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**EVALUATION OF PARTIAL THICKNESS
SUTURING TECHNIQUE FOR THE REPAIR
OF AURAL HAEMATOMA IN DOGS**

**By
ASHA LATHA. A.**

**Thesis submitted in partial fulfilment of the
requirement for the degree of**

Master of Veterinary Science

**Faculty of Veterinary and Animal Sciences
Kerala Agricultural University, Thrissur**

2004

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DECLARATION

I hereby declare that this thesis entitled "EVALUATION OF PARTIAL THICKNESS SUTURING TECHNIQUE FOR THE REPAIR OF AURAL HAEMATOMA IN DOGS" is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title, of any other University or Society.

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CERTIFICATE

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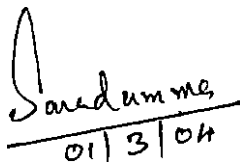
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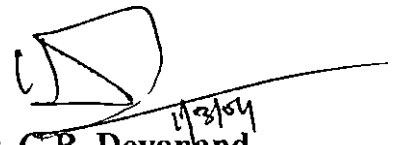
We, the undersigned members of the Advisory Committee of **Ms. Asha Latha .A.**, a candidate for the degree of Master of Veterinary Science in Surgery, agree that the thesis entitled **“EVALUATION OF PARTIAL THICKNESS SUTURING TECHNIQUE FOR THE REPAIR OF AURAL HAEMATOMA IN DOGS”** may be submitted by **Ms. Asha Latha .A.**, in partial fulfilment of the requirement for the degree.



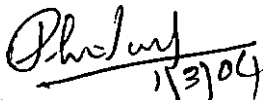
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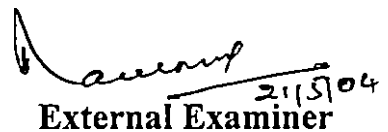
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ACKNOWLEDGEMENT

I would like to express my sincere and heartfelt gratitude to Dr. K. Rajankutty, Associate Professor, Department of Veterinary Surgery and Radiology and Chairman of the advisory committee, for his guidance, expert planning, fruitful suggestions and supporting attitude which lead me to the gateway of success.

With a deep sense of gratitude and respect I express my heartfelt thanks and true indebtedness to Dr. T. Sarada Amma, Associate Professor and Head, Department of Veterinary Surgery and Radiology; for her valuable suggestions and academic support.

I am very much obliged to Dr. C.B. Devanand, Assistant Professor (Sr. Scale), Department of Veterinary Surgery and Radiology for having given expertise, personal attention and inimitable help as a member of advisory committee during each phase of this research work.

I am very much grateful to Dr. P.T. Philomina, Associate Professor and Head, Department of Veterinary Physiology, for her advice and encouragement as a member of advisory committee.

May I acknowledge with profound gratitude the invaluable help and guidance rendered by my teachers Dr. Syam K. Venugopal, Dr. K.D. John Martin and Dr. M.K. Narayanan, Assistant Professors, Department of Veterinary Surgery and Radiology.

I would like to express my sincere gratitude to Dr. Joshy George, Dr. D. Prasanna, Dr. Divya Balan, Dr. Sachin J. Shenoy, Dr. Philip Varghese, Dr. Reshma Damodaran, Dr. B. Julie and Dr. Laiju M. Philip for their whole-hearted help, moral support, co-operation and assistance during the entire period of my study.

I express my special thanks to Mrs. K. Indira Devi, Radiographer, Department of Veterinary Surgery and Radiology for the encouragement during the period of study.

I hereby record my sincere thanks to Mr. Jayesh, Smt. Mary and Smt. Latha for their timely assistance for the conduct of the work.

With great pleasure, I appreciate the help and encouragement showered by Dr. Mary Juliet, Dr. C. Smithamol, Dr. M.S. Preethi and Dr. M.R. Thushara.

I acknowledge with deep sense of gratitude to Dr. G. Krishnan Nair, Associate Professor, Department of Microbiology, Dr. N. Divakaran Nair, Associate Professor, Department of Pathology and Smt. M. Sujatha, Associate Professor, Department of Statistics for their whole-hearted help and co-operation.

I hereby record my sincere thanks to 1997 and 1998 students for their help and co-operation extended during my work.

I express my extreme sense of gratitude to the Dean, College of Veterinary and Animal Sciences, Mannuthy for providing the facilities to carry out the research work.

I am grateful to Mr. O.K. Ravindran and Sherly Johny, C/o Peagles, Mannuthy for the assistance in the preparation of thesis.

With immense pleasure I would like to acknowledge with gratitude the moral support and heartfelt blessings extended by my parents, sisters and in-laws in fulfilling this endeavour.

This task would not have been completed successfully but for the understanding, love, mental support and constant encouragement by my beloved husband Mr. K. Santhoshkumar. I express my heartfelt gratitude to him for bearing with me all the inconveniences.

Above all I bow before the Almighty for all the blessings showered upon me and holding me safe and sound until today.

ASHA LATHA .A.

Dedicated to My Family

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Introduction

INTRODUCTION

Aural haematoma is often encountered in dogs. It is usually formed on its concave aspect, but in rare cases it is seen on the convex aspect, and more rarely in both places. The blood is accumulated between the perichondrium and cartilage (O'Connor, 1980). The condition has also been reported in cat (Scott, 1990), sheep (Morgan, 1992), cow (Mouli, 1989), tree shrew (Brack *et al.*, 1989), rabbit and man (Howard, 1935).

The etiology is not clear and the most accepted theory is that the haematomas develop as a result of ruptured blood vessels within the pinna following otic inflammation, which causes the animal to scratch or shake its head excessively (Angarano, 1988). Recent reports suggested that the disease has autoimmune pathogenesis (Kuwahara, 1986; Joyce and Day, 1997).

Both surgical and non-surgical management of auricular haematoma had been described in the literature (Matera and Marcondes, 1965; Barnes, 1975; Weber, 1979; Kagan, 1983; Venker-Van Haagen, 1983; Cechner, 1990).

Many treatments have been advocated for haematomas, varying from simple aspiration to surgical techniques. Non-surgical methods often may not be effective because of the difficulty in preventing dead space and recurrence of the condition due to inadequate drainage of the contents. Surgical methods of treatment claimed to be more effective than non-surgical methods. But certain post-operative complications like puckering of the pinna and drooping of pinna in erect eared breeds affect the cosmetic appearance.

The present study was undertaken with the objective to evolve a technique which avoids puckering and drooping of pinna in dogs with erect-ears following haematoma operation.

Review of Literature

REVIEW OF LITERATURE

Garbutt (1952) claimed to have obtained best results by treating haematoma of the ear by puncturing the swelling by a hypodermic needle and withdrawing the fluid contents using a syringe, followed by injecting a small amount of tincture of iodine into the cavity and later sealing the opening with a collodium-iodine mixture.

Lacroix (1952) incised the haematoma, evacuated the contents and depending on the size of the ear either a two or three inch long gauze roll bandage was applied against the incision and held in position using adhesive tape. This method claimed to have prevented disfigured corrugations in erect-eared breeds.

Riser (1957) reported less chance of recurrence following treatment of haematoma after having put a longitudinal incision, drawing the fluid, application of through-and-through sutures and bandaging.

Leighton (1964) incised haematoma longitudinally and employed either through-and-through suture technique or metal staples for the treatment of aural haematoma in cats.

Blakemore (1968) tried medical treatment for aural haematoma by aspirating the blood and then injecting aqueous corticosteroid. But surgical treatment was recommended in cases where fibrin clots had been formed, to prevent thickening of the pinna.

Fraser *et al.* (1970) recommended early treatment of haematoma so as to minimize pressure damage to the underlying conchal cartilage.

Ott (1974) reported many methods for treatment of aural haematoma, but through-and-through mattress suture technique with protective bandage was found most satisfactory wherein the sutures extended from the convex surface of

the ear through the skin, cartilage and the skin on the concave surface, emerging 8 mm from the incision and placed parallel to the incision and tied on the convex surface.

O'Connor (1980) reported that aural haematoma can be treated by opening the swelling at its centre by an incision extending from its base to its apex, evacuating the contents, and swabbing the lining with tincture iodine. After putting a series of interrupted sutures or Halsted sutures through the ear, the ear was immobilized with a well fitted cap until healing had occurred.

