EFFECT OF LAPAROHYSTERTOMY BY DIFFERENT APPROACHES IN VIRGIN BLACK BENGAL GOATS

A Thesis
submitted to the
Bidhan Chandra Krishi Viswavidyalaya
in partial fulfilment of the requirements for the Degree of
Master of Veterinary Science
in
ANIMAL GYNAECOLOGY AND OBSTETRICS

BY
BIRESWAR PURKAIT
B. V. Sc. & A. H.

DEPARTMENT OF ANIMAL GYNAECOLOGY AND OBSTETRICS
FACULTY OF VETERINARY AND ANIMAL SCIENCES
BIDHAN CHANDRA KRISHI VISWAVIDYALAYA
MOHANPUR, NADIA, WEST BENGAL
PIN—741252
1990
Dedicated to
my beloved Parents
APPROVAL OF EXAMINERS FOR THE AWARD OF THE DEGREE OF MASTER OF VETERINARY SCIENCE

We, the undersigned, having been satisfied with the performance of Bireswar Purkait in the Viva-Voce examination, conducted to-day, the . . . . . . . . . . . . 199 recommended that the thesis be accepted for the award of the Degree.

Name                                                                                          Signature

1. Dr. E.C. Kanjilal, Advisor Chairman

2. . . . . . . . . . . . . . . . . . . . . . . . . External Examiner

3. Dr. S.K. Bandyopadhyay, Member of the Advisory Committee

4. Prof. P. Roychoudhury, Member of the Advisory Committee

5. Dr. P.K. Bose, Member of the Advisory Committee
This is to certify that the work recorded in the thesis entitled "EFFECT OF LAPARCHYSTEROTOMY BY DIFFERENT APPROACHES IN VIRGIN BLACK BENGAL GOATS" submitted by Bireswar Purkait, in partial fulfilment of the requirements for the Degree of Master of Veterinary Science in Animal Gynaecology and Obstetrics of the Eidiham Chandra Krishi Viswavidyalaya, is the faithful and bona fide research work carried out under my personal supervision and guidance. 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.

(B. C. KANJILAL)
Chairman
Advisory Committee
ACKNOWLEDGEMENT

The author expresses his deep sense of gratitude to his respected guide and Chairman of the Advisory committee Dr. Bikas Chandra Kanjilal, M.V.Sc., N.D.P.V.M., Ph.D., Reader, Department of Animal Gynaecology and Obstetrics, Bidhan Chandra Krishi Viswavidyalaya, for suggesting him the problem and for his invaluable guidance and constant encouragement throughout the course of the present investigation. He will never forget his affection and benevolence bestowed upon him.

The author is also extremely grateful to Dr. P.K. Bose, M.V.Sc., Ph.D., Reader, Department of Veterinary Surgery, and Dr. S.K. Bandopadhyay, M.V.Sc., Ph.D. Reader, Department of Animal Gynaecology and Obstetrics, Bidhan Chandra Krishi Viswavidyalaya for their constant inspiration and valuable suggestions during the course of the investigation.

He feels proud in expressing his inexplicable gratitude to Prof. R. Roychoudhury, M.V.Sc., Ph.D., Dr. B.B. Chosh, M.V.Sc., Reader, Department of Animal Gynaecology and Obstetrics and Dr. D. Chakraborty, B.V.Sc. & A.H., M.Sc., Reader and Head, Department of Animal Gynaecology and Obstetrics, Bidhan Chandra Krishi Viswavidyalaya for their moral-boosting inspiration and suggestions.

He also wishes to express his sincere regards to Dr. D. Basak, M.V.Sc., Ph.D. Reader in Department of Veterinary Pathology; Dr. C. Guha, M.V.Sc., Ph.D., Veterinary Clinics,
Mohanpur, Bidhan Chandra Krishi Viswavidyalaya for their kind co-operation in various ways in connection of his thesis work.

He sincerely expresses his heartiest respect to Dr. N.A. Chowdhury, M.Sc.(Ag.), Ph.D., Dean, Post-Graduate Studies and Dr. S.P. Ghosh, M.V.Sc., Ph.D., Dean, Faculty of Veterinary and Animal Sciences, Bidhan Chandra Krishi Viswavidyalaya for their kindness in providing him with all facilities.

He would be failing in his duties if he does not acknowledge the indispensable help rendered by Dr. S. Roy.

