7.48 ± 0.76	7.63 ± 0.72
7	Granulocyte (%)	77.82^a ± 2.50	78.02^a ± 2.34	72.62 ± 2.20	72.6 ± 3.24	70.9^b ± 2.48	66.43^b ± 3.91
8	Platelet count (10^3/µL)	242.33 ± 34.30	213.17 ± 48.53	320.83 ± 27.18	293.17 ± 60.11	249.33 ± 12.30	271 ± 52.64

Table. 2: Observations on serum biochemical parameters (Mean ± SE) (n=6)

Sl No	Parameters and unit	Preoperative day	Day of surgery	2nd week	4th week	6th week	8th week
1	Calcium (mg/dl)	11.02 ± 0.82	10.1[a] ± 0.42	12.09 ± 2.10	10.25 ± 0.64	11.2 ± 0.40	11.42[b] ± 0.36
2	Phosphorus (mg/dl)	5.45 ± 0.86	6.24 ± 0.71	5.59 ± 0.50	5.26 ± 0.58	5.9 ± 0.37	5.53 ± 0.60
3	Alkaline phosphatase (IU/L)	314.17[a] ± 46.12	330.05[a] ± 60.32	386.30[a] ± 68.44	288.95 ± 38.20	279.37 ± 49.01	255.6[b] ± 38.93

a,b: Means with different letter as super scripts within a row differ significantly

SUMMARY

Dogs treated with elastic stable intramedullary nailing for long bone fractures showed significant variation in the level of lymphocytes, granulocytes, serum calcium and serum alkaline phosphatase during the periods of observation.

REFERENCES

Athira, V.P. 2018. Uniplanar bilateral acrylic external skeletal fixation for the treatment of long bone fracture in goats. *MVSc thesis*, Kerala Veterinary and Animal Sciences University, Pookode, 85p.

Chandy, G. 2000. Clinical evaluation of stainless steel and acrylic external fixator as adjuncts to intramedullary pinning for fracture of femur in dogs. *M.V.Sc thesis*, Tamil Nadu Veterinary and Animal Sciences University, Chennai, 75p.

Lascombes, P., Haumont, T. and Journeau, P. 2006. Use and abuse of flexible intramedullary nailing in children and adolescents. *J. Pediatr. Orthop.* **26**: 827-834.

Ligier, J.N., Metaizeau, J.P., Prévot, J. and Lascombes, P. 1988. Elastic stable intramedullary nailing of femoral shaft fractures in children. *J. Bone Jt. Surg.* **70**: 74-77.

Mathai, V.S. 2015. Comparative evaluation of closed and open static intra-medullary interlocking nail fixation in dogs. *Ph.D thesis*, Kerala Veterinary and Animal Sciences University, Pookode, 146p.

Patil, M., Dilipkumar, D., Shivaprakash, B.V, Kasaralikar, V.R., Tikare, V.P. and Ramesh, B.K. 2017. Physiological and haemato-biochemical changes during repair of femur fracture in dogs. *Pharma Innovation J.* **6**: 381-385.

Sahu, R. 2012. Titanium elastic nails for pediatric femur fractures: A treatment concept. *J. Orthop.* **13**: 44-48.

Singh, S.V., Singh, V., Gautam, P. and Tiwari, M. 2014. Titanium elastic nailing for management of long bone fractures in

dogs: A novel technique [abstract]. In: *Compendium, XXXVIII Annual Congress of ISVS and International Symposium on New Horizons of Camel Surgery and Large Ruminant Surgery*; 15th to 17th October, 2014, Bikaner. Rajasthan University of Veterinary and Animal Sciences. p. 179.Abstract No. 56.

Venkateswaralu, B. 2006. External skeletal fixation in combination with intra-medullary pinning for management of long bone fractures in dogs. *MVSc thesis*, Kerala Veterinary and Animal Sciences University, Pookode, 92p.