Kagan (1983) managed aural haematoma in dogs by manual expression of the contents through stab incisions in the pinna and placement of indwelling *silicone rubber drains, without compression bandage*. The drains were well tolerated by the patients and were non irritating to the tissues. Eventhough the treatment procedure was simple, the treatment period was longer and daily cleaning and massaging the pinna to facilitate drainage was required for the efficacy of treatment.

Wilson (1983) employed drainage method utilizing a Larson's teat tube for the treatment of aural haematomas in dogs and cats, which was easy to perform and required a minimum of expendable materials. Animals quickly returned to normal activity, after care was simple, healing was rapid, and the healed ear was cosmetically acceptable, but the time required for the tube removal and complete correction was more.

Dubielzig *et al.* (1984) studied the pathogenesis of canine aural haematoma and the morphological examination revealed development of haematoma within the pinnal cartilage. The cartilage had fractured from perichondrium to perichondrium and in some area clefts had formed within the cartilage. Cartilage fracture could have resulted from wave motions set up in the pinna during head shaking. An explosive burst of head shaking exceeding a

critical head velocity or a more gentle but sustained head shaking establishing a sinusoidal wave motion within the ear could have caused cartilage fracture.

Kolata (1984) described a quick and effective surgical technique to treat aural haematomas in dogs, wherein a ¼ inch latex drain was placed into the haematoma cavity after making a stab incision in the proximal and distal limits of the haematoma to empty the clotted blood and later flushing with sterile saline. The ends of the drain protruding through the incisions were sutured. The pinna of the ear was secured with tape on both surfaces, drawn dorsally and caudally and bandaged to the dog's neck to prevent *continued trauma to the ear by head-shaking*. Appearance of the healed ear was good in all cases.

Gourley and Vasseur (1985) successfully treated aural haematoma in dogs by opening the haematoma by a large medial incision and reapposing the ear flaps with through-and-through vertical sutures of monofilament nylon or polypropylene with knots placed on outside surface of the pinna.

Kuwahara (1985) suggested the cause of aural haematoma as an autoimmune reaction, and *evaluated the effectiveness of corticosteroid therapy in the management of aural haematoma in dogs and cats*. In most of the cases, complete remission of haematoma occurred within three to nine days, with minimal visible morphological sequelae.

Fox and Woody (1986) compared several treatment modalities like placement of Larson T-tube, indwelling drain and incision with proper suture placement for managing auricular haematoma in dogs. Larson T-tube and indwelling drain claimed to have their advantages like its ease of application, optional head bandage, good cosmetic results and its low cost, but there was likelihood of recurrence of haematoma. From the results of the studies it was also opined that healing process of aural haematoma involves marked chondrocyte recruitment, production of new cartilage, bending of the auricular

cartilage around the newly produced cartilage and distortion of the pinna during healing.

Kuwahara (1986) investigated the pathogenesis of aural haematoma in dogs and cats. A comparative analysis of blood and haematoma fluid, revealed decrease in colour, turbidity, specific gravity, PCV and total protein in haematoma fluid. Fibrinogen was absent in haematoma fluid. The study revealed that aural haematoma was not produced by experimental trauma. Examination of haematoma fluid revealed presence of immunoglobulin IgG anti-DNA antibodies in it. Increase in total serum protein concentration and serum IgG concentration were estimated. Coomb's test and Antinuclear antibody (ANA) test were positive in all the dogs and cats with aural haematoma. The studies revealed the importance of immune mediated pathogenesis as the actual cause of aural haematoma.

Angarano (1988) suggested the cause of haematomas in dogs and cats as immune-mediated rather than otic trauma. All the dogs and cats in the study were positive on direct and indirect Coomb's tests and 50 per cent of them had a positive antinuclear antibody titre.

Bojrab et al. (1990) opined the cause of aural haematoma as self-inflicted trauma from head shaking, scratching and rubbing the affected ear. Suture technique and sutureless technique for the repair of aural haematoma were compared. Suture technique included, putting incision and drainage combined with suturing the skin to the cartilage and then bandaging. Sutureless technique comprised of putting elliptical incision, curetting, irrigating and then reflecting the pinna over a large roll of cast padding and taped in place. Eventhough suture technique was successful it had disadvantages like thickening, wrinkles and contraction/cauliflowering of ear.

Narwade and Diwan (1992) reported the treatment of aural haematoma by employing modified Marshall Putney's technique in dogs, in which button

sutures were used. Drooping of the pinna in dogs with erect ears and pressure necrosis below the buttons were noticed as the post-operative complications.

Henderson and Horne (1993) recommended various methods of treatment for aural haematoma depending on its severity, such as needle aspiration, use of a self-retaining disposable teat cannula, incision (straight, cruciate, or S-shaped) to remove the fibrin and reapposing of the tissue by loosely tied mattress sutures, placed through the ear. It was also recommended to immobilize the ear against the dorsum of the head or neck with a light protective bandage.

Joyce (1994) used an indwelling Penrose drain and oral prednisolone for treatment of aural haematoma in dogs. Good cosmetic results were achieved in all cases but the time period required was more for the treatment.

Sobti *et al.* (1994) treated aural haematoma in dogs by putting a longitudinal stab incision on the concave side of the pinna about 2 cm away from the tip and applied interrupted vertical mattress sutures with monofilament nylon after draining the fluid and flushing the cavity with 5% povidone iodine solution. The technique was found satisfactory however, in a few cases partial refilling in a very small area was observed.

Swaim and Bradley (1996) evaluated closed suction drainage for treating auricular haematomas in dogs. The technique was found simple and inexpensive, but the recurrence of haematoma was occasionally encountered.

The treatment of choice recommended by Tyagi and Singh (1996) in case of aural haematoma was incision and drainage of the haematoma, curetting and irrigating the cavity with a mild antiseptic solution and obliteration of the cavity with through and through horizontal mattress sutures placed on both sides of incision.

Joyce and Day (1997) reviewed 15 cases of aural haematoma in dogs to investigate a range of biochemical, immunological and histopathological

parameters to examine whether haematoma has an autoimmune pathogenesis. All dogs were Coombs' test negative and Antinuclear antibody had negative or low titres in all the 11 cases tested. Histopathological examination of biopsies from the affected ears revealed variable degrees of erosion of auricular cartilage with fibrovascular granulation tissue filling the cartilage defects. There was minimal perichondral inflammation. Though the findings of the study did not support an autoimmune pathogenesis for canine aural haematoma, it suggested the involvement of an early immunological event in the development of cartilage erosion.

Aithal *et al.* (2000) reviewed ten cases of aural haematoma in dogs to evaluate the efficacy of corticosteroid in the treatment. Local injection of dexamethasone (@ 0.25 mg/kg body weight) and gentamicin (@ 1.0 mg/kg body weight) once in every 24/48 hours helped to cure the haematoma in 80 per cent of cases. Normal saline irrigation helped to remove the blood clots and other debris present in the haematoma cavity. The animals treated with cortisone therapy showed less degree of fibrosis, malformation and drooping of pinna which were very common after conventional surgical treatment.

Dye *et al.* (2002) described a new technique using the carbon dioxide (CO₂) laser for the treatment of aural haematomas to allow for evacuation of the blood, and then multiple, small incisions were made over the surface of the haematoma to stimulate adhesions between the tissue layers. The cosmetic results were fair to excellent.

Materials and Methods

MATERIALS AND METHODS

The study was carried out in twelve selected clinical cases of aural haematoma in dogs of different breeds of either sex presented to the Veterinary College Hospitals at Mannuthy and Kokkalai. The animals were divided into two groups viz., Group I and Group II, each consisting of six animals numbered serially from one to six. The following lines of treatments were adopted.

In Group I, surgical drainage was carried out and the dead space was obliterated by applying a series of through and through (full thickness) interrupted mattress suture.

In Group II, surgical drainage was carried out and the dead space was obliterated by applying a series of partial thickness interrupted mattress suture.

Pre-operative considerations

Animals with history of recent occurrence of haematoma, tablets containing rutin¹ were administered twice daily orally for four consecutive days before surgery, to favour clot formation. In all the animals food was withheld for 18 hours and water for 12 hours prior to surgery.

Surgical Management

Preparation of the site

The external ear canal was examined, cleaned and packed with cotton to prevent fluid or blood from entering the ear canal during surgery. The pinna of the affected ear was shaved on both sides, scrubbed, mopped, painted with Tincture Iodine and draped for aseptic surgery.