He wishes to offer his thanks to Dr. G. Banerjee, Dr. A. Chandra, Dr. A. Mondal, Dr. S. Dutta, Dr. P. Bhattacharjee, Dr. A. Guha and other students of M.V.Sc. course in the Department of Animal Gynaecology and Obstetrics, Bidhan Chandra Krishi Viswavidyalaya for their encouragement and co-operation.

The uncrudging help and co-operation offered by laboratory and office staff of the Department of Veterinary Gynaecology and Obstetrics went a long way for the success of this work. Author owes his thanks to them.

Lastly, but not the least author extremely grateful to his parents and sister 'MADHURI' for their constant encouragement during the period of this study.

Dated, Mohanpur

(BIRESHWAR PURKAIT)

The....................199.
CONTENTS

CHAPTER NO. | PAGE NO.
---|---
I | INTRODUCTION .. 1
II | REVIEW OF LITERATURE .. 5
   | 1. Laparohysterotomy in various species of animals including goats .. 6
   | 2. Indications of laparohysterotomy .. 7
   | 3. Site and type of incision .. 8
   | 4. Types of suture material and suture pattern .. 10
   | 5. Clinical and haematological pictures following laparohysterotomy .. 12
   | 6. Macroscopical and microscopical healing process .. 13
III | MATERIALS AND METHODS .. 15
   | A. Clinical and haematological studies before surgery .. 16
   | B. Surgical Technique .. 16
   | C. Clinical study of the experimental animals after laparohysterotomy .. 19
   | D. Haematological study of the experimental animals after laparohysterotomy 19
   | E. Macroscopical study of the tissue changes on 15th day post-operative 20
   | F. Microscopical study of the tissue changes 20
   | G. Future reproductive efficiency after laparohysterotomy .. 21
IV | RESULTS AND DISCUSSION .. 22
   | A. Clinical condition of the experimental animals before and after laparohysterotomy .. 22
B. Haematological study of the experimental animals before and after laparohysterotomy

C. Macroscopical study of the wounds created on laparohysterotomy by different approaches

D. Microscopical study on superficial skin and underlying muscles

E. Future reproductive efficiency after laparohysterotomy

V SUMMARY AND CONCLUSIONS

VI FUTURE SCOPE OF RESEARCH

VII BIBLIOGRAPHY
# LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE NO.</th>
<th>Particulars</th>
<th>PAGE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Clinical condition and appetite of experimental Black Bengal goats before and after laparohysterotomy by different approaches</td>
<td>23</td>
</tr>
<tr>
<td>2</td>
<td>Temperature ( T )(^\circ)F) of experimental Black Bengal goats before and after laparohysterotomy by different approaches</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>Pulse and respiration rate per minute of experimental Black Bengal goats before and after laparohysterotomy by different approaches</td>
<td>26</td>
</tr>
<tr>
<td>4</td>
<td>Total leukocytic count (WBC) per command haemoglobin content (gm%) of experimental Black Bengal goats before and after laparohysterotomy by different approaches</td>
<td>28</td>
</tr>
<tr>
<td>5</td>
<td>Differential leukocytic count percentage of experimental Black Bengal goats before and after laparohysterotomy by different approaches</td>
<td>31</td>
</tr>
<tr>
<td>6</td>
<td>Macroscopical tissue changes in experimental goats following laparohysterotomy by different approaches</td>
<td>34</td>
</tr>
</tbody>
</table>

...
## List of Figures

<table>
<thead>
<tr>
<th>FIGURE NO.</th>
<th>CONTENTS</th>
<th>PAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Picture shows preparation of the mid-ventral approach in dorsal recumbency</td>
<td>16-17</td>
</tr>
<tr>
<td></td>
<td>of the tranquilised animal</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Exposure of the abdominal cavity</td>
<td>16-17</td>
</tr>
<tr>
<td></td>
<td>through left flank approach</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Picture shows full view of the uterus (Horns, ovaries and the corpus)</td>
<td>17-18</td>
</tr>
<tr>
<td>4</td>
<td>Picture shows closure of the wound on the corpus of the uterus by left</td>
<td>17-18</td>
</tr>
<tr>
<td></td>
<td>flank approach</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Closure of the uterine wound after right flank approach</td>
<td>17-18</td>
</tr>
<tr>
<td>6</td>
<td>Picture shows closure of the right flank incisional approach after</td>
<td>17-18</td>
</tr>
<tr>
<td></td>
<td>operation</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Picture shows closure of skin suture after left flank approach</td>
<td>17-18</td>
</tr>
<tr>
<td>8</td>
<td>Picture shows the healing process of the left flank operative site on</td>
<td>32-33</td>
</tr>
<tr>
<td></td>
<td>15th post-operative day prior to sacrifice</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Picture shows the healing process of the mid-ventral operative site on</td>
<td>32-33</td>
</tr>
<tr>
<td></td>
<td>the 15th post-operative day.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Picture shows pregnancy in a goat after mid-ventral operation</td>
<td>35-36</td>
</tr>
</tbody>
</table>
FIGURE NO. | CONTENTS | IN BETWEEN PAGES
--- | --- | ---
11 | Section of integument showing immature fibroblastic cell proliferation | 34-35
12 | Section of integument showing mature and well defined scar tissue formation | 34-35
CHAPTER 1

