CLINICO- PHYSIOLOGICAL AND HEMATO-BIOCHEMICAL OBSERVATIONS DURING TREATMENT OF FRACTURE IN GOATS USING LIMITED CONTACT DYNAMIC COMPRESSION PLATE

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Abstract

The study was conducted on six clinical cases of fracture of tibia in goats free from neurologic, metabolic or infectious diseases, irrespective of age, breed, sex, and bodyweight. The goats found fit for surgical procedure were treated by minimally invasive plate osteosynthesis (MIPO) using limited contact dynamic compression plate (LC-DCP) under general anaesthesia. Clinical, physiological, haematological and biochemical evaluations were conducted preoperatively, on the day of surgery and on 15th, 30th and 60th postoperative days. Normal weight bearing with good functional outcome was noticed by 60th postoperative day (after surgical treatment of fracture). In the present study, physiological and haematological parameters varied within the normal range throughout the period of observation. The serum calcium and phosphorus levels decreased throughout the period of study, but was within the normal range. The preoperative serum alkaline phosphatase level was found elevated which further increased by 15th postoperative day and later returned to normal range by 60th postoperative day. From the present study, it could be concluded that surgical treatment of long bone fractures using LC-DCP did not significantly affect the physiological and haemato-biochemical parameters in goats.

Key words: *MIPO, LC-DCP, physiology, haematology, serum biochemistry, goats*

Fractures of long bones are very common in goats. They are treated either conservatively by external coaptation, or by

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internal/external fixation techniques. Owing to the associated drawbacks and disturbances of soft tissue at the fracture site, attempting treatment for fracture of long bones in goats resulted in inadequacies in bringing the animal back to pre-disease state. Advances in understanding fracture complications and bone healing lead to modification of technique of internal fixation using limited contact dynamic compression plates (LC-DCP) which utilises the principles of biological osteosynthesis (Perren, 2002).

The technique of plate introduction through skin incision made away from the site of fracture was termed as minimally invasive plate osteosynthesis (MIPO) and the procedure is less time consuming and provide stable fixation with minimal damage to soft tissue and vasculature. It also provided good immobilisation, early return of limb function following indirect fracture healing (Krettek, 2001).

Taking into consideration all this beneficial effects, the study was conducted in fractures of tibia in six goats using limited contact dynamic compression plate and the present paper reports clinico-physiological and hemato-biochemical changes following the implantation of plates throughout the observation period.

Materials and Methods

Six kids with age between 1.5 to 2 months irrespective of breed, sex, age and bodyweight, having fracture of long bones, were selected for the study. Pre-surgical evaluation of the patient was conducted and, all the kids were subjected to treatment of fracture by minimally invasive plate osteosynthesis (MIPO) using limited contact dynamic compression plate (LC-DCP) under general anaesthesia with informed consent of the owner. Clinical, physiological, haematological and biochemical evaluations were conducted preoperatively, on the day of surgery and on 15th, 30th and 60th postoperative day. The kids were administered with antibiotics and analgesics postoperatively and the limb was immobilized with Modified Robert-Jones bandage.

Statistical analysis of data was performed by SPSS software.

Result and Discussion

In the present study, clinical evaluation indicated presence of oedema and pain on palpation of fracture site in all cases when presented to the hospital. Oedema subsided by 3rd day of presentation and pain on palpation subsided by 15th postoperative day. The physical status of all the cases indicated normal growth and development during the postoperative period.

Normal limb length, range of motion and moderately increased limb girth was noticed on comparison with the opposite member in all the kids at 60th postoperative day. Lameness grade showed gradual improvement to normal weight bearing over the period of study with good functional outcome by 60th postoperative day.

The conjunctival mucous membrane was pink and capillary refill time was less than

Table: 1 Observations on Physiological Parameters

Parameters	Day of presentation	Day of surgery	Postoperative day 15	Postoperative day 30	Postoperative day 60
Rectal Temperature (^{0}F)	101.38 ± 0.56^{b}	102.00 ± 0.71^{ab}	102.06 ± 0.59^{ab}	102.95 ± 0.37^{ab}	102.38 ± 0.62^{ab}
Pulse rate (per min)	175.17 ± 1.75^{a}	162.83 ± 2.84^{b}	125.00 ± 2.04^{d}	114.17 ± 0.94^{e}	99.17 ± 2.38^{f}
Respiration rate (Per min)	38.50 ± 0.61^{a}	32.33 ± 0.49^{b}	19.00 ± 1.06^{d}	14.67 ± 1.11^{e}	14.17 ± 0.70^{e}