¹Styptovit - Dr. Reddy's Laboratories Ltd. 7-1-27, Ameerpet, Hyderabad - 500 016

Anaesthesia

All the dogs were premedicated with intramuscular administration of atropine sulphate¹ at the dose rate of 0.045 mg/kg body weight. Thereafter at 10 minutes interval xylazine² and ketamine hydrochloride³ at the rates of 1 mg/kg and 10 mg/kg body weight respectively were administered intramuscularly to effect general anaesthesia.

Surgical technique

All the animals were controlled in lateral recumbency with affected ear up. The haematoma was opened by a longitudinal skin incision along its entire length on the concave aspect of the pinna. A small elliptical piece of skin was excised from one edge of the wound. The contents were evacuated and the cavity was flushed with sterile normal saline solution to remove blood clots, fibrin deposits and other debris.

In Group I, the dead space was obliterated by a series of through and through (full thickness) interrupted mattress sutures placed parallel to the incision, in one to four rows depending on the size of haematoma, piercing through the skin of convex surface of pinna, cartilage and the skin of the concave surface of the pinna and returned to the convex surface by taking a bite 5 mm away and sutures were fixed by granny knots using braided silk (1/0). The sutures were tied just enough to appose the cartilage and skin. The incised cutaneous edges were left unapposed (Fig.1-3).

In Group II, the dead space was obliterated by applying a series of partial thickness interrupted matters sutures placing parallel to the incision, starting from the concave surface of the pinna piercing through the skin and cartilage including the subdermal tissue and returning to the concave surface by taking a 'U' shaped

¹Atropine-Atropine sulphate (each ml contains: Atropine sulphate I.P. 0.6 mg) – Harson Laboratories, Akota, Baroda – 390 020

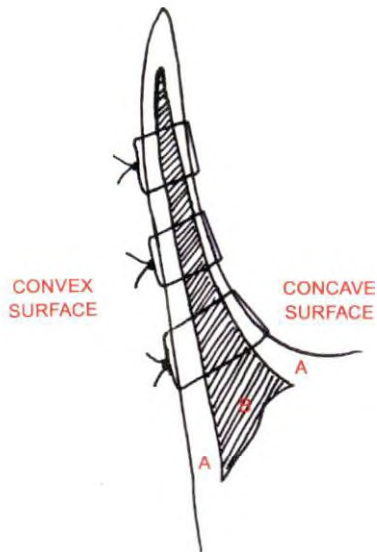
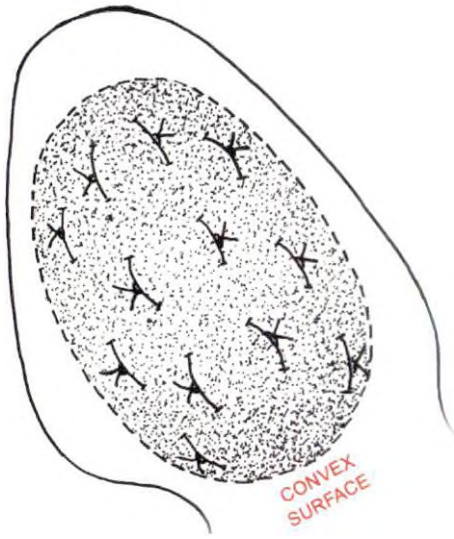
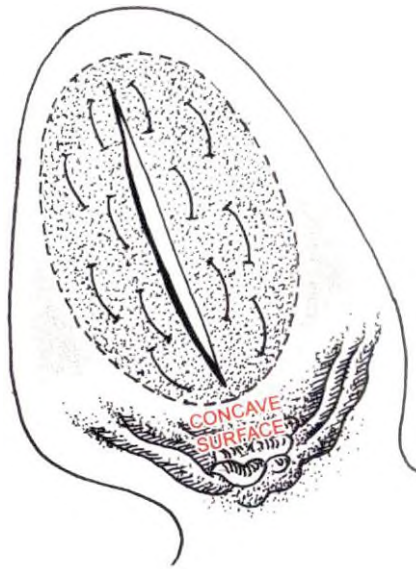
²IZINE (each ml contains: Xylazine hydrochloride BP (Vet.) 23.32 mg equivalent to xylazine 20.0 mg) – Intas Pharmaceuticals Ltd., Matoda – 382 210, Ahmedabad, India

³KETMIN 50 (each ml contains: Ketamine 50 mg as Ketamine hydrochloride, Themis Medicare Ltd., 11/12, Udyognagar, S.V. Road, Goregoan, Mumbai – 400 104

Fig.1 **Concave surface of the pinna with full thickness sutures**
(Group I) (Diagrammatic representation)

Fig.2 **Convex surface of the pinna with full thickness sutures**
(Group I) (Diagrammatic representation)

Fig.3 **Longitudinal section of pinna with full thickness sutures**
(Group I) (Diagrammatic representation)
A. Skin B. Cartilage



bite and the sutures were fixed by square knots using braided silk (1/0). The sutures were tied just enough to appose the cartilage and skin. The incised cutaneous edges were left unapposed (Fig.4-6).

In both the groups, after the operation the cotton packing from the ear canal was removed and the canal was cleaned. Additional compression of the sutured pinna was achieved by a roll of gauze bandage placed in contact with the inner surface of the ear. The bandage roll was held in position with adhesive tape, wound around the pinna.

Post-operative management

Immediately after the operation, the dogs were administered with ampicillin-cloxacillin¹ injection at the dose rate of 10 mg/kg body weight intramuscularly. For the next four consecutive days tablets containing ampicillin-cloxacillin combination at the dose rate of 10 mg/kg body weight at eight hours interval was administered orally. The bandage was removed and reapplied after dressing the wound with povidone iodine solution on every third day upto ninth post-operative day. Sutures were removed on the ninth post-operative day. Thereafter the animals were observed after a period of one month, in order to observe the post-operative changes of the pinna.

Main items of observation

History

Anamnesis regarding the duration of illness, previous occurrence and/or treatments given if any were recorded

Clinical observations

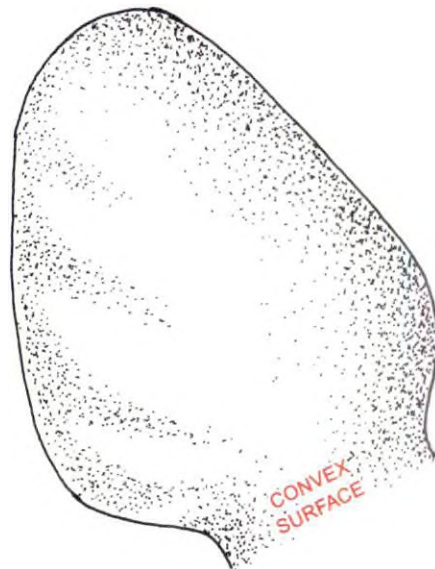
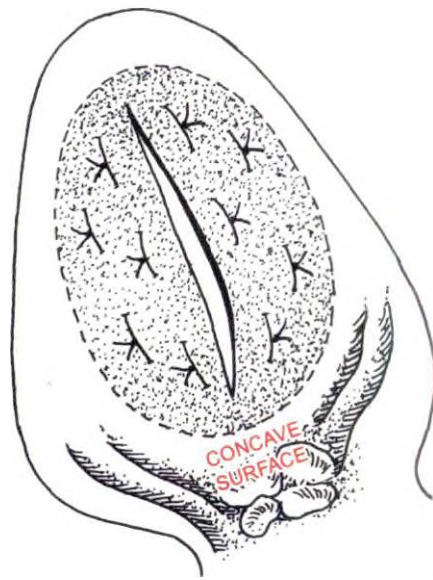
Before surgery the age, breed, sex and side of ear affected were recorded. Cause of haematoma (concurrent with bacterial, parasitic, fungal otitis etc.),

¹Megapen – Aristo Pharma Pvt. Ltd., Mumbai

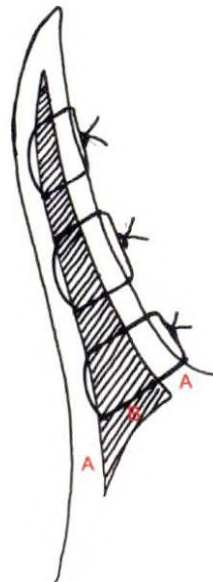
Fig.4 **Concave surface of the pinna with partial thickness sutures (Group II) (Diagrammatic representation)**

Fig.5 **Convex surface of the pinna with partial thickness sutures (Group II) (Diagrammatic representation)**

Fig.6 **Longitudinal section of pinna with partial thickness sutures (Group II) (Diagrammatic representation)**
A. Skin B. Cartilage



CONVEX SURFACE



CONCAVE SURFACE

presence of scratching and or head shaking, drooping of pinna (if it is erect-eared) and thickness and extent of haematoma were recorded.