INTRODUCTION
INTRODUCTION

Goat production in many areas of the world is increasing many folds as people have become aware of the value of this animal. Goat keeping plays an important role in the agricultural economy of the small marginal and landless farmers of the country particularly, in West Bengal (Chawla et al., 1981). India ranks first in goat population in the world (Sahani, 1982). The total population of goat has been estimated as 81.5 millions in India (FAO, 1985) of which, about 10 millions are in the State of West Bengal and the figure makes about one seventh of total goat population during the period from 1976-1983.

The usefulness of doing 'Laparohysterotomy' in various species of domestic animals like caprines, canines, bovines, felines etc is being increasingly felt by the veterinarians due to various causes, specially in view of relieving dystocia. This operation entails not only the immediate risk, but it also makes the individual prone to various hazards,
if future pregnancy has to develop. The main indication for laparohysterotomy in large and small animals is foetal postural abnormalities. Besides, other indications of laparohysterotomy are uterine torsion, ring womb conditions, uterine inertia due to absolute oversized foetus, pelvic defects, mummified foetus according to priority and any other conditions where manual delivery of the foetus both are impossible. Urinary bladder is yet another organ which is involved with the effects of such surgical intervention.

This is quite obvious and reasonable to expect various types of tissue changes and associated abnormalities as effect of this type of operation. Adhesions may also occur with surrounding structures and abdominal walls. The changes of the skin and muscle have direct bearing on the functional status in relation to future reproductive ability. So these changes are of great importance for the observation of possible complications and hazards after operation so that suitable medical aid be given for avoiding such complications.

Systematic studies on the effect of repeated caesarean section in human beings have been made by various authors in the field of human surgery. Unfortunately no such comparable studies have yet been conducted in the veterinary field of research on all species of domestic animals save and except some selective studies made on some particular species of animals namely, bitches and cows as revealed from the available literatures. The obvious consequences after repeated
laparotomies were considerable fibrosis and adhesions observed in abdominal musculature as also viscera. Uptill now there is no such systematic studies on the comparative merits and demerits on the different incisional sites for caesarean operations in farm animals.

Moreover, unlike human beings no scientific investigation appears to be on record in veterinary field of research as regards untoward effect of such operations like incisional hernias. Besides, detailed studies to evaluate different sutures and suture patterns in uterine healing are limited (Tyagi and Lumb, 1961; Verma and Tyagi, 1973).

The present study has been undertaken to observe the healing process, and nature and degree of changes after laparohysterotomy in Black Bengal goats and to record the comparative advantages and disadvantages of abdominal incision by different approaches for performing elective laparohysterotomy.

With the above in view the following parameters have been undertaken within the short duration of the work -

1. Study of clinical conditions of experimental post-puberal virgin Black Bengal goats before and after laparohysterotomy.
2. Haematological studies - TLC (WBC), haemoglobin content, differential leukocytic count both before and after operation.

3. Macroscopical study on 15th day post operative.

4. Histological study of the superficial skin and underlying muscles on 15th day post-operative.
CHAPTER II

REVIEW OF LITERATURE
The present work was conducted to study the effect of laparohysterotomy by different approaches in virgin Black Bengal goats.

For the purpose of better and easy comprehension, the available literatures relating to the different facts of the present work, have been grouped under the following sub-heads:

I   Laparohysterotomy in various species of animals including goats.

II  Indications of laparohysterotomy

III Site and type of incision.

IV Types of suture material and suture pattern.

V  Clinical and haematological pictures following laparohysterotomy.

VI Macroscopical and microscopical healing process.
I. Laparohysterotomy in various species of animals including goats

Laparohysterotomy is the surgical operation for delivery of foetus usually at parturition by caesarean section. This is usually performed when mutation and forced extraction of foetus or foetuses become difficult to relieve the impending or present dystocia or when it is desired that the foetus or foetuses should be delivered alive and mother should be alive after operation.

