STUDIES ON THE MANAGEMENT OF ANAESTHESIA AND SURGICAL TECHNICS FOR SPAYING IN QUEEN CATS AND BITCHES UNDER FIELD PRACTICES

A Thesis
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Bidhan Chandra Krishi Viswavidyalaya
In partial fulfilment of the requirements for the Degree of
Master of Veterinary Science
in
VETERINARY SURGERY & RADIOLOGY

BY

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D E D I C A T E D

to my respected parents,

SRI SRIMANTA KR. BATUL

B.COM,P.G.B.T.

a n d

MRS. ARATI BATUL

APPROVAL OF EXAMINARS FOR THE AWARD OF THE DEGREE OF MASTER OF VETERINARY SCIENCES(SURGERY)

We ,the undersigned, having been satisfied with the performance of Dibyendu Batul, in the Viva Voce Examination, conducted to-day, the 19th day of December, 1992. recommend that the thesis be accepted for the award of the degree.

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C E R T I F I C A T E

This is to certify that the work recorded in the thesis entitled 'Studies on management of anaesthesia and surgical technics in queen cats & bitches under field practice' submitted by Dr. D. Batul in partial fulfilment of the requirements for the Degree of Master of Veterinary Sciences in Veterinary Surgery and Radiology of the Bidhan Chandra Krishi Viswavidyalaya, is the faithful and bonafide research work carried out under my personal supervision and guidence. The results of the investigation reported in the thesis have not so far been submitted for any other Degree or Diploma. The assistance and help received during the course of investigation have been duly acknowledged.

P.K. Samanta.

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Dibyendu Batul

(DIBYENDU BATUL)

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CHAPTER I

INTRODUCTION

I N T R O D U C T I O N

For many years there have been growing concerns about the problems of continued overproduction among dogs and cats. There are also other related problems with alarm.

Per intact female,queens annually produce 3 or 4 times, as many offsprings as do bitches. The most obvious method to control the growth of canine and feline population is by decreasing the productivity from increasing the proportion of queens and bitches neutering that is by spaying or ovariohysterectomy . In Veterinary practices ovariohysterectomy, i.e. removal of both ovaries and uterus is performed to prevent breeding,as well as the related nuisances. Spaying is the most common operation which the veterinarian is called upon to do. Therefore this operation should be practiced not only diligently but also in a systemic manner, for which anaesthesia and operative technic and post operative management should be formulated in such a way that it may be safely applied under field condition by avoiding any sorts of cumbersome produces in either direction with regard to anaesthesia and operative technic.

Since there is no systemic standard approach specially in canine and feline practices, there are always possibility of variable results and complications in anaesthetic management and operative procedure. Moreover an elaborated and sophisticated technic performed in an institution can not be possible for a single veterinary surgeon in the field condition.

So,it is obligatory on our part to make a simple device for an easy but effective operative technique and a simple and standard anaesthesia for performing spaying in queen cats and bitches which can be effectively practised with the limited sources of field condition.

CHAPTER II

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Operative Procedure :

Flynn(1925) first formulated a pattern of suturele -ss spaying operative procedures in young bitches.

Benesch (1957) recommended a midline approach in queen cats and bitches for spaying. The length of incision varried from 2.5 to 4 inches.

Markowitz et.al (1964) reported that the midline is the best site for abdominal incisioin in dogs and cats.

Ormord (1966) has recommended an oblique flank incisioin for spaying of bitches and queen cats.

Pearson (1970) reported that there were always chances for suppuration due to ovarian or uterine ligature by nonabsorbable suture materials which needed further treatment.

Krzaczynski (1974) formulated an alternative technique for ovariohysterectomy by vertical flank incision

Arther (1975) performed ovariohysterectomy in bitches by giving incisioin on the flank and length

of incision varried from 9 to 12 cm.

Lande (1975) performed the operation with two incisic n, one at below the umbilicus of 4 cm length and another was just above the symphysis pubis with 3 to 4 cm. length. From cranial incision, both ovaries were removed and cutting of cervix performed through caudal incision.

Chaffaux and Kaiser (1978) performed ova riectomy in bitches by a modified technique using clamps of tantella they had kept some radio-opaque bodies within the abdomen for recognisation of errors of operation by radiological diagnosis. They claimed that intervention below the lumber muscle at lateral recumbancy allowed easier approach to the ovaries. But there may be chance of major haemorrhage due to the use of clamp by a unskilled surgeon. It was an expensive technique and in obese animals the technique maynot be applied easily.

Rubin and Maplesden (1978) performed ovariohysterectomy in bitches by mid-ventral approach. They claimed that the length of incision did not affect the healing process. In very small incision there is a chance of technical difficulty, but there is less chance of contamination , less wound dehiscence. less time is required for operation than that of a large incision. Moreover cosmetic value of the subject will be affected due to

long incision.

David and Rajendran (1980) observed the after effects of spaying in cats and bitches and found that half of the animals out of 320 bitches and 214 queen cats developed obesity. There were also urinary incontinence and discharge from the vulva in few cases.

Okkens et al.(1981) noticed that due to the presence of residual ovarian tissue, 28 spayed bitches developed discharge from vulva, 37 bitches developed attractiveness to male, 28 bitches showed periods of heat and 14 bitches showed pseudopregnancy out of 109 spayed bitches. In 39% of cases there were cytological pattern of oestrous and in 70% cases high progesterone level were observed.

Wissler et al. (1988) performed two stages of operation, first ovariectomy and autotrans-plantation of the ovarian tissue in the gastric serosa and then ovariohysterectomy. There was least evidence of urinary incontinence, but this operation required time and skilled hand.

Wood et al. (1984) recommended mid-ventral approaches through linea alba as the site of incision

in bitches for performing ovariohysterectomy.

Wildt and Lawler (1985) performed sterilization inyoung bitches and queen cats using laparoscopic technique by occ lusion of uterine horn. It requires sophisticated laparoscopic device and skilled hand.

Hoque (1991) conducted a comparative study of various approaches for feline ovariohysterectomy. He conducted that flank approach was superior to mid-ventral approach due to easy localisation and exteriori -sation of uterine horn and ovaries with least post-operative complications.

Janssens et al. (1991) studied that the surgica -l tchnique and it's sequele by performing ovarioectomy by bi-lateral flank approach in 72 bitches of 27 breed. They claimed that the procedure gave better ovarian exposure with deep placement of ligature through a small incision in both flanks, but the procedure requires a little more time for turning the patient to other side redraping the operative site and finally closing of the incision. Post surgical complication were minimum but in long run 60% of operated animal gained weight.

In 26% animals excessive hair shedding was noticed. 22% animals became aggressive , in 29% cases there were sedentary behaviour and in 18% cases urinary incontinences occurred.

Anaesthetic Management :

Jones (1957) stated that atropine in therapeutic dosage acts as a mild stimulant of respiratory and central nervous system, but there is species variations.

Archer et al.(1964) stated that pentazocine is a strong analgesic but non-narcotic. In man the analgesic potency of 30 mg. of pentazocine is equal to 10 mg. of morphine. It is a weak narcotic antagonist.

Fraser and Rosenburg (1964) claimed that pentazocine could be used effectively as powerful analgesic agent having no abuse potential.

Keats et al.(1964) claimed that pentazocine was safer than morphine regarding respiratory depression effect. During the clinical use of pentazocine in human there was no evidence of apnoea.

Lowe (1969) stated that the analgesic action

of pentazocine in the pony provides more prolonged and consistant effect than meperidine. In case of meperidine duration of analgesia is 21 minutes. It was 48 minutes in case of pentazocine. An intravenous dose of pentazocine (0.55 - 1.11 mg/kg body weight) produces analgesia, lasting for 20 minutes, an I/M or I/V dose (1.65 to 2.2 mg/kg body weight) produces 15 to 60 minutes analgesia. when pentazocine at the dose rate of 2.2 to 4.4 mgper kg body weight is given I/M orI/V route causes side effects like incordination, muscular tremor, muscle hypertonacity and hypersensitivity to noise.

kyshakevych (1970) observed that the analgesic effect of pentazocine in dog at a dose rate of 1 mg per kg body weight. In comparison to morphine, pain, response to heat and mechanical stimuli were more satisfactory in case of pentazocine. During the analgesic period (2 hours) there was no marked changes in pulse rate, respiration and body temperature.

Soma (1970) studied on dogs with pentazocine at a dose rate of 6 tol0 mg per kg body weight. He reported that like morphine compound pentazocine produces tremors and convulsion.

Romoli (1971) used pentazocine in 500 traumatic human patients as preanaesthetic. During anaesthesia and in the post-operative period,he noticed that pentazocine have good analgesic effects with little side effects.

Short et al. (1971) compared pentazocine with meperidine for clinical use in veterinary surgery. They claimed that pentazocine was more effective mainly in occular surgery.

Benitez and Brunel (1973) studied the effects of pentazocine indifferent doses in dogs and cats. In dogs pentazocine was administered I/V at the dose rate of 0.5, 1 and 2 mg per kg body weight while in case of cat it was 3 mg and 4 mg per kg body weight S/C The analgesic effect was evaluated by applying heated copper plates in the medial aspect of the thigh. The obtained result created interest for application of pentazocine in the field of veterinary practices.

Done et al. (1975) used only diazepam to sedate the deer under laboratory and field condition .For laborato -ry deer he recommended the oral dose at the rate of 28 to 38 mg per kg body weight. But, in field condition the dose rate should be higher.

Still (1975) stated that pentazocine was an optically active substance. Its dextroisomers produced psychotomimymetic effect while its levoisomers produced analgesic effect.

Takahashi et al. (1976) studied with the combinati -on of droperidol and pentazocine. He claimed that except decrease in the pulmonary vascular resistance there was no haemodynamic disturbances.

Booth (1977) claimed that pentazocine was nearly 5 times more potent analgesic than pethidine (meperidine hydrochloride) and the principal effects of pentazocine are on C.N.S. and smooth muscle.

Cooper and Organ (1977) administered pentazocine indogs at the dose rate of 15 mg and 30 mg per kg body weight I/M. He observedno untowardeffect in dogs even with 30 mg per kg body weight of pentazocine administered. Although the animals remained tranquilized even upto 8 hours. But when pentazocine is used at a dose rate of 2 mg per kg body weight there is no such type of drawback.

Kumar and Thurmon (1977) studied the effet

of diazepam in goats. They claimed that there was insignifi cant effect of diazepam on serum electrolyte and enzyme which indicated the least toxicity of diazepam in goats.