Post-operatively all the animals were observed on third, sixth and ninth day for the evaluation of : (a) Self mutilation, (b) scratching and shaking of head, (c) puckering and carriage of the pinna, (d) accumulation of blood/exudates and (e) retention of bandage.

After 30th day all the animals were observed for the evaluation of : (a) carriage of the pinna and (b) complications if any, like fibrosis or puckering of the pinna.

Physiological observations

Rectal temperature (°C), pulse rate (per minute) and respiratory rate (per minute) were recorded before surgery and post-operatively on the third, sixth and ninth day.

Haematological evaluation

Blood samples were collected from the cephalic vein before surgery and post-operatively on the third, sixth and ninth day for the estimation of packed cell volume (Wintrobe, 1961), haemoglobin concentration, total erythrocyte count, total leukocyte count and differential leukocyte count (Schalm, 1975).

Photographic observations

Photographs of the affected ear were taken before surgery, immediately after operation and thereafter on third, sixth, ninth and thirtieth day and were observed for evaluating the post-operative cosmetic appearance of the pinna.

Histopathological examination

The elliptical piece of skin excised from the wound edge collected at the time of surgery was fixed in neutral buffered formalin. The fixed tissues were processed and 5-6 µm paraffin sections were cut and stained using hematoxylin and eosin (Humason, 1979).

Statistical analysis

The data obtained from the study were subjected to statistical analysis as per the procedure described by Snedecor and Cochran (1994).

Results

RESULTS

GROUP I

In six dogs with aural haematoma, a longitudinal skin incision was made along its entire length and the contents were evacuated and resultant dead space was obliterated by applying a series of through and through (full thickness) interrupted mattress sutures.

History (Table 1)

The breeds of dogs included in this group were Alsatian (two), Dachshund (one), Labrador (one), Spitz (one) and non-descript (one). This group consisted of five males and one female. The dogs were aged three to eight years and weighing 14 to 35 kg. In all the dogs, the haematoma was on the concave surface of the pinna (Fig. 7&8). The duration of condition varied from three to fourteen days. In fifty per cent of the cases haematoma was on the right ear. There was no history of previous occurrence of the condition in any of these dogs.

Clinical observations

Pre-operative observations (Table 1)

Shaking of the head, scratching and drooping of the affected pinna were observed in all the dogs, except scratching in one dog (1/3). Length of ear and haematoma varied from 7.4 cm to 13.7 cm and 7 cm to 12 cm respectively. Width of ear and haematoma varied from 4.7 cm to 9.2 cm and 3.6 cm to 7.4 cm respectively. Thickness of haematoma varied from 2.1 cm to 5.5 cm. The cause of haematoma could not be identified except tick infestation in one dog (1/4).

Post-operative observations (Table 2) (Fig. 9-13)

Self mutilation of wound was noticed in two cases (I/2 and I/4) on the sixth day and ninth day. Scratching was noticed in two animals (I/3 and I/6) on the third day, in two other animals (I/1 and I/3) on the sixth day and in one animal (I/4) on ninth day. Shaking of the head was noticed in all the animals on the third day but it was absent in two animals (I/3 and I/5) on the sixth day and in other three animals (I/1, I/3 and I/5) on ninth day. Puckering of the affected pinna was noticed in four dogs (I/2, I/3, I/4 and I/5) by the ninth day but carriage of ear was drooped in all the animals. There was no accumulation of blood/exudates in any of the cases. All the animals retained bandage throughout the period except two animals (I/3 and I/6) which retained only upto sixth day.

Clinical examination of the animals after one month revealed post-operative complications like puckering and drooping of the pinna in all the dogs.

Physiological observations (Table 3)

The rectal temperature ($^{\circ}\text{C}$) was 39.76 ± 0.44 before surgery and 39.39 ± 0.29 , 39.25 ± 0.42 and 39.28 ± 0.34 on the third, sixth and ninth post-operative day respectively. The variations were marginal.

The pulse rate {per min} was 94.83 ± 8.50 before surgery and 95.67 ± 3.63 , 94.33 ± 3.24 and 93.67 ± 4.77 on the third, sixth and ninth post-operative day respectively. The variations were marginal and within the normal range.

The respiration was of panting type before surgery and on the third post-operative day whereas the respiratory rate (per min) was 37.83 ± 8.09 , 40.83 ± 8.61 on the sixth and ninth post-operative days respectively. The respiration though panting before surgery was within the normal range thereafter.

Haematological evaluation (Table 4)

The packed cell volume (per cent) was 40.81 ± 2.42 before surgery and 40.33 ± 2.27 , 39.43 ± 2.46 and 42.15 ± 1.60 on the third, sixth and ninth post-operative days respectively. The variations were within the normal range.

The total erythrocyte count ($10^6/\text{mm}^3$) was 8.88 ± 0.68 before surgery 8.86 ± 0.62 , 8.91 ± 0.52 and 9.22 ± 0.60 on the third, sixth and ninth post-operative day respectively. The variations were marginal.

The haemoglobin concentration (g/dl) was 11.17 ± 1.27 before surgery, 10.75 ± 1.27 , 11.33 ± 1.17 and 12.58 ± 0.94 on the third, sixth and ninth post-operative day respectively. There was decrease in haemoglobin concentration on third day but thereafter it gradually increased.

The total leucocyte count ($10^3/\text{mm}^3$) was 8.23 ± 2.13 before surgery, 8.37 ± 2.11 , 8.57 ± 2.05 and 8.55 ± 2.17 on the third, sixth and ninth post-operative day respectively. There was gradual increase in total leucocyte count after surgery.

The neutrophil count (per cent) was 65.33 ± 3.01 before surgery, 64.00 ± 2.74 , 63.67 ± 2.56 and 65.83 ± 2.73 on the third, sixth and ninth post-operative day respectively. The variations were marginal.

The lymphocyte count (per cent) was 22.17 ± 6.07 before surgery, 24.67 ± 5.92 , 25.17 ± 6.01 and 23.31 ± 5.65 on the third, sixth and ninth post-operative day respectively. There was an increase in the lymphocyte count after surgery.

The eosinophil count (per cent) was 5.67 ± 2.65 before surgery, 4.31 ± 2.84 , 4.00 ± 2.58 and 4.00 ± 2.54 respectively on the third, sixth and ninth post-operative day. There was decrease in the eosinophil count.

The basophil count (per cent) was 4.17 ± 2.51 before surgery, 3.83 ± 2.31 , 3.51 ± 2.21 and 3.67 ± 2.27 respectively on the third, sixth and ninth post-operative day. There was gradual decrease in the basophil count.

The monocyte count (per cent) was 2.67 ± 1.89 before surgery, 3.00 ± 2.22 , 3.67 ± 2.33 and 3.17 ± 2.01 respectively on the third, sixth and ninth post-operative day. There was increase in monocyte count after surgery.

Table 1. History and Pre-operative Observations in Group I animals (n = 6)

| Animal No. | Breed | Sex | Age (years) | Colour | Body weight (kg) | Carriage of ear | | Ear affected | Length (cm) | | Width (cm) | | Thickness of Haematoma (cm) | Clinical signs | | | |
|------------|--------------|--------|-------------|---------------|------------------|-----------------|----------|--------------|-------------|-----------|------------|-----------|-----------------------------|----------------|---|---|---|
| | | | | | | Normal | Affected | | Ear | Haematoma | Ear | Haematoma | | A | B | C | D |
| 1 | Alsatian | Male | 3½ | Black and Tan | 30 | Erect | Drooped | Right | 9.4 | 9.4 | 6 | 6 | 4.3 | 3 | + | + | + |
| 2 | Alsatian | Female | 4½ | Black | 35 | Erect | Drooped | Left | 13 | 11.3 | 7.5 | 6.1 | 4.2 | 3 | + | + | + |
| 3 | Non Descript | Male | 8 | Black | 14 | Erect | Drooped | Right | 9.6 | 9 | 7.1 | 5.8 | 3.4 | 4 | - | + | + |
| 4 | Labrador | Male | 6 | Black | 35 | Drooped | Drooped | Left | 13.7 | 12 | 9.2 | 7.4 | 5.5 | 6 | + | + | + |
| 5 | Dachshund | Male | 7 | Black | 14 | Drooped | Drooped | Left | 8.1 | 7.8 | 4.7 | 3.6 | 8.8 | 14 | + | + | + |
| 6 | Spitz | Male | 3 | White | 15 | Erect | Drooped | Right | 7.4 | 7 | 5.8 | 4.2 | 2.1 | 3 | + | + | + |