Means with different superscript differ significantly (P<0.05) (n=6)

Table: 2 Observations on Haematological Parameters

Parameters	Day of presentation	Day of surgery	Postoperative day 15	Postoperative day 30	Postoperative day 60
Total Erythrocyte Count (10^6/uL)	15.40 ± 0.72	15.34 ± 0.66	15.34 ± 0.63	15.16 ± 0.63	15.15 ± 0.57
Total Leukocyte Count (10^3/uL)	9.47 ± 0.73	9.66 ± 0.85	9.69 ± 0.82	9.72 ± 0.70	9.75 ± 0.65
Haemoglobin (Per cent)	11.31 ± 0.70	11.16 ± 0.70	11.11 ± 0.73	11.11 ± 0.73	11.06 ± 0.72
Volume of Packed Red Cell (Per cent)	32.40 ± 1.07	32.33 ± 1.03	32.33 ± 0.97	32.11 ± 0.97	32.10 ± 0.98
Lymphocyte (Per cent)	58.70 ± 2.05	58.59 ± 2.10	58.56 ± 2.16	58.50 ± 2.10	58.49 ± 2.00
Monocyte (Per cent)	2.62 ± 0.40	2.65 ± 0.33	2.45 ± 0.45	2.47 ± 0.32	2.62 ± 0.37
Granulocyte (Per cent)	38.66 ± 2.09	38.75 ± 2.00	38.98 ± 2.19	39.02 ± 2.12	39.10± 2.06
Erythrocyte Sedimentation Rate (mm/hr)	2.00 ± 0.36	2.00 ± 0.36	2.00 ± 0.36	2.00 ± 0.16	2.00 ± 0.00

Means with different superscript differ significantly (P<0.05) (n=6)

Table: 3 Observations on Biochemical Parameters

Parameters	Day of presentation	Day of surgery	Postoperative day 15	Postoperative day 30	Postoperative day 60
Serum Calcium (mg/dl)	8.93 ± 0.15	8.83 ± 0.17	8.66 ± 0.19	8.58 ± 0.17	8.53 ± 0.22
Serum Phosphorous (mg/dl)	5.11 ± 0.17^{a}	5.03 ± 0.18^{a}	4.60 ± 0.20^{abc}	4.28 ± 0.24^{bc}	4.13 ± 0.28^{c}
Serum Alkaline Phosphatase (U/L)	211.83 ± 5.87^{c}	251.67 ± 3.80^{b}	257.83 ± 4.07^{b}	221.17 ± 3.28^{c}	163.33 ± 5.16^{d}

Means with different superscript differ significantly (P<0.05) (n=6)

two seconds in all the cases throughout the period of study.

The pulse rate and rate of respiration decreased significantly (P<0.05) within the normal physiological range for the respective age of the animal throughout the period of study. The rectal temperature increased significantly (P<0.05) but within the normal physiological range throughout the period of study. (Table 1)

The haemoglobin concentration, total erythrocyte count, volume of packed red cell and percentage of lymphocyte found decreased at various period of observation. The decrease was not significant, and the values were within the normal range. These observations were similar to those reported by Gupta (2015). The erythrocyte sedimentation rate and percentage of monocytes remained within the normal physiological range throughout the study with no significant difference (P>0.05). The total leukocyte count and percentage of granulocyte increased insignificantly (P<0.05) within the normal physiological range throughout the study. This observation was similar to that made by Gupta (2015). (Table 2)

The serum calcium levels varied during the period of study, but was within the normal range. The variations noted were not significant. This observation was similar to that made by Kumar *et al.* (1992). (Table 3)

The serum phosphorous level was found decreased at various time of observation, but was within normal range. This change in serum level of phosphorus can be because of the fracture healing. This observation was similar to that made by Kumar *et al.* (1992). (Table 3)

The serum alkaline phosphatase level was high on the day of presentation and it increased significantly (P>0.05) on the day of surgery and 15th postoperative day. The level decreased significantly (P>0.05) on 30th and 60th postoperative days and was found within normal physiological range. These findings were similar to those made by Vasanth (1991). (Table 3)

Conclusion

The results of the study revealed that there was no significant alterations in the clinico-physiological and haemato-biochemical parameters during the treatment of fracture in goats using limited contact dynamic compression plate (LC-DCP).

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