Shima et al. (1977) reported motor and emotional r responses of cat like movement of head, escape and attack were abolished after 15 minutes administration of pentazocine. This analgesic effect remained for more than 20 minutes.

Gilman et al. (1980) stated that diazepam might have some depressive effect on thermoregulartory center (hypothalamus) causing fall in body temperature andslight depression on respiratory center. According to them diazepam also possessed agranulocytosis and lymphocytosis effect.

Some (1980) studied the effect of pentazocine On cardiovascular system in dogs. He found when pentazocine was administered inclinical doses,it stimulated both alpha & beta receptors and then catecholamine was released from sympathetic nervous system and it caused constriction of peripheral and pulmonary vessels and increased cardiac output.

Tulunay (1980) observed that when pentazocine was used at the dose rate of 11.5 mg/kg body wt., it caused hyperthermia in case of rats. But this dose-dependent initial hyperthermia gradually fall down and produced hypothermia later on.

Yanagida (1980) compared morphine with pentazocine regarding their physical potential while morphine had higher dependence potential, pentazocine had no or very little addictive property though it was used frequently.

Sawyer (1982) claimed that in case of dog diazepam had negligible effect on respiratory center but it caused sedation, muscle relaxation and ataxia. He also stated that diazepam can be used as an alternative and given safely in patients where phenothiazine can not be given as tranquilizer i.e. in case of epilepsis or patients with severe heart disease.

Miner and Losaco (1984) studied on the analgesic effect of pentazocine in dogs. They administered pentazocine at the dose rates ranging from 0.75 to 1.5mg /lb body wt. intramuscularly. They observed that pain eleived very quickly and the effect remained upto more or less 3 hours. There were mild to moderate salivation but

no adverse effect on respiration. They concluded that pentazocine could be used safely as reliable powerful analgesic with very little side effects when it was administered in lower doses.

Saini and Singh (1984) claimed that combination of Atropine, Diazepam and Pentazocine could be used more safely as premedicants in generalanaesthesia in mices than that of the combination of only diazepam and pentazocine. The first combination increased the safety index of ether or halothane.

Pandey & Sharma (1986) administered diazepam @ 2 mg/kg and pentazocine lactate @ 4mg/kg intravenously in canine surgical patient and recorded the clinical and haematological changes. There was significant ($P < 0.05$) fall in body temperature and reduction of respiration within ½ hour which came to normal after 5 hour of drug administration . There were significant ($P < 0.05$) drop of leucocytes, neutrophil , eosinophil count and P.C.V.but lymphocyte count increased significantly and there was insignificant effect ($P > 0.05$) on erythrocytes. It was concluded that the drug combination produced satisfactory sedation and analgesia which were sufficient

for performing even some major operations.

Sawyer and Rech (1987) made experiments on the analgesic and behavioral effects of pentazocine in feline species. They reported that there was sufficient visceral analgesic effect but with no adverse effect on behavioural response.

Singh and Kumar (1987) observed that when atropine was premedicated in diazepam tranquilizer it significantly reduce the onset of tranquilization from 1.75 $\pm$ 0.64 minute to 1.62 $\pm$ 0.62 minute and duration of peak tranquilization reduced from 15.60 $\pm$ .81 minute to 12.75 $\pm$ 2.21 minute. The duration of tranquilization was increased from 37.5 $\pm$ 8.66 minute to 48.25 $\pm$ 13.62 minute. This premedication decreased the recovery time from 87.50 $\pm$ 18.92 minute to 85.00 $\pm$ 17.32 minute and controlled bradycardia due to administration of diazepam.

Parihar and Pandey (1988) observed the clinical response of drug combination of atropine sulphate, pentazocine lactate and diazepam in dogs. They caused satisfactory analgesia , sedation and muscle relaxation for performing surgery of various kinds. In barbiturate anaesthesia when the above combination was used as premedication, it increased the duration of anaesthesia and decreased the required dose rate.

Bnattacharya (1989) reported the effects of pentazocine alone and in combination with diazepam in goats. There was narrow range of muscle relaxation but satisfactory sedation with little analgesia with the combination but when pentazocine was used alone the above features were inadequate.

Bhattacharya (1989) administered diazepam I/V route at the dose rate of 0.4 mg/kg body wt. inhorse and evaluated a non-significant fall of total erythrocytes count, Hb% and T.E.C. but PCV% decreased significantly. He claimed that decrease of T.E.C. was due to pulling of blood in to the spleen.

Gouripur and Patil (1989) evaluated that pentazocine lactate was an anticholinergic which caused reduction of colonomic motor activity as observed in frog heart and ileum of guineapig.

Maji (1990) evaluated that pentazocine lactate, Lorazepam and atropine sulphate can effectively be used as a substitute of regional or general anaesthesia in goats.

CHAPTER III

MATERIALS AND METHODS

MATERIALS AND METHODS

Selection of Animals :

In the present study a total number of twelve apparently healthy non-seasonal, non-pregnant , adult mongrel bitches, weighing between 12 to 14 kg body wt. aged between 3 to 5 years and eighteen clinically healthy non-seasonal, non-pregnant , adult queen cats, weighing between 2 to 3 kg body weight aged between 2 - 3 yrs. were used. Both the bitches and queen cats were obtained from local procurement facilities and were kept in animal house before being used in the experiment. After their arrival they were kept under close observation for a period of three weeks during which period routine physical examination were done to check up their health. Temperature pulse rate, heart rate, respiration were also recorded. Tney were also treated for intestinal helminth and were maintained in identical envioronment ,management and standard diet as was given in Bengal Veterinary College, Calcutta with liberal supply of drinking water.

Materials :

1. Inj. Atropine Sulphate - I ml. ampule containing Atropine Sulphate equivalent to 0.65 mg. Atropine per ml. (Begal Immunity).

2. Inj. Calmpose - 2 ml. ampule containing Diazepam IP 10 mg and Benzyle Alcohol IP 1.5% per 2 ml. (Ranbaxy Laboratories).

3. Inj. Fortwin - 1 ml. ampule containing pentazocine lactate equivalent to 30 mg Pentazocine per ml. (Ranbaxy Laboratories).

4. Inj. 2% Xylocaine- 30 ml vial containing 2% Lignocaine hydrochloride (Astra -IDL, Bangalore)

5. Inj. Oxysteclin - Each ml. contain 50 mg oxytetracycline (Sarabhai India Ltd.)

6. Nabasulph Powder (SK&F)

7. Betadine 100 ml.ph. containing Providone Iodine (Wockhard - Bombay)

8. Routine surgical Instruments, Suture materials and appliances.

9. Bandage role, Absorbant cotton, Sterite gauge, Leukoplast-Adhesive Tape.

Design of the experiments :

B i t c h e s :

In the present plan of work a total number of twelve animals were utilized for the study by random selection all the twelve animals were placed in two groups namely group - A and group - B respectively. All the animls, in group- A and group- B were serially numbered from one to twelve. So, in group -A animals were numbered from one to six and in group-B from seven to twelve. In group - A animals ovariohisterectomy was performed through midventral approach from pubic brim to umbilicus or a bit further anterior to it . In case of group - B same operation was performed through upper flank incisioin by a vertical incision in the middle of the flank.

Preanaesthetic medications and anaesthetic agent were followed similarly in both the two groups except the line of infiltration of 2% lignocaine hydrochloride, at the dose rate of 1 ml. per centimetre length subcuteneously, differed according to the site of incision.

Inj. Atropine Sulphate @ 0.05 mg. per kg. body wt. administered intramuscularly, after 30 minutes Pentazocine Lactate at a dose rate of 3 mg per kg body wt. administered intravenously (I/V). Which was followed by diazepam @ 3 mg per kg body weight administered intravenously (I/V).

Then according to the site of operation , linear infiltration of 2% Lignocaine hydrochloride @ 1 ml.per 1 cm.length was done. Prior to administration of the above drugs each animal was carefully secured and physically restrained on the operation table. After 10 minutes of administration of local anaesthetic solutioin operation was started. In case of group -A bitches spaying was performed by Midventral approach and in group - B animals flank incision method was followed.

Queen Cats :

All the eighteen cats were randomly divided into three groups namely group - A, B and C respectively. Now the animals of all groups were serially numbered from one to eighteen. Thus animals were numbered in

group - A from one to six, in group -B from seven to twelve and in group- C from thirteen to eighteen.

For anaesthesia following drugs were used accordin to the dose schedule mentioned below :-

Atropine sulphate, pentazocine lactate and Diazepam at the dose rate of 0.05mg. per kg. body weight by intra muscular injection (I/M), 4 mg per kg- I/M and 4 mg per kg-I/M were administered respectively following the time schedule as in case of bitches. Each animal was carefully secured and physically restrained prior to administration of the above drugs. After 5 minutes of administratioin of this drug combination 2% lignocaine hydrochloride was infiltered sub-cutenously on the proposed line of incision according to their group specification. After waiting for a period of 10 minutes, ovariohysterectomy was performed in group-A animal, by mid ventral incision, in group - B animal, by left flank incisioin and in group -C animal, by bi-lateral flank incision.

METHODS

Preparation of the animal on the previous day of experiment :

From the groups of animals of both species one animal was selected for experiment on the next morning. The area of saphenous vein and jugular vein (in case of cat) were shaved to facilitate the administration of drugs and collection of blood. According to the method the operative area was shaved and cleaned with 70% alcohol and covered up. Food and water were withhold for 24 hours and 6 hours respectively prior to start of experiment.

Preparation of the animal just before the experiment :

At first, clinical examinations like recording of temperature, pulse, heart rate, respiration were made. The animals were carefully secured and physically restrained on the operative table. The sites of drug administration and operation were washed and cleaned with 70% alcohol. Before administration of drugs related

parameters were recorded and blood sample was collected by placing the animal on lateral recumbancy for study of haematological and biochemical parameters tomake the base value or control value of the present study.

Procedure of work :

Anaesthetic Procedure : In case of bitch in both groups Atropine sulphate was administered intramuscularly after 30 minutes Pentazocine and Diazepam was administered slowly through saphanous vein. Drugs were administered with the doses mentioned before. Group-A animal was placed on its back, then draping and final cleaning of operative area was done. Then 5 ml. of 2% Lignocaine hydrochbride was infiltered sub-cutenously in the proposed line of incision.Group- B animal was placed on right lateral recumbancy. The operative area was finally cleaned and draped. Then 6 ml of local anaesthetic solution was infiltered in proposed line of incision. After waiting 10 minutes operation for ovariohysterectomy according to the group was started.