A. Duration of illness in days + Present

B. Presence of scratching - Absent

C. Head shaking

D. Drooping of pinna

Table 2. Post-operative observations in Group I animals (n=6)

| Animal No. | Self mutilation (day) | | | Scratching (day) | | | Head shaking (day) | | | Carriage of ear (day) | | | | Accumulation of blood/Exudate (day) | | | Retaining bandages (day) | | | Puckering of pinna (day) | | | |
|------------|-----------------------|---|---|------------------|---|---|--------------------|---|---|-----------------------|---|---|----|-------------------------------------|---|---|--------------------------|---|---|--------------------------|---|---|----|
| | 3 | 6 | 9 | 3 | 6 | 9 | 3 | 6 | 9 | 3 | 6 | 9 | 30 | 3 | 6 | 9 | 3 | 6 | 9 | 3 | 6 | 9 | 30 |
| 1 | - | - | - | - | + | - | + | + | - | D | D | D | D | - | - | - | + | + | + | - | - | - | + |
| 2 | - | + | - | - | - | - | + | + | + | D | D | D | D | - | - | - | + | + | + | - | - | + | + |
| 3 | - | - | - | + | + | - | + | - | - | D | D | D | D | - | - | - | - | - | - | - | - | + | + |
| 4 | - | - | + | - | - | + | + | + | + | D | D | D | D | - | - | - | + | + | + | - | - | + | + |
| 5 | - | - | - | - | - | - | + | - | - | D | D | D | D | - | - | - | + | + | + | - | - | + | + |
| 6 | - | - | - | + | - | - | + | + | + | D | D | D | D | - | - | - | - | - | - | - | - | - | + |

D – Drooped + Present - Absent

Table 3. Physiological observations (respiratory rate, pulse rate and rectal temperature) in Group I animals (n = 6)

| Parameters | Before surgery | 3 rd Post-operative day | 6 th Post-operative day | 9 th Post-operative day |
|----------------------------|----------------|------------------------------------|------------------------------------|------------------------------------|
| Respiratory Rate (per min) | * | * | 37.83 ± 8.09 | 40.83 ± 8.61 |
| Pulse Rate (per min) | 94.83 ± 8.50 | 95.67 ± 3.63 | 94.33 ± 3.24 | 93.67 ± 4.77 |
| Rectal Temperature (°C) | 39.76 ± 0.44 | 39.39 ± 0.29 | 39.25 ± 0.42 | 39.28 ± 0.34 |

* Panting

Table 4. Haematological evaluation in Group I animals (n = 6)

| Parameters | Before surgery | 3 rd Post-operative day | 6 th Post-operative day | 9 th Post-operative day |
|-------------------------------------------------------------|----------------|------------------------------------|------------------------------------|------------------------------------|
| Packed cell volume (per cent) | 40.81 ± 2.42 | 40.33 ± 2.27 | 39.43 ± 2.46 | 42.15 ± 1.60 |
| Total erythrocyte count (10 ⁶ /mm ³) | 8.88 ± 0.68 | 8.86 ± 0.62 | 8.91 ± 0.52 | 9.22 ± 0.60 |
| Haemoglobin concentration (g/dl) | 11.17 ± 1.27 | 10.75 ± 1.27 | 11.33 ± 1.17 | 12.58 ± 0.94 |
| Total leucocyte count (10 ³ /mm ³) | 8.23 ± 2.13 | 8.37 ± 2.11 | 8.57 ± 2.05 | 8.55 ± 2.17 |
| Neutrophil count (per cent) | 65.33 ± 3.01 | 64.00 ± 2.74 | 63.67 ± 2.56 | 65.83 ± 2.73 |
| Lymphocyte count (per cent) | 22.17 ± 6.07 | 24.67 ± 5.92 | 25.17 ± 6.01 | 23.31 ± 5.65 |
| Eosinophil count (per cent) | 5.67 ± 2.65 | 4.31 ± 2.84 | 4.00 ± 2.58 | 4.00 ± 2.54 |
| Basophil count (per cent) | 4.17 ± 2.51 | 3.83 ± 2.31 | 3.51 ± 2.21 | 3.67 ± 2.27 |
| Monocyte count (per cent) | 2.67 ± 1.89 | 3.00 ± 2.22 | 3.67 ± 2.33 | 3.17 ± 2.01 |

Fig.7 **Dog with haematoma of the right ear (Group I)**
- Drooped ear with swelling on the concave surface
of the pinna

Fig.8. **Dog with aural haematoma - before surgery (Group I)**
- Aseptically prepared with drape



Fig.9 Dog operated for aural haematoma - immediately after surgery (Group I)
- Full thickness sutures with granny knots on the convex surface of the pinna

Fig.10 Dog operated for aural haematoma- 3rd post operative day (Group I)
Pinna with post-operative thickening



Fig.11 Dog operated for aural haematoma – 6th post operative day (Group I)
- Ear drooped – sutures intact

Fig.12 Dog operated for aural haematoma – 9th post operative day (Group I)
- Sutures were removed



Fig.13 Dog operated for aural haematoma by 30th post-operative day (Group I)
- Ear completely drooped



GROUP II

In six dogs with aural haematoma, after making a longitudinal skin incision along its entire length, the contents were evacuated. The dead space was obliterated by applying a series of partial thickness interrupted mattress sutures.

History (Table 5)

The breeds of dogs included in this group were Alsatian (three), Dobermann (one), Spitz (one) and non descript (one). This group consisted of three males and three females. The dogs were aged three to six years and weighing 9 to 35 kg. In all the dogs the haematoma was on the concave surface of the pinna (Fig. 14). In fifty per cent of the dogs, haematoma was observed in the right ear. The duration of condition varied from two to 14 days. There was history of previous occurrence in two dogs (II/1 and II/3) in the opposite ear and were treated surgically.

Clinical observations

Pre-operative observations (Table 5)

Shaking of the head, scratching and drooping of pinna were observed in all the dogs. Length of ear and haematoma varied from 6.8 cm to 12.3 cm and 5.9 cm to 11.2 cm respectively. Width of ear and haematoma varied from 4.5 cm to 7.3 cm and 2.9 cm to 6.5 cm respectively. Thickness of haematoma varied from 1.2 cm to 2.9 cm. Generalised fungal infection was evident in one animal (II/4).

Post-operative observations (Table 6) (Fig. 15-20)

There was self mutilation in two animals (II/2, II/4) on third day and in one animal (II/2) on the sixth day. Scratching was noticed in all the animals except one (II/1) on the third day. But on sixth day it was noticed only in one animal (II/6). Shaking of the head was there in all the animals except in one

(II/1) on third day. But on sixth and ninth day, it was absent in two (II/1 and II/3). Puckering of the affected pinna was not noticed until ninth day in any of the animals. The degree of post-operative drooping of the ear in the erect-eared breeds was less. Two animals (II/2 and II/6) did not retain bandage on third and sixth day and three animals (II/3, II/5 and II/6) did not retain bandage on ninth day.

Examination of the affected ears, after one month revealed perfect healing without any puckering or distortion of pinna in all the dogs and the degree of post-operative drooping of the ear in the erect-eared breeds was less.

Physiological observations (Table 7)

The rectal temperature ($^{\circ}\text{C}$) was 39.56 ± 0.42 before surgery and 38.94 ± 0.29 , 38.78 ± 0.29 and 38.94 ± 0.33 on the third, sixth and ninth post-operative day respectively. The variations were marginal.

The pulse rate (per min) was 110.51 ± 15.15 before surgery and 77.67 ± 13.91 , 81.17 ± 10.62 and 79.50 ± 13.06 on the third, sixth and ninth post-operative day respectively. The variations were marginal.

The respiratory rate (per min) was 76.83 ± 13.6 before surgery and 41.00 ± 8.85 , 73.66 ± 17.32 and 67.00 ± 16.01 on the third, sixth and ninth post-operative day respectively. There was decrease in respiratory rate on third day but thereafter it gradually increased.

Haematological evaluation (Table 8)

The packed cell volume (per cent) was 43.47 ± 1.76 before surgery, 41.43 ± 2.75 , 44.27 ± 2.55 and 45.73 ± 2.25 on the third, sixth and ninth post-operative day respectively. The variations were marginal.