In case of queen cats in all three groups

atropine sulphate was administered. I/M then after 30 minutes pentazocine and diazepam were administered both I/M. All the drugs were administered with the before stated doses. Now group - A animal was placed on dorsal recumbancy, group - B animal was placed on right lateral recumbancy and group - C animal was placed on right lateral recumbancy at first,then on left lateral recumbancy. The operartive area was finally cleaned and drapping was done. In case of group - C animal re-drapping on the right flank and local infiltratioin were done after closing the left flank incision. After waiting 5 minutes after pre-anaesthetic medication 5 ml.of local anaesthetic solution for group-A animal, 4 ml. for group- B animal and 3 ml. each for both sides in group - C animal, was infiltered on the proposed line of incision. After waiting 10 minutes operation for ovariohysterectomy was performed according to the groups and blood sampling was done at 10, 30, 60, and 120 minutes and finally after 3 hours.

Surgical techniques :

In case of bitch :

a) Midventral incision method : Operation was

conducted after placing the anaesthetized animal on its dorsal recumbancy with the pelvis slightly raised.

A midline incision was made from the umbilicus and extending caudally for 5 to 5.5 cm. The structures incised include the skin, subcutaneous fascia,linea alba, falciform ligament and peritoneum. The left fore finger was introduced into the abdominal cavity and lateral to the fundus of the bladder, the uterine horn of one side was located. It was readily recognised by its small size, round form and firm consistancy and by the adiposity of the mesometrium (ligamentum latum). The uterine horn was brought into the wound and ovary was then pulled out gently as far as possible. Then clamping across the ovarian vessels and ovarian bursa, by using two haemostats,was done and the ovary was grasped between the thumb and index finger. Then the ovarian pedicle with the ovarian vessels were ligated by using 2-0 plain catgut. Then the attachment between ligature and ovary was severed.

After removing one ovary, the other one was located by following the uterus to the tip of the opposite horn and the procedure was repeated.

Then the body of the uterus was withdrawn for ligatioin. Two haemostats were clamped across the body of the uterus to hold it for ligation and excision. The uterine blood vessels were ligated on each side and a final ligature was used to encompass the entire cervix. The uterus was excised just cranial to the ligature A thorough checking was given for haemarrhage before the stump was returned into the abdomen. Then abdomen was closed as a routine manner by using chromic catgut (No-2) after dusting of Nebasulph powder and the skin incision was closed by 2-3 interrupted horizontal mattress sutures by nylon threads.

b) Left Flank incisionmethod :

The animal was placed on its right side with the hind legs stretched moderately backwards. A vertical skin incisioin of 6 to 7 cm. length was made below the lumber region and midway between the last rib and the level of the tuber coxae. After the skin incision, the external and internal abdominal oblique and transversus muscles were transected. The peritoneum and transversus fascia closely adhere to the deep surface of the transversus and usually was penetrated as the muscle was transected.

After introducing the left fore finger the left uterine horn was easily isolated. The same procedure, as was followed in midventral approaches, was done for removal of ovaries and uterus and closing of the wound. But a careful check-up was needed during removal of the right ovary.

In Queen Cats :

a) Mid-ventral approach : The same procedure was followed as in case of bitches for spaying by mid-ventral approach. But in this case only 4 to 5 cm long skin incision was given.

b) Left Flank incision method : The positioning of the animal andsite of operation was same as in case of bitches under flank incision method. A 3 to 4 cm long incision was made slight obliquely from anterior to posterior was made. Removal of ovaries and uterus and closing of wound were performed as routine manner.

c) Both flank incision method : At first the posi-

tioning of the animal was kept same as in case of left flank incision method. But the position of the animal was changed to opposite after closing of the wound of the respective side. Vertical skin incisions of 3 cm length each were made on each operative site. From the left side incisioin left ovary and uterus were removed and after closing the left side wound, animal was turned to the opposite side for surgery. From the right side incisioin the right ovary was removed. Closing of wounds were followed as routine manner as in other methods.

Parameters of Study :

1) Clinical Studies : The general performance of the animal before and after the anaesthesia and operation were observed and recorded. physical condition of the animal was also evaluated. Respiration, rectal temperature, heart and pulse rate were noted before and at different time intervals of drug administration as mentioned earlier. The effect of thedrugs combination on vital functions of thebody and extent of relaxation of muscles were also observed.

Regarding operative procedure observations were made on comparative length of incision, easy manoeuvring, least post operative complications and healing patterns at different approaches of spaying.

2) Anaesthetic observation : Onset of action, duration of effect and recovery time were studied in all the cases. Cutaneous and eye reflexes were tested and Muscle tone was monitored to assess thedegree of drug action by standard techniques. Response to pain stimuli was assessed by pin prick, pinching of skin and abdominal muscle.

3) Haematological Parameters : Haematological studies were done at different times of drugs administration as mentioned before. It included the estimation of total erythrocyte count (TEC), TLC, haemoglobin percentage (Hb gm%) and packed cell volume (PCV%). TEC AND TLC were done by haemocytometer by using Ganti's fluid (Sastry 1983). Haemoglobin was estimated by Sahli's haemoglobinometer and packed cell volume by Drummond microhaematocrit

4) Biochemical Parameters : 4-5 ml.of venous blood was collected in seperate test tube without anticoagulent at different time intervals of study. The blood was allowed to clot within the test tube in a slanting position in refrigera -tor for 2 hrs. Then serum was poured off in another test tube and centrifuged at 3,500 r.p.m. for 10 minutes. The supernatant serum was collected for the studies of Serum Glutamic Oxaloacetic transaminase(SGOT) and Serum Glutamic Pyruvic Transaminase (SGPT) level. For SGOT studies reagents of 'span diagnostics Pvt.Ltd'.-Udhna (Surat) has been used. For S.G.P.T. estimation "Serum G.P.T. Test Kit" of 'Stanbio Co'. has been used and procedures were followed accordingly as mentioned in the literature supplied with the kit, for respective study.

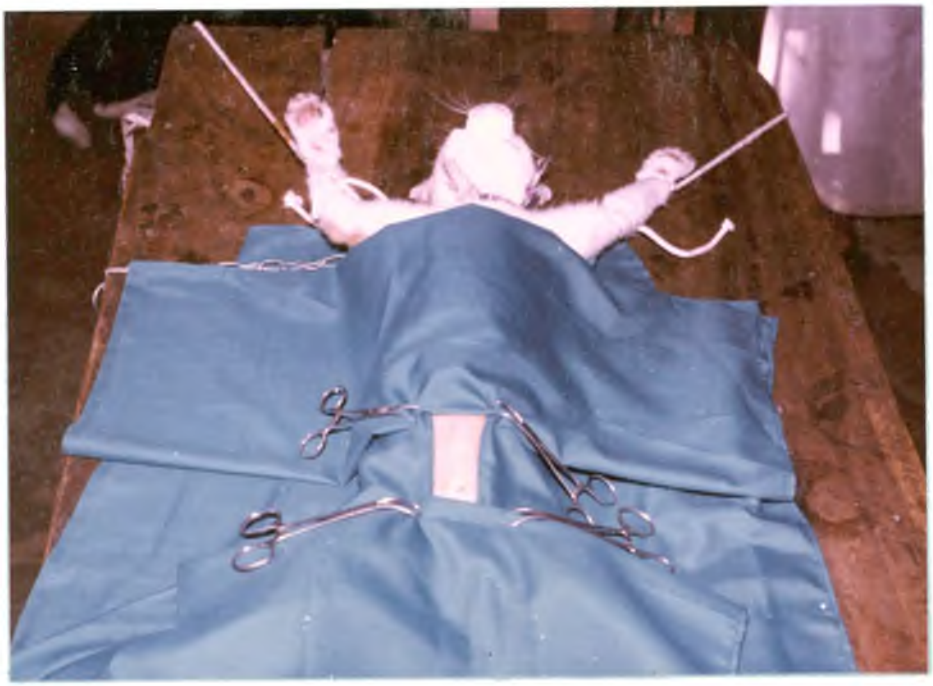

Fig.1: Showing the dorso-ventral position of anaesthetised cat on the operation table and the operative site after draping for spaying through mid ventral approach.

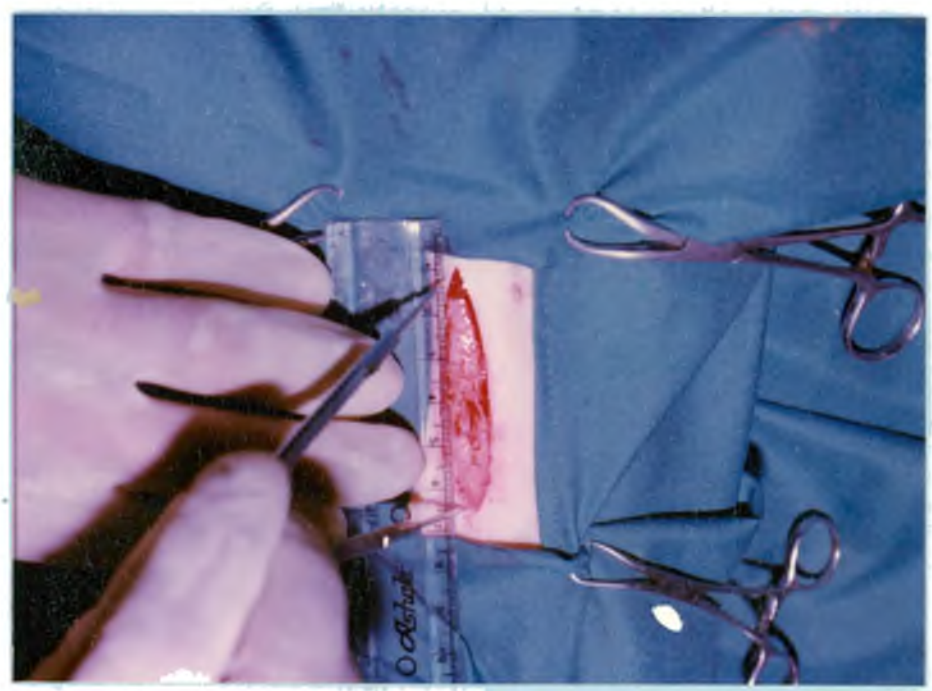

Fig.:2: Showing the length of incision for ovariohysterectomy in cat by mid ventral incision method.