The total erythrocyte count ($10^6/\text{mm}^3$) 6.86 ± 0.41 before surgery, 6.33 ± 0.40 , 6.70 ± 0.45 and 6.56 ± 0.46 on the third, sixth and ninth post-operative day respectively. The variations were marginal.

The haemoglobin concentration (g/dl) was 16.02 ± 0.37 before surgery, 15.30 ± 0.35 , 15.80 ± 0.34 and 16.05 ± 0.31 on the third, sixth and ninth post-operative day respectively. The variations were marginal.

The total leucocyte count ($10^3/\text{mm}^3$) was 12.43 ± 1.63 before surgery, 11.72 ± 1.04 , 11.88 ± 1.31 and 11.95 ± 1.27 on the third, sixth and ninth post-operative day respectively. The variations were marginal.

The neutrophil count (per cent) was 65.50 ± 0.85 before surgery, 64.33 ± 3.15 , 68.17 ± 2.89 and 67.83 ± 2.93 on the third, sixth and ninth post-operative day respectively. The variations were marginal.

The lymphocyte count (per cent) was 29.67 ± 3.08 before surgery, 30.33 ± 1.64 , 28.83 ± 2.59 and 28.00 ± 2.95 on the third, sixth and ninth post-operative day respectively. The variations were marginal.

The eosinophil count (per cent) was 2.67 ± 1.43 before surgery, 4.67 ± 2.17 , 1.83 ± 0.98 and 2.00 ± 1.18 on the third, sixth and ninth post-operative day respectively. There was an increase in the eosinophil count on the third day but thereafter it gradually decreased.

The basophil count (per cent) was 1.33 ± 1.32 before surgery, 1.67 ± 1.44 , 2.00 ± 1.59 and 2.33 ± 1.93 on the third, sixth and ninth post-operative day respectively. There was gradual increase in the basophil count after surgery.

The monocyte count (per cent) was 0.50 ± 0.34 before surgery, 0.67 ± 0.30 , 1.17 ± 0.83 and 0.50 ± 0.34 on the third, sixth and ninth post-operative day respectively. There was gradual increase in monocyte count after surgery but it decreased to pre-operative level by the ninth day.

Histopathological examination

Histopathological examination of the excised skin from the affected ears also revealed irregular separation of the perichondrium, necrosis of the perichondrial connective tissue, diffuse inflammatory cell infiltration in the damaged perichondrial zone alongwith subchondral accumulation of blood cells. The cartilage appeared distorted and showed loss of chondrocytes at certain areas (Fig. 21).

Table 5. History and Pre-operative observations in Group II animals (n = 6)

| Animal No. | Breed | Sex | Age (years) | Colour | Body weight (kg) | Carriage of ear | | Ear affected | Length (cm) | | Width (cm) | | Thickness of Haematoma (cm) | Clinical signs | | | |
|------------|-------------|--------|-------------|---------------|------------------|-----------------|----------|--------------|-------------|-----------|------------|-----------|-----------------------------|----------------|---|---|---|
| | | | | | | Normal | Affected | | Ear | Haematoma | Ear | Haematoma | | A | B | C | D |
| 1 | Nondescript | Male | 6 | White | 13 | Erect | Drooped | Left | 7.0 | 6.2 | 4.5 | 4.3 | 1.6 | 2 | + | + | + |
| 2 | Dobermann | Male | 3 | Brown | 22 | Erect | Drooped | Right | 11.8 | 11.2 | 6.7 | 6.5 | 2.9 | 11 | + | + | + |
| 3 | Alsatian | Female | 4 | Black and Tan | 21 | Erect | Drooped | Right | 12.3 | 7.1 | 6.1 | 4.2 | 2.1 | 2 | + | + | + |
| 4 | Alsatian | Female | 3 | Black and Tan | 17 | Erect | Drooped | Left | 10.6 | 6.2 | 7.3 | 3.1 | 2.2 | 5 | + | + | + |
| 5 | Spitz | Female | 5 | White | 9 | Erect | Drooped | Left | 6.8 | 6.8 | 6.8 | 2.9 | 1.2 | 14 | + | + | + |
| 6 | Alsatian | Male | 3 | Black and Tan | 35 | Erect | Drooped | Right | 9.2 | 5.9 | 7.1 | 3.8 | 2.8 | 6 | + | + | + |

- A. Duration of illness in days + Present
 B. Presence of scratching
 C. Head shaking
 D. Drooping of pinna

Table 6. Post-operative observations in Group II animals (n=6)

| Animal No. | Self mutilation (day) | | | Scratching (day) | | | Head shaking (day) | | | Carriage of ear (day) | | | | Accumulation of blood/Exudate (day) | | | Retaining bandages (day) | | | Puckering of pinna (day) | | | |
|------------|-----------------------|---|---|------------------|---|---|--------------------|---|---|-----------------------|---|---|----|-------------------------------------|---|---|--------------------------|---|---|--------------------------|---|---|----|
| | 3 | 6 | 9 | 3 | 6 | 9 | 3 | 6 | 9 | 3 | 6 | 9 | 30 | 3 | 6 | 9 | 3 | 6 | 9 | 3 | 6 | 9 | 30 |
| 1 | - | - | - | - | - | - | - | - | - | D | D | D | D | - | - | - | + | + | + | - | - | - | - |
| 2 | + | + | - | + | + | - | + | + | + | D | D | D | D | - | - | - | - | - | + | - | - | - | - |
| 3 | - | - | - | + | - | - | + | - | - | D | D | D | D | - | - | - | + | + | - | - | - | - | - |
| 4 | + | - | - | + | - | - | + | + | + | D | D | D | D | - | - | - | + | + | + | - | - | - | - |
| 5 | - | - | - | + | - | - | + | + | + | D | D | D | D | - | - | - | + | + | - | - | - | - | - |
| 6 | - | - | - | + | - | - | + | + | + | D | D | D | D | - | - | - | - | - | - | - | - | - | - |

D – Drooped + Present - Absent

Table 7. Physiological observations (respiratory rate, pulse rate and rectal temperature) in Group II animals (n = 6)

| Parameters | Before surgery | 3 rd Post-operative day | 6 th Post-operative day | 9 th Post-operative day |
|----------------------------|----------------|------------------------------------|------------------------------------|------------------------------------|
| Respiratory Rate (per min) | 76.83 ± 13.6 | 41.00 ± 8.85 | 73.66 ± 17.32 | 67.00 ± 16.01 |
| Pulse Rate (per min) | 110.51 ± 15.15 | 77.67 ± 13.91 | 81.17 ± 10.62 | 79.50 ± 13.06 |
| Rectal Temperature (°C) | 39.56 ± 0.42 | 38.94 ± 0.29 | 38.78 ± 0.29 | 38.94 ± 0.33 |

Table 8. Haematological observations in Group II animals (n = 6)

| Parameters | Before surgery | 3 rd Post-operative day | 6 th Post-operative day | 9 th Post-operative day |
|-------------------------------------------------------------|----------------|------------------------------------|------------------------------------|------------------------------------|
| Packed cell volume (per cent) | 43.47 ± 1.76 | 41.43 ± 2.75 | 44.27 ± 2.55 | 45.73 ± 2.25 |
| Total erythrocyte count (10 ⁶ /mm ³) | 6.86 ± 0.41 | 6.33 ± 0.40 | 6.70 ± 0.45 | 6.56 ± 0.46 |
| Haemoglobin concentration (g/dl) | 16.02 ± 0.37 | 15.30 ± 0.35 | 15.80 ± 0.34 | 16.05 ± 0.31 |
| Total leucocyte count (10 ³ /mm ³) | 12.43 ± 1.63 | 11.72 ± 1.04 | 11.88 ± 1.31 | 11.95 ± 1.27 |
| Neutrophil count (per cent) | 65.50 ± 0.85 | 64.33 ± 3.15 | 68.17 ± 2.89 | 67.83 ± 2.93 |
| Lymphocyte count (per cent) | 29.67 ± 3.08 | 30.33 ± 1.64 | 28.83 ± 2.59 | 28.00 ± 2.95 |
| Eosinophil count (per cent) | 2.67 ± 1.43 | 4.67 ± 2.17 | 1.83 ± 0.98 | 2.00 ± 1.18 |
| Basophil count (per cent) | 1.33 ± 1.32 | 1.67 ± 1.44 | 2.00 ± 1.59 | 2.33 ± 1.93 |
| Monocyte count (per cent) | 0.50 ± 0.34 | 0.67 ± 0.30 | 1.17 ± 0.83 | 0.50 ± 0.34 |