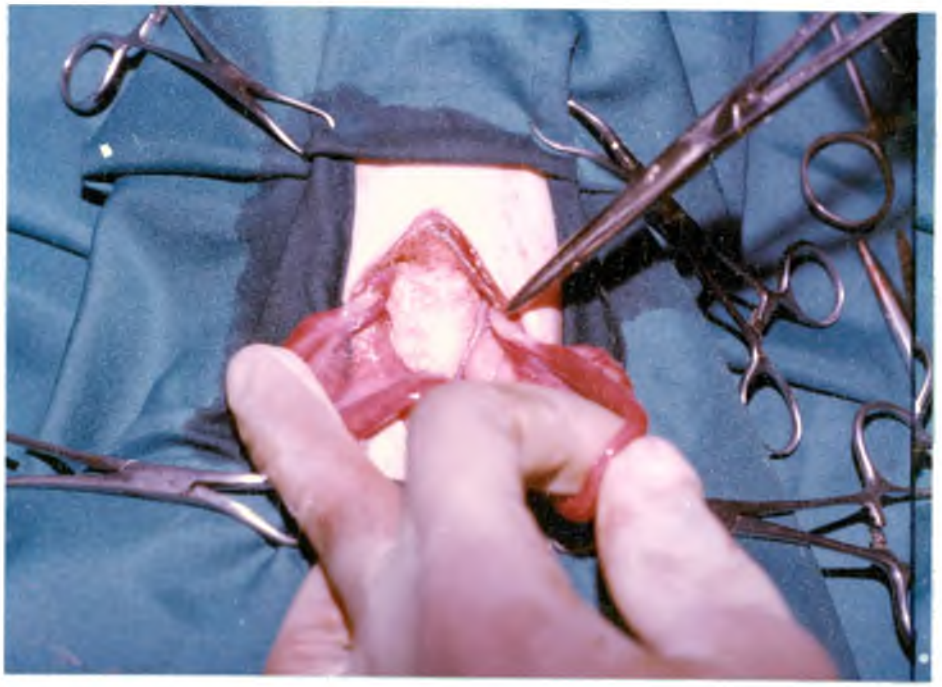

Fig-3. Showing prominant left overy & left horn of uterus and the contra lateral right horn and right ovary alongwith the broad ligament.

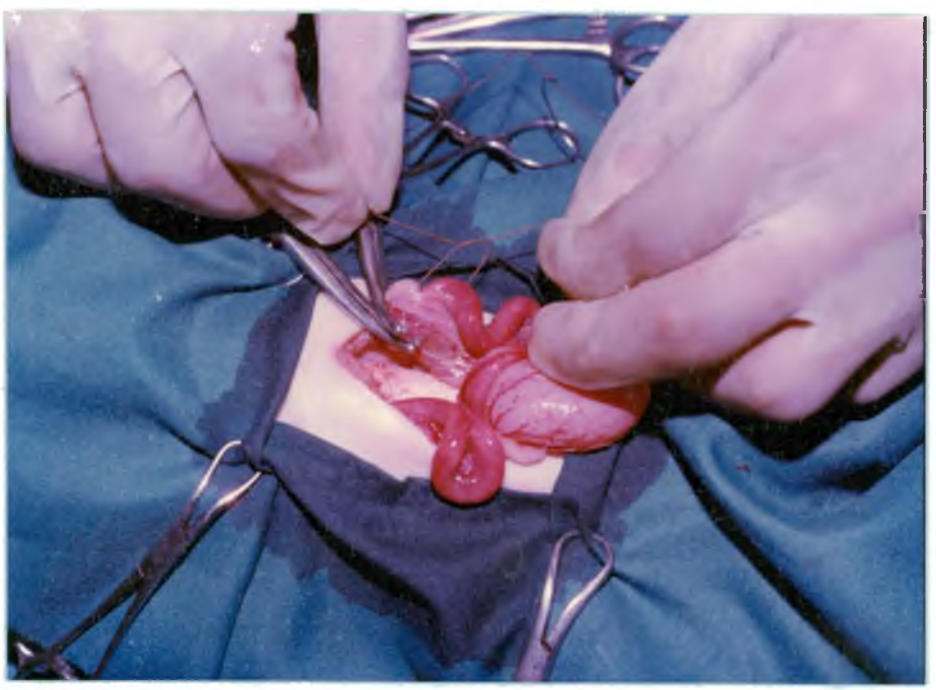

Fig-4: Showing the placing of ligature on left ovarian ligament, anterior to the ovary.

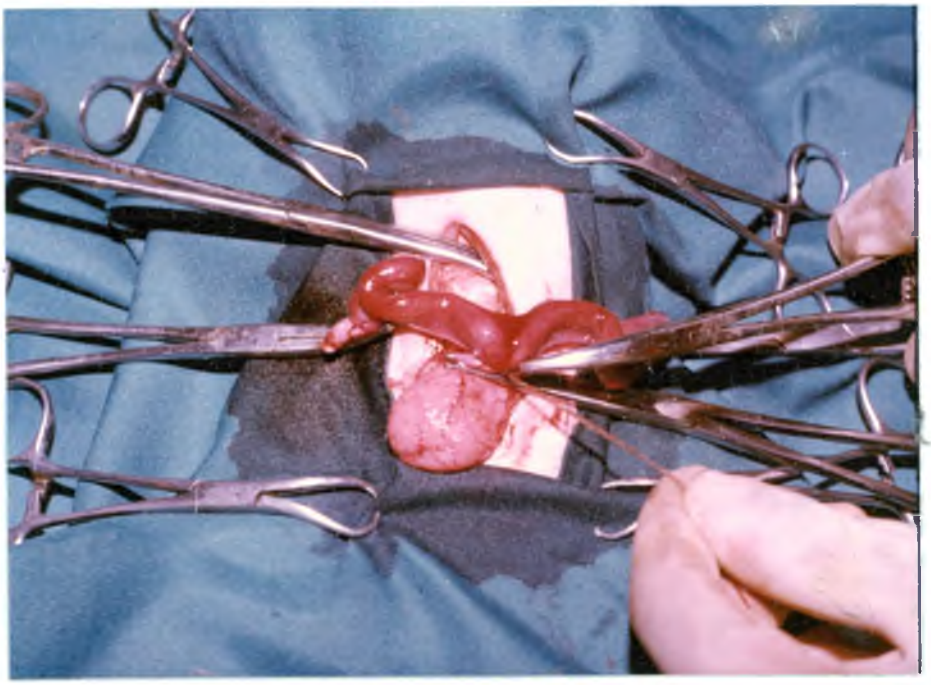

Fig-5: Showing the ligature on the body of uterus after incising the left and right ovary.

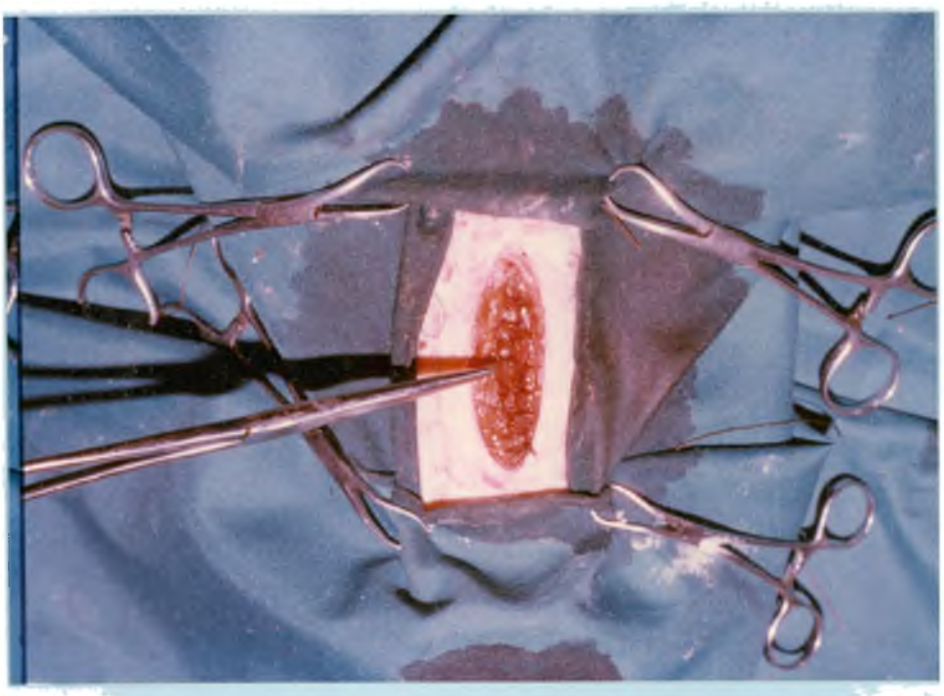

Fig- 6 : Showing the abdominal closure with interrupted sutures, muscle and peritoneum taken together.

Fig-7 : Showing right lateral recumbent position of the anaesthetised cat on the operation table and the operative site after draping, for spaying through left flank approach.

Fig-8 : Showing the length of skin incision for ovariohysterectomy in cat by left flank approach.

Fi -9: Showing the position cf the left horn of the uterus after incision of peritoneum by left flank incision method.

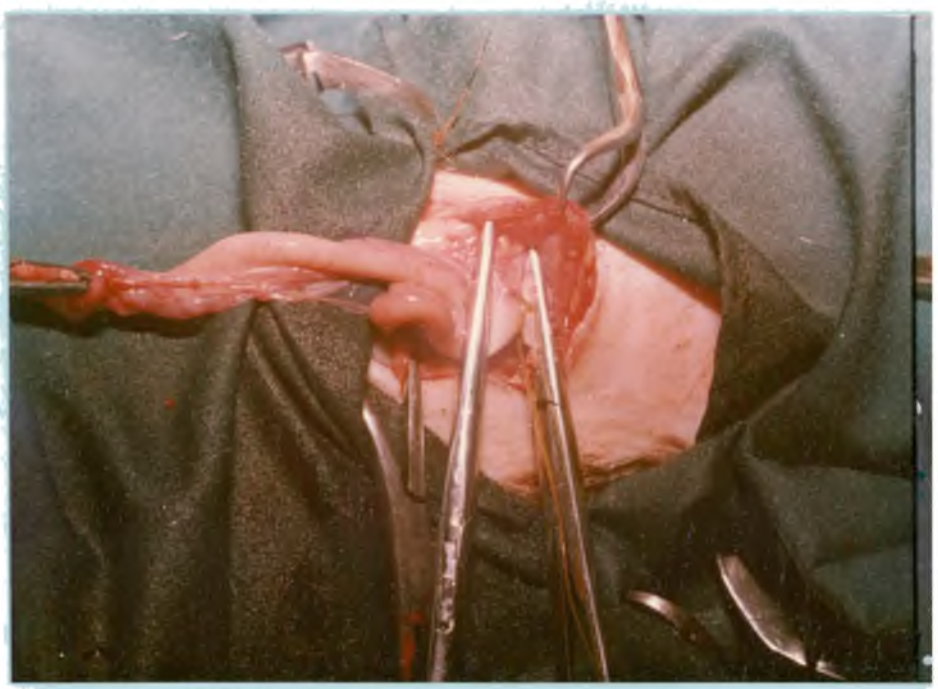

Fig-10: Showing the incised left ovary & horn and clamping on the body of the uterus.

Fig-11: Showing the left lateral recumbancy of the anaesthetised cat on the operation table and the operative site of the right flank after draping for Ovariohysterectomy by bilateral flank incisions.

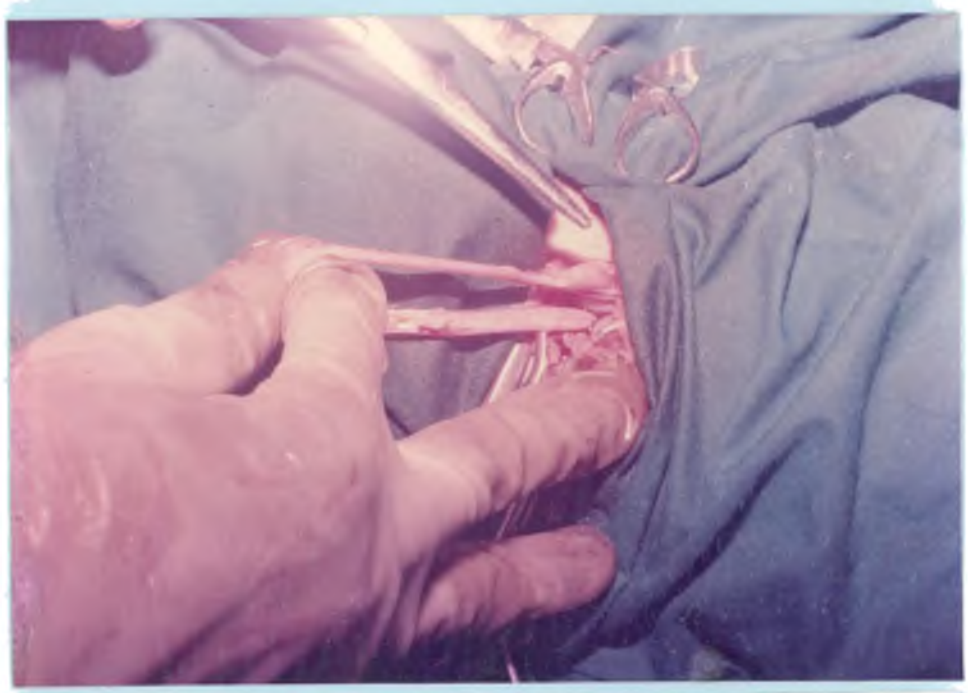

Fig.12: Showing incision on right flank, in bilateral approach for spaying, the right ovary and right horn along with severed left horn and body of the uterus.

Fig-13: Showing the dorsoventral recumbancy of anaesthetised bitch on the operation table and the operative site after draping for spaying through linea alba.

Fig :14: Showing the length of incision for ovariohysterectomy in bitch through mid ventral approach.

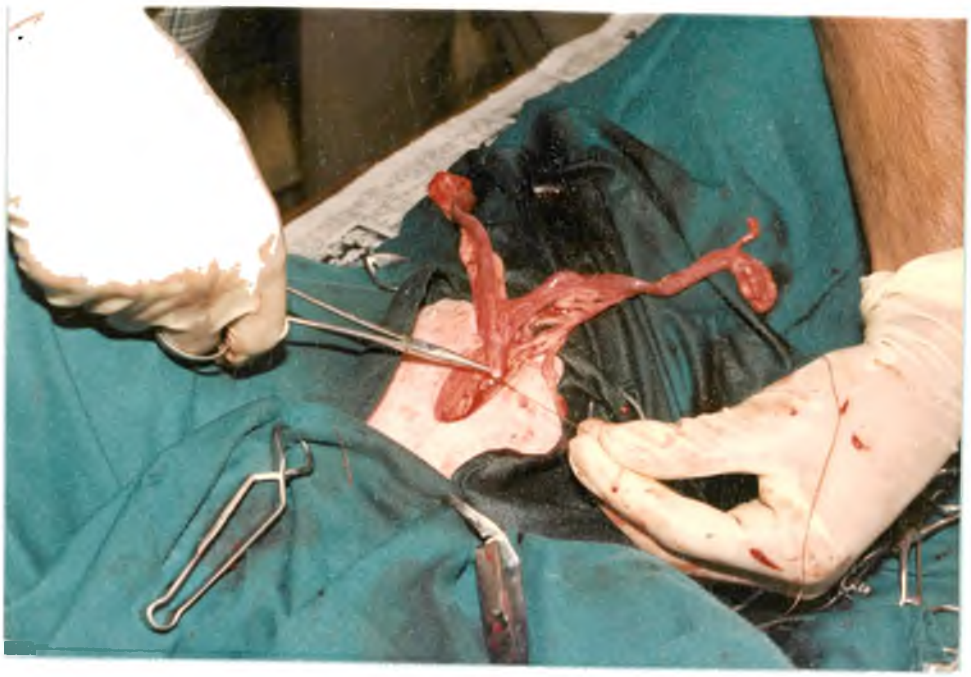

Fig. 15 : Showing the ligature of the body of uterus after incision of both right & left ovaries.

Fig-15 : Showing the relationship of the ovaries, both the horn and body of the uterus along with the broad ligament, after it, removal through mid ventral incision.

Fig-16: Showing the right lateral recumbant position of the anaesthetised bitch and the operative site after draping, for spaying through left flank incision method.

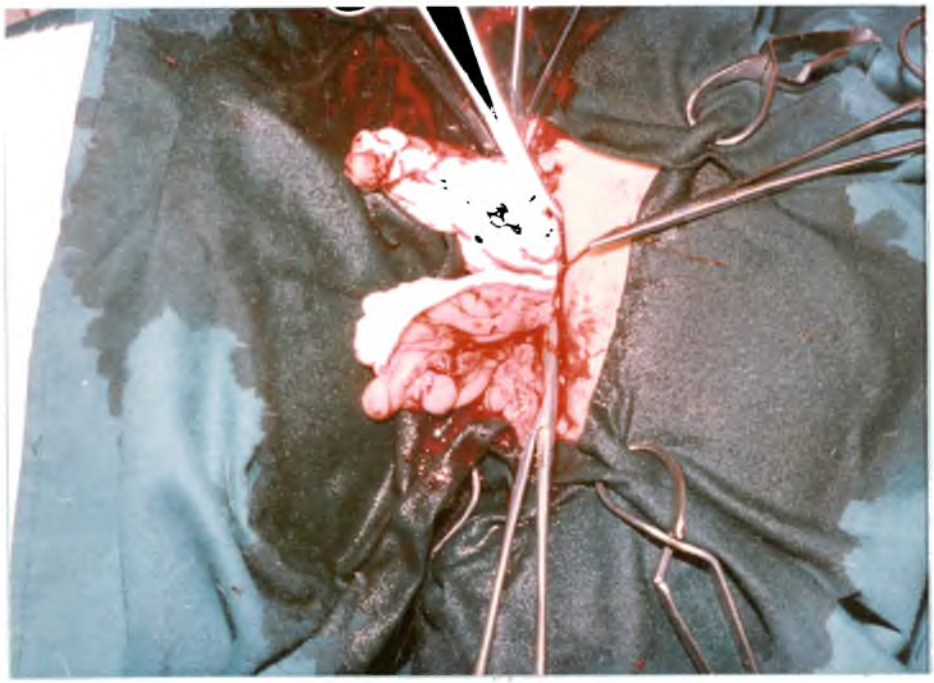

Fig-18 : Showing the ligature of the body of the uterus after incising both right and left ovaries through left flank approach and relatively greater amount of haemorrhage than mid ventral approach.

CHAPTER IV

RESULTS

RESULTS & OBSERVATION

Results of the operative study :

In performing ovariohysterectomy in queen cats and bitches by different methods as mentioned in the present study, necessary observation during and after operation in respect to length of incision, relative advantages and disadvantages , average duration of each operation exclusive of anaesthesia post-oprative complications and differences in healing process of the wounds revealed comparable features.

Queen Cat : Group -A- animals : (Mid-ventral approach):

The average length of incision required for ovariohysterectomy was 5 cm. Average duration of each operation exclusive of anaesthesia was 30 to 35 minutes. After evacuating the bladder and everting it, the body of the uterus was found out easily . There was a negligible haemorrhage. Out of 6 cases operated animals none of them died. But in two cases stitch abscesses were found and they were healed by secondary closer. Complete skin healing in these two cases required 18 days. on the other hand, in remaining animals there were uneventful healing and suture was removed on 11th day of operation.

Group - B animal :(Left flank approach) :

The average length of skin incision was 4 cm. Average duration of each operation exclusive of anaesthesia was 25 to 30 minutes . In comparison to group - A animals there was slight more haemorrhage .After opening the peritoneum the left horn was easily searched out. Left ovary and the body of the uterus were easily ligated and easily cut off. But slight difficulty encounter -ed to ligate the right mesoovarian ligament with the ovarian vesseles. In all cases the wound healed uneventfully by first intensioin of healing. Sutures were removed on 10th day of operation. None of the animals of total six operated died.

Group - C animal : (bi-lateral flank method) :

The average length of operation in both sides was 3 cm. each. Total time taken for the operation was 45 to 50 minutes. After closing of left side incision, animals were turned on the opposite side and local anaesthe -tic infiltration and re-drapping were done. Animals woke up during turning and difficulty encountered in 2nd incision. Total haemorrhage in this method was more than that of other two methods. Uterus and both ovaries

were easily located and removed. There was uneventfull healing in all the cses. Sutures were removed on 10th day of operation.