Fig.14 Dog with haematoma of the left ear (Group II)
- Erect-ear with swelling on the concave surface of the pinna

Fig.15 Dog operated for aural haematoma - immediately after surgery (Group II)
- Partial thickness sutures with square knots on the concave surface of pinna



Fig.16 Dog operated for aural haematoma - immediately after operation (Group II)
- With bandage in position

Fig.17 Dog operated for aural haematoma - 3rd post operative day (Group II)
- Pinna with less post-operative thickening



Fig.18 Dog operated for aural haematoma - 6th post-operative day (Group II)
- Ear erect – sutures intact

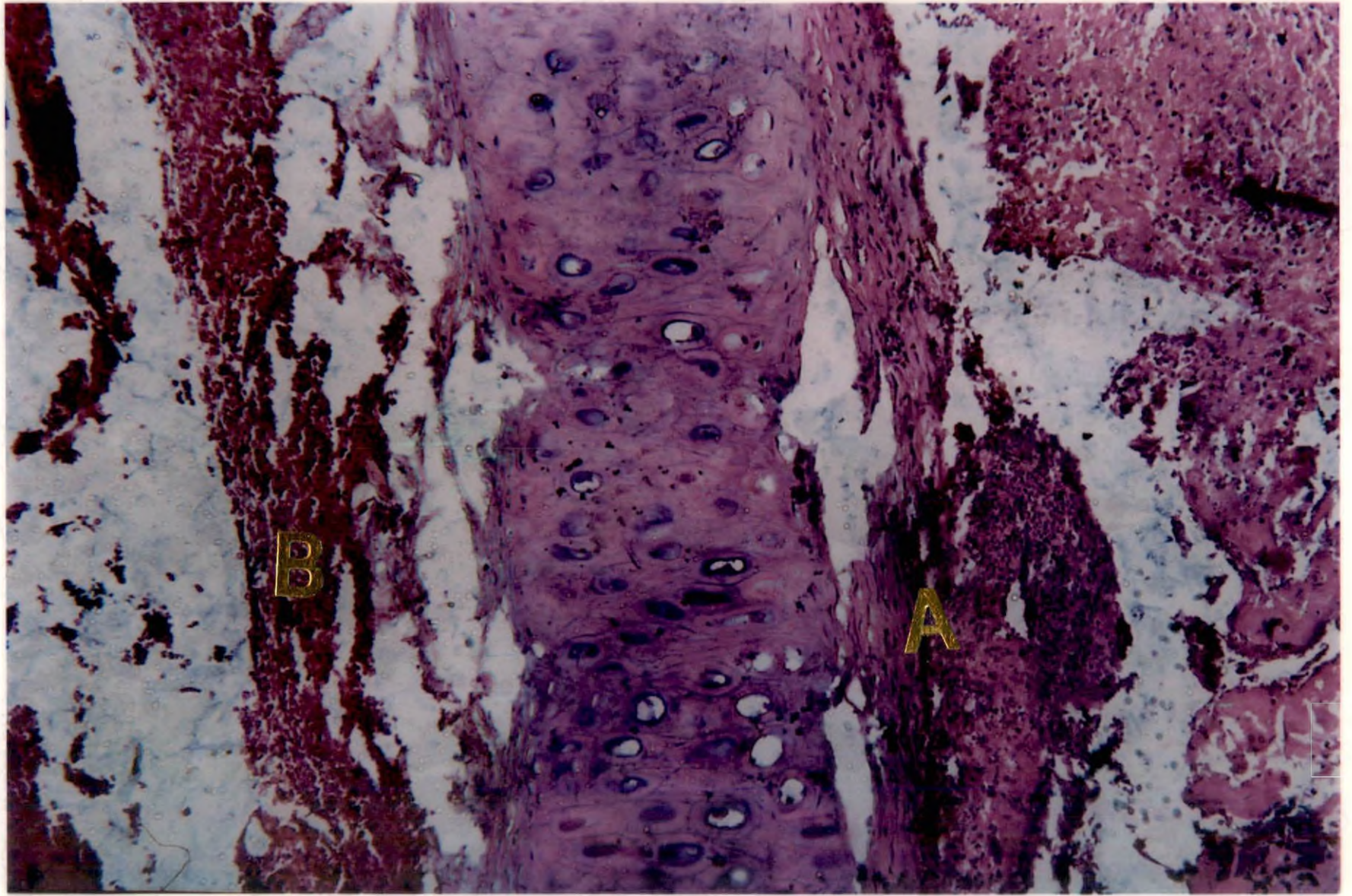
Fig.19 Dog operated for aural haematoma – 9th post operative day (Group II)
- Sutures were removed



Fig.20 Dog operated for aural haematoma on left ear by 30th post-operative day (Group II)
- Ear not completely drooped



Fig.21 Photomicrographs of the cross section of excised portion of pinna
– Showing perichondrial necrosis along with infiltrating inflammatory cells (A) and subchondral accumulation of blood cells (B).



Discussion

DISCUSSION

The study was carried out in twelve dogs with aural haematoma. The animals were divided into two groups, viz., Group I and Group II, each consisting of six animals. In Group I surgical drainage was carried out by making a longitudinal skin incision along the entire length of haematoma and the dead space was obliterated by applying a series of through and through (full thickness) interrupted mattress sutures placed parallel to the incision. In Group II surgical drainage was carried out as in Group I whereas the dead space was obliterated by applying a series of partial thickness interrupted mattress sutures placed parallel to the incision.

History and Clinical Observations

The breeds of dogs presented for the treatment of aural haematoma included Alsatian, Spitz, Dachshund, Labrador and Dobermann and nondescript dogs. Among the twelve dogs there were eight males and four females. The dogs were aged three to eight years and weighing 9 to 35 kg. In the present study the highest incidence was noticed in Alsatian breed of dogs in which the normal carriage of ear is erect.

According to Kuwahara (1986) there is no particular predilection as to animal's breed, age, sex or type of ear. Wilson (1983) and Joyce (1994) observed no marked sex predisposition for aural haematoma but reported higher incidence in middle-aged to older dogs. Studies by Aithal *et al.* (2000) indicated that left ear was more commonly affected but in the present study both the right and left ears were seen to be equally affected. Only two animals had the history of previous occurrence of haematoma in the contra lateral ear. In all the animals no concurrent disease was detected except in two in which one had generalized fungal infection and in the other tick infestation.

According to Bojrab *et al.* (1990) certain breeds of dogs are prone to endocrine or allergic skin disorders that might be the primary cause for irritation of the ear or secondary to an already existing primary ear problem. Angarano (1988) opined that haematomas develop as a result of ruptured blood vessels within the pinna following otic inflammation which causes the animal to scratch or shake its head excessively. Kuwahara (1986) opined that aural haematoma is not caused by trauma to the pinna, but has an autoimmune pathogenesis and reported the presence of vigorous ear scratching and/or shaking of head in affected dogs. Dubielzig *et al.* (1984) reported that fracture of cartilage could have resulted from the wave motions set up in the pinna during head shaking. In the present study shaking of head, scratching and drooping of pinna were observed in concurrent with haematoma in all the animals.

Length and width of haematoma varied from 5.9 cm to 12 cm and 2.9 cm to 7.4 cm respectively. Thickness of haematoma varied from 1.2 cm to 5.5 cm. Riser (1957) reported that haematoma may occur in any region on the inner aspect of the ear and varies from less than one to five centimeter in diameter. Kuwahara (1986) also reported that the haematoma may be of various sizes, depending upon the size of the affected animal and the stage and the severity of the disease.

Physiological observations

The rectal temperature, pulse rate and respiratory rate were normal in dogs of both groups.

Haematological Evaluation

The variations in haematological values were well within the normal range in both the groups. Joyce and Day (1997) observed normal haematological values in many animals with aural haematoma.

From the physiological and haematological studies it could be inferred that haematoma of the ear will not cause any appreciable systemic changes to the affected animal.

Post-operative observations

Shaking of the head, scratching and self mutilation of the wound were observed in a few animals. Carriage of the ear was drooped in all the animals. But the post-operative drooping of the ear in the erect eared breeds, where partial thickness suturing technique was adopted, the degree of drooping was less.