B I T C H : Group-A animals (mid-ventral incision)

The average length of incision was 5.5.cm. Average duration of each operation was 35 to 40 minutes. There was no difficulty in keeping the incision in a straight line on lineaalba . After everting the urinary bladder uterus was easily searched out . No major haemorrha -ge was encountered in this case. Retraction of wound edges became easier. out of 6 operated animals no animal died. Except in one case the wound was healed uneventfully by first intention and suture was removed on 11th day of operation. In one case there was stitch abscess and secondary closer was done. There was no herniation.

Group - B animal : (Left flank incision) :

The average length of incisioin was 6 to 7 cms. The average time taken for each operation excluding the anaesthesia was 40 to 45 minutes. In comparison to mid ventral approach there was much more haemorrhage in each case. More difficulty in removal of right ovary was encountered. There was difficulty in retracting the wound edges. Out of six cases one animal (no- 10) died. In rest five cases there were uneventful first intension of healing.

Observation of the anaesthetic study :

Observations were made in all experimental animals of all groups. For clinical study results were recorded in terms of rate and depth of respiratioin, rectal temperature, heart rate and pulse rate at different time intervals - at 0, 10, 30, 60, 120, and 180 minutes.

For anaesthetic parameter, onset of anaesthesia, duration of action and recovery time were noted. Development of anaesthesia was evaluated by physical evaluation and assesing the reflexes namely degree of sedation, muscle relaxation, response to painful stimuli, cuteneous reflexes and palpebral reflexes.

under haematological profile total erythrocyte count (TEC), total leucocyte count (TLC), packed cell volume (PCV) and haemoglobin (Hb) estimation were done at different time intervals as stated in case of clinical study.

The effect of drug on liver and heart was evaluated by estimating serum glutamic oxaloacetic transaminase (SGOT) and Serum Glutamic pyruvic Transaminase (SGPT) in biochemical studies at different time intervals upto 3 hours of drug administration.

clinical Parameters : (in cats) :

Following administration of diazepam and pentazocine the rectal temperature in both groups of animal exhibited a progressive declining from 101.56 ± 0.85 °F (base value at 0 minute) to a minimum of 98.55 ± 1.1 °F at 30 minutes. At 60 minutes it again began to increase and after 3 hrs. it became 100.85 ± 0.98 °F The analysis of variance shows that the changes of temperature are statistically non significant.

Heart and pulse rate showed a gradual increase after administration of drug combination in both groups. From the base value of 152.5 ± 1.3 per minute, the heart rate increased to a maximum of 171.4 ± 0.96 per minute at 60 minutes. Then there was a tendency to return to the normal value and 3 hrs. it became 158.4 ± 1.4 per minute. The analysis of variance (ANOVA) showes that the value of any moment does not change significantly from that of the previous one. But in the values of 0 minute and 60 minutes there was a significant change ($P < 0.05$). But this change was within the physiological limits. Results of pulse rate showed similar changes like the heart rate . From the control (0 minute) value

of 149.2 ± 1.6 per minute it became the maximum of 166.3 ± 0.89 at 60 minutes, then it began to be normalised and at 3 hrs. it became 153.5 ± 1.2 per minute .

The respiratory rate did not show any appreciable changes at any time of drug administration in both groups of animal. There were gradual marginal declining at different period of observations, the minimum being 23.6 ± 1.8 per minute at 30 minutes from the base value of 30.2 ± 0.88 per minute. At 3 hrs. it became 29.4 ± 1.5 which was almost same as the 'O' minute value. The depth of respiration decreased slightly from deep to moderate upto 30 minutes, then gradually it became normal.

All the results of clinical parameters are tabulated in the table no - 3. There was no incidence of salivation and bulging of anus at any moment in any case of both groups.

Anaesthetic Parameters :

The average induction time was 12.35 ± 1.12 minutes. In any case there was no excitement immediately but slight movement of tail and legs were observed in some cases after few minutes. Then after 10-12 minutes the animals became calm and quiet. Superficial cuteneous reflex was lost within 12 minutes but deep pin prick at jaw and neck area exhibited some response. There was no sensation in the operative field after 10 minutes of local infiltration. Moderate muscle relaxation was present from 15 to 50 minutes of drugs administration. The animals were calm and quiet upto 50.52 ± 2.86 minutes. After 50 minutes animals of both groups tried to raise their head but failed to rise as they could not raise their hind portion. After 70 minutes animals stood up and walked like drunkers, falling down and subsequently getting up. After 2½ to 3 hrs. all the animal regained their normal gaits.

Hamematological parameters :

The observations of haematological parameters exhibited no alarming changes due to preanaesthetic and anaesthetic medication in all groups of cats. The

analysed mean values for various haematological parameters are shjown in table no - 4

Haemoglobin gram percentage at 10 minutes of drug administration slightly increased. Then there was gradual fall of the results and at 60 minutes there was the maximum fall upto 12.66 $\pm$ 1.26 gram percent. from the base value of 13.46 $\pm$ 1.15. At 3 hours it became near the normal value ANOVA shows the changes were always non-significant.

Regarding PCV% the changes were same as in case of Hb%. None of the results showed significant alternation . After 10 minutes of drug administration there was gradual fall of P.C.V% with the maximum fall upto 34.65 $\pm$ 1.75 at 60 minutes, from the base value of 37.85 $\pm$ 1.35. At 3 hours the result showed like the normal value.

The results of total erythrocyte count(TEC) showed a gradual non-significant fall upto 6.18 $\pm$ 0.89 x 10^6 /c.m.m. at 60 minutes from the base value (0 minute) of 6.95 $\pm$ 0.95 x 10^6 /cmm. Results of 2 hours and 3 hours revealedthat the changes were transitory and became to be normalised.

Total leucocyte count (TLC) showed a tendency to increase at different time intervals upto 60 minutes with an exception at 10 minutes, where the count was decreased upto 11.26 $\pm$ 0.88 x 10^3 /cmm. from the base value of 11.64$\pm$ 1.3 x 10^3 /cmm. At 60 minutes the maximu result (12.22 $\pm$ 1.53 x 10^3 /cmm. was recorded, then after the value began to fall to be normalised.

The results of haematological parameters were tabulated in table no - 4.

Biochemical parameters :

The observations of biochemical studies exhibited no such appreciable changes regarding SGOT and SGPT level at different time intervals of drug administration. In all the cases there were marginal gradual increase inboth SGOT and SGPT level. SGOT level reached to a maximum of 38.44 $\pm$ 0.86 a t 60 minutes of drug administrat -ion from the base value of 30.86 $\pm$ 1.32. The result of 2 hrs. and 3 hrs. revealed that the increased value gradually became normal.The values of 0 and 60 minutes differ significantly ($P < 0.05$) to each other. The alternations in the SGOT values were always with in the physiological limits.

SGPT value gradually increased upto a maximum of 41.2 ± 0.88 at 60 minutes of drug administration from the O minute value of 35.2 ± 1.64. After 60 minutes the values began to decline again towards normal. The changes of SGPT values were always with in the physiological limits.

All the results were tabulated in table no - 4 .

Clinical Parameters : (in bitches) :

Following administration of drug combination (Atropine sulphate ,Diazpam, pentazocine and local infiltration) the rectal temperature in both groups of animals exhibited a gradual, marginal declining from 101.26 ± 1.21 °F 9 Base value) to a minimum of 99.24 ± 0.88 °F at 30 minute. Results of 60 minutes, two hours and three hours revealed that the temperature began to increase to be normalized. ANOVA shows that the alternation of temperature statistically non-significant and within the physiological limits.

Heart and pulse rate showed a gradual marginal increase after administration of drug combination in both groups of animals. From the base value of 85.46±

1.31 per minute the heart rate increased to a maximum of 96.88 $\pm$ 1.14 at 30 minutes. Then, it gradually decreased to return to the normal value and at 3 hours it became 87.85 $\pm$ 1.28 per minute. Analysis of variance shows that the value of 30 minute significantly ($P < 0.05$) varies with the results of 0 minute ,10 minute and 3 hours. But this alternation was with in the physiological limits.

Regarding the pulse rate similar changes were encountered like the heart rate in both groups of animals There was gradual increase in pulse rate up to a maximum of 93.21 $\pm$ 0.98 per minute at 30 minutes from the base value of 81.38 $\pm$ 1.24 per minute. Results of 1, 2 and 3 hours showed that the increased pulse rate gradually became normalised. A NOVA shows that results of 30 minutes Significantly varies with that of 0 minute and 3 hours. In other cases there were always non-significant changes. observations at any moment never crossed the physiological limits.

Regarding respiratory rate, no appreciable change was encountered at any time of drug administration in both groups of animals. After intravenous injection of diazepam and pentazocine, there was a slight increase

in respiratory rate at 10 minute (26.48 ± 1.15 per minute) from the base value of 25.64 ± 1.36 per minute. Then the respiratory rate decreased to 23.34 ± 1.12 per minute which again began to increase from 60 minutes. At 3 hours respiratory rate became 25.15 ± 1.34 per minute. The changes in the rate of respiration were always non significant. There was always moderate depth of respiration and the nature of the respiration was always thoraco-abdominal.

There was no incidence of salivation and bulging of anus at any moment in all the animals of both group.

All the results of clinical parameters are tabulated in the table no - 5.

Anaesthetic Parameter :

After 7 to 8 minutes of intra-venous injection of diazepam and pentazocinethe animal became calm and quiet. In most of the animals there were slight excitement immediately after administration of above drugs but gradually they became calm and quiet. Superficial cutaneous reflex was completely lost within 10 minutes in

most of the animal but deep pin prick at jaw and neck area exhibited some responses. After 10 minutes of local infiltration there was no sensation of the operative field.

In case of group - A animals (mid-ventral approach) there was no pain feeling throughout the operative procedure. Whereas in group - B (flank approach) animal there was some pain feeling during the incision of deeper muscles. In all cases in both groups of animals there were no complete absence of the reflexes namely palpebral and cutaneous reflexes, but reflexes became sluggish in all cases. Moderate muscle relaxation was present from 10 to 45 minutes which was sufficient for the operative procedure in group -A animal only. The animals remained calm and quiet upto 45 minutes. After 45 minutes animal raised their head but unable to get up as they could not raise their hind portion. After 50 to 60 minutes animal stood up and walked like drunker as in case of bitches, falling down and subsequently getting up. After 2 to 2½ hrs. all the animals regained their normal gaits.

Haematological Parameters :

The observations at different time intervals exhibited no alarming changes. In any parameter of haemato-

logical profile in cases of bitches in both groups. The analysed mean values for various haematological parameters at different time interval are shown in the table no - 6.

Atfirst Hb gm% showed an increased value (15.62± 0.94) at 10 minutes of drug administration from the base value of 15.38± 1.22. Then the value gradually declined to the minimum of 13.88 ± 1.34 at 60 minute and the result became nearer to the normal value. ANOVA shows that all the changes in Hb gm% were always non-significant.

PCV% correlated with the results of Hb gm%. Atfirst there was slight increased value (46.34 ± 1.15) at 10 minutes from the base value of 45.83 ± 1.31. There -after the value gradually became decreased to the minimum of 41.66 ± 1.12 at 60 minutes, the results of 3 hours showed that the changes were transitory as the result came towards the normal. Like the Hb gm% there were always non-significant alternations in PCV%.

Regarding total erythrocyte count (TEC) there were gradual marginal fall upto 5.24 ± 1.06 x 10^6 /cmm. at 60 minute from the base value of 6.46 ± 0.98 x 10^6

/ cmm. The results of 2 hours and 3 hours exhibited that alternations of TEC was transient and became towards normal at 3 hours. ANOVA showed that the changes in TEC were always non significant.

TLC showed an initial fall at 10 minutes of drug administration from the base value of 12.96 $\pm$ 1.00 10^3 /cmm. to 12.32 $\pm$ 1.13 x 10^3 /cmm. After 10 minutes there was a gradual marginal increase upto the maximum of 14.28 $\pm$ 1.08 x 10^3 /cmm. at 60 minutes which again became towards the normal value. According to analysis of variance the changes were always non significant and with in the physiological limits.

Biochemical Parameters :

In biochemical profile no such appreciable changes encountered regarding SGOT and SGPT level at different times of intervals of drug administration in both groups. Both SGOT and SGPT values gradually increased upto 60 minutes and then the values began to be normalised after 3 hours. SGOT value reached to its maximum level 36.41 $\pm$ 0.92 from the base value of 28.56 $\pm$ 1.28. Where as SGPT value reached to its maximum level of 39.63

± 1.13 from the base value of 32.52 ± 1.16 ANOVA showed that in both SGOT & SGPT there were non-significant changes andthese changes were always with in the physiologi -cal limits.

Values of biochemical studies are shown in the table No - 6.

TABLE NO - I

OPERASTIVE RESULTS-QUEEN CATS

Method of operation	No. of animal	Av.length of incision.	Duration of operation.	Post-operative complication.
Midventral incision	6	4.5cm	30-35 minutes	There was stitch abscess in 2 animals. Rest were healed bylst intention.
Left flank incision	6	3.4cm	25-30min.	Healing took place uneventfully in all cases by 1st intention.
Both flank incision	6	3cm on each side	45-50min.	Healing took place uneventfully except in one case.

TABLE NO- 2

OPERATIVE RESULT-BITCHES

Method of operation	No.of animal	Av.length of incision.	Duration of operation.	Post-operative findings
Midvental approach	6	5.5cm.	35-40 minutes	In No.4 in animal there was wound complicastion. In rest animal healing was by 1st intention. None died.
Flank approach	6	6.7cm	40-45 minutes	No-10 animal died on next day. In remaining animals, there were 1st intention of healing.

TABLE NO- 3

CLINICAL FEATURES (CATS)

Parameters	Observations in different time intervals of drug Adm.					
	Before experiment	10 min.	30 min.	60min.	120min.	3hrs.
Tempera ture(°F)	101.56 ±0.85	99.44 ±0.94	98.55 ±1.1	99.25 ±0.96	100.45 1.3	100.85 ±0.98
Heart rate (Per min.)	152.5 ±1.3	160.3 ±1.1	166.6 ±1.6	171.4 ±0.96	168.2 ±1.5	158.4 ±1.4
Pulse rate (per min.)	149.2 ±1.6	156.6 ±1.3	162.7 ±0.96	166.3 ±0.89	163.7 ±I.8	153.5 ±1.2
Respiration (per min.)	30.2 ±0.88	25.5 ±1.6	23.6 ±1.8	24.3 ±1.3	26.8 ±1.4	29.4 ±1.5

TABLE NO-4

Haematological & Biochemical parameters (Cats)

Parameter	Observations in different time intervals					
	Before experiment	10min.	30min.	60min.	120min.	3 hours.
Hb(gm%)	13.46 ±1.15	13.65 ±0.96	13.28 ±1.35	12.66 ±1.26	12.95 ±1.24	13.35 ±1.42
P.C.V(%)	37.85 ±1.35	38.23 ±1.38	37.48 ±1.43	34.65 ±1.75	35.95 ±1.34	37.24 ±1.44
T.L.C. ($x\ 10^3$/cmm)	11.64 ±1.3	11.26 ±0.88	11.65 ±1.13	12.22 ±1.53	12.12 ±1.29	11.76 ±1.55
T.E.C. ($X10^6$/cmm)	6.95 ±0.95	6.84 ±1.33	6.26 ±1.21	6.18 ±0.89	6.20 0.89	6.72 ±1.33
SGOT	30.86 ±1.32	33.4 ±1.12	35.36 ±0.96	38.44 ±0.86	36.22 ±0.94	33.4 ±1.16
SGPT	35.2 ±1.64	37.18 ±0.94	40.3 ±0.79	41.2 ±0.88	38.8 ±1.11	36.65 ±1.21

TABLE NO- 5

CLINICAL FEATURES (DOGS)

Parameter	Observation in different time intervals.					
	0 min.	10 min.	30 min.	60min.	120min.	3 hours.
Temperature (°F)	101.26 ±1.21	100.65 ±0.96	99.24 ±0.88	99.84 ±0.94	100.28 ±1.18	100.82 ±1.24
Heart rate permin.	85.46 ±1.31	88.64 ±1.18	96.88 ±1.14	96.52 ±1.08	91.35 ±1. 5	87.85 ±1.28
Pulse rate per min.	81.38 ±1.24	84.18 ± 1.10	93.21 ±0.98	93.08 ±1.16	87.46 ±1.32	83.95 ±1.44
Respiration per min.	25.64 ±1.36	26.48 ±1.15	23.34 ±1.12	23.46 ±1.28	24.18 ±1.08	25.15 ±1.34

TABLE NO-6

HAEMATOLOGICAL AND BIOCHEMICAL FEATURES (DOGS)

Parameter	Observations in different time intervals.					
	0min.	10min.	30min.	60min.	120min.	3 hours.
Hb gm%	15.38 ±1.22	15.62 ±0.94	15.12 ±1.13	13.88 ±1.34	14.32 ±1.05	15.08 ±1.32
PCV %	45.83 ±1.31	46.34 ±1.15	46.12 ±1.18	41.66 ±1.12	43.58 ±1.08	44.96 ±1.28
TLC ($X10^3$/cmm)	12.96 ±1.06	12.32 ±1.13	12.95 ±1.05	14.28 ±1.08	14.20 ±1.16	13.18 ±1.42
TEC ($X10^6$/cmm)	6.46 ±0.98	6.18 ±1.21	5.76 ±1.18	5.24 ±1.06	5.81 ±1.24	6.18 ±1.38
SGOT	28.56 ±1.28	29.32 ±1.22	33.86 ±1.13	36.41 ±0.02	36.22 ±1.28	32.48 ±1.35
SGPT	32.52 ±1.16	33.88 ±1.18	37.4 ±1.32	39.63 ±1.13	39.22 ±1.22	35.34 ±1.18

CHAPTER - V

DISCUSSION

D I S C U S S I O N

In the present study an attempt has been made to develop a very simple but effective anaesthesia and improved surgical technique which could be used safely for performing ovariohysterecomy in bitches and queen cats especially infield practices.

Ovariohysterectomy or spaying in cats and bitches must be treated as a major operation, otherwise there will be occational failure. This is the most common operation,the veterinarian is called upon to do, therefore it must be practised not only diligently but also in a systemic routine manner.

Twelve number of bitches, weighing between 12 to 14 kg, aged between 3 to 5 years and eighteen numbers of queen cats,weighing between 2 to 3 kg, aged between 2 to 3 years have been utilised for the present study. The anaesthesia and surgical techniques as stated under 'Materials and Methods' have been tested on these experimental animals.

According to the plan of work, twotypes of approaches were made for bitches namely midventral incision and flank incision, and in case of queen cats in addition

to these two approaches, bilateral flank incision have also been tried.

For anaesthetic purpose atropine sulphate, diazepam and pentazocine were used as pre- anaesthetic medication by intramuscular injection in case of cats,follo -wed by linear infiltration of 2% lignocaine hydrochloride subcutaneously on proposed line of incision as local anaesthetic agent in all cases. But in case of bitch pentazocine and diazepam were administered intravenously. This was followed with a view to provide a safe anaesthesia without much adjunctive medication.

The combination of atropine, as an autonomic depressant or as vagolytic agent ; diazepam, as sedative and muscle relaxing tranquilizer, and a non narcotic potent analgesic like pentazocinelactate,for the relief of pain were used,as all such drugs have a definite place in premedication as viewed by Randall et al. (1961), Lowe (1969), Soma (1970), Kyshakevych (1970), Booth (1977) Gilman et al.(1980) and other workers.

The drugs combination was also subsequently combined with local infiltration anaesthesia using 2% lignocaine hydrochloride, subcutaneously on the proposed

line of incision with a view to eliminate sensitivity in the operative field during the surgical procedure. By the use of local anaesthetic solution an undisturbed operative field can be achieved. Moreover dangers associated with general anaesthesia may be avoided by the use of local anaesthetic along with sedative or alone. Local and general anaesthesia are complimentary as viewed by Westheus and Fitch(1964). At no level, there were any serious respiratory, cardiac and temperature changes wit h no untoward side effect. Subsequent control, restrain and positioning of the animals were also done without much difficulty. The duration of the effect of the drugs combination lasted for about 40 to 45 minutes and allowed to perform the operation, spaying, without any difficulty. By such anaesthesia, stress on the dogs and cats, lessened in anaesthetic management and surgical manovaring.

The aplication of selected drug combination brought about sedation to a desirable level and reduced pain sensitivity and much of the autonomic excitement. Specific effects appeared at the selected dose level which lasted 45 minutes in cats and 40 minutes in dogs on an average.