According to Fox and Woody (1986) ear bandaging is a disadvantage in the post-operative management of surgical disease of ear because the patient rarely tolerates it. Kagan (1983) also reported that the dogs are uncooperative patients and often attempt to remove the bandage. But in the present study, most of the animals retained bandage.

Swaim and Bradley (1996) reported recurrence of haematoma following treatment with closed suction drainage technique. But in the present study, there was no accumulation of blood or exudates in any of the animals, which could be attributed to the open drainage provided by way of non-suturing of the incised wound edges and the bandaging technique adopted.

Puckering of the pinna was present in dogs treated with full thickness suturing technique where as it was absent in dogs treated with partial thickness suturing technique (Fig. 22-24). Bojrab *et al.* (1990) reported thickening, wrinkles and cauliflower like appearance of pinna as post-operative complications and the cause was attributed to scar formation on the surface of the ear. In partial thickness suturing the outside skin of the pinna was not fully included, hence scar formation was absent on the outer surface and it may be the reason for absence of puckering. In addition post-operative bandaging technique adopted might have given additional compression to prevent disfiguring of the pinna as stated by Lacroix (1952).

Fig.22 Dog with aural haematoma (Group II)
- Swelling on the concave surface of the left ear

Fig.23 Dog with aural haematoma (Group II)
- Aseptically prepared before draping



Fig.24 Dog operated for aural haematoma by 30th post-operative day (Group II)
- With no puckering of the pinna



Histopathological examination

Kagan (1983) opined that blood accumulation is between perichondrium and cartilaginous tissue and not between skin and cartilage as reported by Wilson (1983). Joyce and Day (1997) observed a zone of haemorrhage and necrosis above the area of granulation tissue on the side of the pinna containing the haematoma and minimal perichondral inflammation in biopsy samples. In the present study histopathological examination of the collected specimens from the affected ear revealed the presence of damaged perichondrium and distorted conchal cartilage along with subchondral accumulation of blood cells. This supports the statement by Kuwahara (1986). According to him, in animals having aural haematoma, when the skin of the concave surface of the pinna is detached from the cartilage, a part of the cartilage tissue may be torn from the cartilage plate along with the skin and in many animals the thin layer of tissue detached from the cartilage plate could be seen both macroscopically and microscopically.

Conclusion

From the present study it was observed that in aural haematoma, the accumulation of blood is subperichondral and for the treatment of the same partial thickness suturing technique was found more advantageous than full thickness suturing technique because the former prevented puckering and thickening of the pinna and the degree of post-operative drooping of the pinna in erect eared breeds was less compared to full thickness suturing technique.

Summary

SUMMARY

The study was carried out in twelve dogs with aural haematoma. The animals were divided into two groups, viz., Group I and Group II, each consisting of six animals. In Group I, surgical drainage was carried out by making a longitudinal skin incision along the entire length of haematoma and the dead space was obliterated by applying a series of through and through (full thickness) interrupted mattress sutures placed parallel to the incision. In Group II, surgical drainage was carried out as in Group I and the dead space was obliterated by applying a series of partial thickness interrupted mattress sutures placed parallel to the incision.

The breeds of dogs presented for the treatment of aural haematoma included Alsatian, Spitz, Dachshund, Labrador and Dobermann and nondescript dogs. Among the twelve dogs there were eight males and four females. The dogs were aged three to eight years and weighing 9 to 35 kg.

In the present study the highest incidence was noticed in Alsatian breeds of dogs in which the normal carriage of ear is erect. Both the right and left ears were seen equally affected. Shaking of head, scratching and drooping of pinna were observed in concurrent with haematoma in all the animals. Length and width of haematoma varied from 5.9 cm to 12 cm and 2.9 cm to 7.4 cm respectively. Thickness of haematoma varied from 1.2 cm to 5.5 cm. No cause of haematoma could be identified except for generalized fungal infection and tick infestation in one animal. The variations in physiological and haematological parameters were within the normal range through out the period of observation.

Post-operatively self mutilation of the wound, scratching and shaking of the head were observed in a few animals. Carriage of the ear was drooped in all the animals. But the post-operative drooping of the ear in the erect eared breeds, where partial thickness suturing technique was adopted the degree of drooping

was less. There was no accumulation of blood or exudates in any of the animals. Most of the animals retained bandage.

Puckering of the pinna was present in dogs treated with full thickness suturing technique whereas it was absent in dogs treated with partial thickness suturing technique.

Histopathological examination of the collected specimen from the affected ears revealed irregular separation of the perichondrium, necrosis of the perichondrial connective tissue, diffuse inflammatory cell infiltration in the damaged perichondrial zone along with subchondral accumulation of blood cells. The cartilage appeared distorted and showed loss of chondrocytes at certain areas.

From the present study it was observed that in aural haematoma, the accumulation of blood is subperichondral and for the treatment of the same partial thickness suturing technique was found more advantageous than full thickness suturing technique because the former prevented puckering and thickening of the pinna and the degree of post-operative drooping of the pinna in erect eared breeds was less compared to full thickness suturing technique.

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EVALUATION OF PARTIAL THICKNESS SUTURING TECHNIQUE FOR THE REPAIR OF AURAL HAEMATOMA IN DOGS

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requirement for the degree of**

Master of Veterinary Science

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ABSTRACT

The study was carried out in twelve selected clinical cases of aural haematoma in dogs of different breeds of either sex presented to the College Veterinary Hospitals at Mannuthy and Kokkalai. The animals were divided into two groups viz., Group I and Group II, each consisting of six animals.

In Group I, surgical drainage was carried out and the dead space was obliterated by applying a series of through and through (full thickness) interrupted mattress suture. In Group II, surgical drainage was carried out and the dead space was obliterated by applying a series of partial thickness interrupted mattress suture.

In Group I, the dogs were aged three to eight years and the duration of illness varied from three to fourteen days. Shaking of the head, scratching and drooping of the affected pinna were observed in all the dogs, except scratching in one dog. Length of the ear and haematoma varied from 7.4 cm to 13.7 cm and 7 cm to 12 cm respectively. Width of ear and haematoma varied from 4.7 cm to 9.2 cm and 3.6 cm to 7.4 cm respectively. Thickness of haematoma varied from 2.1 cm to 5.5 cm. The physiological parameters like rectal temperature, pulse rate and respiratory rate was found to be within normal range. The haematological values such as packed cell volume, total erythrocyte count, haemoglobin concentration, total leucocyte count and differential leucocyte count were also within normal physiological range. Post-operatively self mutilation of wound, scratching and shaking of the head were reported in a few animals and carriage of affected ear was drooped in all the animals. There was no accumulation of blood or exudates in any of the animals. Most of the animals retained bandage. Photographs of the affected ear was taken before surgery, immediately after operation and thereafter on third, sixth, ninth and thirtieth day and were observed for evaluating the post-operative cosmetic appearance of the

pinna. Puckering of the affected pinna was noticed in four dogs by the ninth day and it was marked in all the dogs by one month.

In Group II, the dogs were aged three to six years and the duration of illness varied from two to 14 days. Shaking of the head, scratching and drooping of pinna were observed in all the dogs. Length of the ear and haematoma varied from 6.8 cm to 12.3 cm and 5.9 cm to 11.2 cm respectively. Width of ear and haematoma varied from 4.5 cm to 7.3 cm and 2.9 cm to 6.5 cm respectively. Thickness of haematoma varied from 1.2 cm to 2.9 cm. The physiological parameters like rectal temperature, pulse rate and respiratory rate was found to be within the normal range. The haematological values such as packed cell volume, total erythrocyte count, haemoglobin concentration, total leucocyte count and differential leucocyte count were also within the normal physiological range. Post-operatively shaking of the head, scratching and self mutilation of wound were reported in a few animals and carriage of affected ear was drooped in all the animals. There was no accumulation of blood or exudates in any of the animals. Most of the animals did not retain bandage. Photographs of the affected ear was taken before surgery, immediately after operation and thereafter on third, sixth, ninth and thirtieth day and were observed for evaluating the post-operative cosmetic appearance of the pinna. After one month of examination of the ear, which was affected with haematoma, revealed perfect healing without any puckering or distortion of pinna.

Histopathological examination of the collected specimen from the affected ears revealed irregular separation of the perichondrium, necrosis of the perichondrial connective tissue, diffuse inflammatory cell infiltration in the damaged perichondrial zone along with subchondral accumulation of blood cells. The cartilage appeared distorted and showed loss of chondrocytes at certain areas.