However during the early period of anaesthesia

a fall of rectal temperature upto 98.55 ± 1.1 °F from 101.56 ± 0.85 °F and in dogs upto 99.24 ± 0.88 °F from 101.26± 1.21 °F for about 30 minute duration were found. These fall of temperatures were transitory which were subsequently raised from about 60 minutes in both cases. This observation corroborates with the findings of Pandey and Sharma (1986).Such fall of body temperature might be due to the effect of lowering the increased metabolic rate caused by the drugs combination. It might be also due to that diazepam depressed the hypothalamic thermo-regulartory centre causing hypothermia as was reported by Gilman et al. (1980).

There were some changes regarding respiration, circulation, autonomic reflexes, and eye ball movement and reflexes. But they were not severely or seriously affected at any time as all the changes were with in the physiological limits. Temporary peresis and ataxia were observed. Depression or sedation was enough for smooth surgical interventioins in all cases except in bilateral incision in group - C cats where animals woke up during turning to the opposite side.

However, pentazocine, along with its analgesic effect, potentiated the degree of sedation which was

achieved by diazepam. Both dogs and cats were very quiet but sedation tended to be more pronounced in cats than in dogs.

The observations of haematological parameters and biochemical analysis of SGOT and SGPT values remained within the physiological range of variation, indicating no undesirable effect on blood pictures, heart and liver respectively.

Anaesthesia in cats deserves special consideration than dogs. It may be considered as a specialised subject as cats tend to be awkard to handle, very easily excited and specially liable to shock and damage to itself. Excessive and forceful restraint should always be avoided in handling and administration of preanaesthetic and anaesthetic injection but a watch should be kept for possible bites and scratches. To compromise with the situation ,it avoids the necessity of intravenous injection in cats. But the dogs necessarily be given both pentazocine and diazepam by intravenous injection with safety for quicker anaesthesia and better results. So the choices of intramuscular route in cats and intravenous route for dogs are justified in their relative aplication.

There are an unusually large number of methods of anaesthesia which may be recommended for cats and dogs . Dosage of various drugs is very much and an individual matter. The particular indication for a certain form of anaesthesia must therefore be carefully considerded. Individual differences in breeds, size and temparment are never the less ignored.

For successful spaying operation, every bitch and queen cat should receive premedication by means of a muscle relaxing tranquilizer,autonomic depressant or atleast a vagolytic agent and an analgesic. The majority of anaesthetic accidents collapse, cardiac and respiratory arrest are attributable due to parasympathetic disturbances. It is therefore desirable to give parasympatholytic injection before anaesthesia.In present study both dogs and cats received atropine sulphate injection to counteract or depress the parasympathetic activities and autonomic reflexes which are particularly stimulated easily in cats. Its application also protected from the severe respiratory depression due to the combined effects of diazepam and pentazocine. It might be due to that respiratory centre are stimulated by atropine as stated by Jones (1957).

Tranquilizer like diazepam helped to depress auto

nomic nervous system (ANS) andsome degrgee ofsedation was achieved. Though its action is short lived but it was found that when combined with pentazocine, the degree and duration of action were increased with generalised analgesia which permitted smooth and trouble free operation for spaying in bitches and queen cats. moreover by using 2% lignocaine hydrochloride as infiltration marked abolition of pain feelings in the operative sites were achieved in all aproaches for spaying operations in the present study which merits consideration as recommended by Hall (1978).

In operative procedure for performing spaying inqueen cats and bitches there were variable results indifferent approaches, inrespect to the different parameter of study. In mid-ventral approaches about 4 to 5 cm. long incision was needed in queen cat, where as in case of bitches 5 to 5.5 cm.long incision was needed .In both the species no difficulty was encountered in keeping the incision on linea alba. In comparision with the other methods there were always less haemorrhage and the retraction of the wound edges were easier. Both the uterus and ovaries were easily located and removed without much difficulties in all the cases. All the

operative procedure were performed within the anaesthetic period. In case of cats, the average of 25 to 30 minutes was required, for completion of the operation, where as in case of bitches 30 to 35 minutes time was needed.

In case of cats restraining was difficult for post operative dressing of wounds. Because of the great flexibility and excitability of the body movement of cat bandages were disturbed and exposed to contamination of the wound. In two cases wound complications were found which were subsequently healed by secondary closure. It is obvious, that if contamination of wound takes place post operatively then the exudative phase will be prolonged and will delay the wound healing. Moreover sub-cutaneous fatty tissues of abdomen in the area of incision in cat may also be easily traumatized, so a subsequent wound infection may be a sequelae which may not be avoided inspite of the aseptic surgery. There always remains the chance of wound complication and delayed healing due to the predisposing factors which may be imposed on by surgical approach of this site. In comparison to cats, there was no difficulty encountered during post operative dressing of the wounds in case of bitches. Naturally there was a least chance of wound complications and the wounds healed by first intension

except in only one case secondary closure was needed.

In left flank approaches about 4 cm. long incision was needed in queen cats and 6 to 7 cm. long in bitches. As the abdominal muscles of cats are thin and elastic in nature the retruction of wound edges was easier and there were very little haemorrhage found in all cases. on the other hand in bitches retraction of wound edges were not easy and there were always more haemorrhage during transection of large muscles. In case of cats both uterus and ovaries were easily located and removed while in case of bitches some difficulties encounted during removal of ovaries especially the right one and there were much more soft tissue handling. All the operative procedure were performed within the anaesthetic period as 25-30 minutes time was required for cats and about 40 minutes required for dogs. But in case ofbitches there were some painfeelings during transection of large muscles. Moreover the accurate apposition of the transected muscles were difficult in bitches which resembled with the recommendation of Archibald (1974). One bitch died onthe next day of operation. On post mortum, it was revealed that due to improper ligation in right overian vessels, the animal died.

In both the species except in 2 bitches there was no incidence of post operative wound complications and all the wounds were healed by first intension. In No.8 animals there was delayed healing, it might be due to greater soft tissue handling.

In bilateral flank approaches in queen cats two incisions (each of 3 cm length) were needed in both flanks. In comparison to other two methods for spaying of cats there were more haemorrhage and more time (about 45 minutes) was needed , which crossed the anaesthetic period. Moreover during turning of animals on other side, most of cats woke up as turning of animal during sedation caused excitement. Post-operative dressing in two sides were difficult as animals did not allow more time for dressing and in one case there was delayed wound healing as it was unable to deress properly.

From the different observations it can be stated that in case of bitches spaying operation can be effectively practiced in field by mid-ventral approach due to the easy manoevering and least post-operative complications The same finding corroborates with the recommendation of Archibald (1974), Berge and Westhuses (1966) and

Markowitz *et al.* (1964), Rubin and Maplesden (1978) and Wood *et al.* (1984). In case of queen cats left flank incision method revealed the best site for performing overiohysterectomy as it needed simple operative manovering with least post-operative complication. The results simulate with the findings of Berge and Westhues(1966), Ormord (1966) and Hoque (1991). But the findings disagreed with the recommendation of Markowitz *et al.* (1964) with regard to the surgical approach.

CHAPTER VI

SUMMARY

S U M M A R Y

Author of the present study has tried to develop a very simple but effective anaesthesia and improved surgical procedure for spaying in bitches and queen cats which can be very easily performed with in the limitations of the field practices.

A total number of twelve non-pregnant adult bitches weighing 12 to 14 kg. and eighteen non-pregnant adult queen cats weighingg 2 to 3 kg., had been utilised for the present study. In bitches , ovariohysterectomy or spaying were done by using intramuscular (I/M) injection of atropine sulphate @ 0.05 mg/kg. b.wt., intravenous injection (I/V) injection of Pentazocine @ 3 mg/kg. b.wt. followed by I/V injection of diazepam @ 3 mg/kg. b.wt. Atropine sulphate was injected 30 minutes, before pentazocine and diazepam which were followed by local infiltration by using 2% lignocaine hydrochloride injected subcutaneously along the proposed line of incision both for mid-ventral and flank approach 10 minutes after local infiltration spaying was performed.

Likewise in cats, the same anaesthetics regimen was followed but,it varried in its route of administration

and doses. Atropine, pentazocine and diazepam were given intramuscularly @ 0.05 mg/kg b.wt., @ 4 mg/kg. b.wt. and @ 4 mg/kg b.wt. respectively. Time interval of drug administrations was same as in bitches. Then 2% lignocaine hydrochloride was injected subcutaneously along the proposed line of incision for midventral, left flank and bilateral flank approaches. After 10 minutes spaying was performed.

The performance of the anaesthesia as well as the relative advantages & disadvantages in different operative approaches were observed and evaluated. The preanaesthetic medication along with local analgesia were found to be highly satisfactory in both dogs and cats. Among the different methods of spaying, the mid ventral incision method in bitches and left flank approach in queen cats were found to the best site due to their easy manoeuvring, least post-operative complication and better wound healing.

The adapted technic of anaesthesia and operative procedure was very simple and safe for its aplication and management and may be performed in the fields, even with the help of an untrained assistant.

CHAPTER VII

CONCLUSION

C O N C L U S I O N

1. Spaying or ovariohysterectomy is a most common operation, veterinarians are called upon to do. So it can be performed not only diligently but also in a systemic routine manner. Otherwise there will be an occasional failure.

2. Combination of atropine , pentazocine, diazepam and 2% lignocaine on operative area produces, satisfactory sedation, moderate relaxation and good analgesia under which major operation like spaying can be smoothly practised without any untoward effect.

3. Through the midventral approach in bitch and by left flank approach in queen cats, spaying should be performed due to their easy manoeuvring and least post operative complication with better healing.

4. In the field practices spayng can be easyly and effectively performed by using preanaesthetics and anaesthetic like atropine, pentazocine, diazepam and 2% ligonocaine, and by simple operative technique -midventral incision for

bitch and left flank incision for queen cats, a major operation like spaying can be safely and effectively practised even with the help of an untrained assistant.

5. Though anaesthesia,with which the operator is most familiar , is probably the safest, but adaption of this technique has a good prospect for successful outcome of the operation and will not disappoint any veterinarian if followed with sincerity as it deserves.

CHAPTER VIII

FUTURE SCOPE OF RESEARCH

FUTURE SCOPE OF RESEARCH

1. Further research should focus in evolving better anaesthetic combination, simple operative device as far as practicable, and simple suture materials which may fullfil the ideal characteristic of a suture material. The methodology should be developed and standarised in such a way that it becomes possible for the veterinary surgeon to follow this technique not only in the field but also may be adapted in some indications of other abdominal operations.

2. Efforts must be directed for further improvement of the technique. A balance must be established between the sophisticated treatment and the economics of the treatment as well as feasibility of application in the field conditions.

3. Studies on the side effects in animals after different methods of spaying.

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