There are records of laparohysterotomy in various species. Roberts (1971) while reviewing the history of laparohysterotomy recorded the first report of this operation in English literature by John Field in 1839 on two bitches. Next year J.B. Carlisle reported caesarean section in a sow.

Laparohysterotomy in domestic animals had been well described by Arthur (1964) and Tillman (1965).

With the advent of anaesthesia, suture technique and antibiotic therapy this operation has increasingly become common. There were reports of successful performance of caesarean section in ewe by Farquharson (1941). Subsequently there were reports of successful operation in same species by Harmer and Mount (1951), Arthur (1952), Mackinnon and Byliss (1952) and Boogaard (1953).
Vandeplasche and Pariedis (1953) reported 45 successful laparohysterotomy in bovines and in the same year Wright (1953) performed 58 successful laparohysterotomy on same species.

A very few reports are available on caesarean section in goats by Tyagi and Lumb (1961); Banerjee et al. (1966); in equine by Goldberg (1970). Smaby; Verma and Tyagi (1973) and Philip et al. (1985) in goat.

II. Indications of laparohysterotomy

Caesarean section in small ruminants like sheep and goats are indicated in narrowness of pelvis, failure of the cervix to dilate (ring worms), foetal oversize (Singh, 1951; Arthur, 1952 and Walsby, 1952).

Milne (1951) reported that due to pregnancy toxaemia in ewe the caesarean section was undertaken.

Insufficient dilatation of cervix was recorded as the predominant indication for caesarotomy in goats by Banerjee et al. (1966).
Roberts (1971) while reviewing on various indications for laparo-hysterotomy stated that the operation in mare was indicated in pelvic fractures with exostosis, transverse biconcave pregnancy, dogsitting posture, torsion of uterus and foetal monsters. This operation in cow was also indicated in cervical incomplete dilation with secondary inertia, uterine torsion, foetal dystocia—specially postural defects like hock and breech presentation, abnormally large foetus, foetal monsters, hydrops, amnion and allantois, marked stenosis in vagina and in rare cases of fracture of maternal pelvis or stenosis of birth canal due to presence of tumours. The author also stated that the same operation was indicated during dystocia in ewe due to toxaemia or ketosis.

Sometimes caesarean section in goats are indicated due to foetal abnormalities like Schistosoma reflexus (Nayar et al., 1979) besides other causes.

III. Site and type of incision

There are different sites of operation in different species for laparohysterotomy as recommended by various authors in the field.

The sites of operation performed in small ruminants like sheep and goats were paramedian incision as per Walsby (1952), right flank by Singh (1951), Parkinson (1952) and Tyagi and Lumb (1961).
Verma (1973) while performing caesarean section in 30 goats selected left flank approach and desensitized the area with inverted 'L' block methods by local anaesthetic infiltration.

Garciasanz (1981) while performing caesarean section in ewes and goats made an oblique incision forward and ventrally from the level of stifle joint.

Philip et al. (1985) while conducting a clinical study on caesarean section in goats prepared the left flank for surgical approach and the site of incision was one on imaginary line commencing from infront of the prefemoral lymphnode towards the umbilicus being desensitized with either 2% Lignocaine Hydrochloride or 4% procaine hydrochloride.

Abulfadel and Gohar (1987) while performing laparohysterotomy in cows, ewes and goats through different approaches recorded that the incision mid way between tubercoxae and the 13th rib on both flanks in cows were more advantageous than that in other sites, whereas in ewes and goats free incision on either left or right flank depending on foetal position in ewes and goats was convenient.

In the recent past SyAhDahash (1989) approached the abdomen through left flank laparotomy in ewes under the local infiltration of 3% Lidoain Hydrochloride.
IV. Types of suture material and suture pattern

Singh (1951) sutured hysterotomy wound with single layer of lembert suture using chromic catgut in goat with uneventful healing.

Parkinson (1952) obtained uneventful healing of uterus after hysterotomy in bovines and ovinos using a continuous lembert type of suture with fine catgut.

Tyagi and Lumb (1961) sutured uterine wounds in 17 goats by interrupted lembert single row of continuous lock and double row of continuous lock stitches or two rows of simple interrupted lembert suture and found that the edges of the wounds throughout the entire line of incision were held together by early proliferation of fibroblasts and blood capillaries after 14-27 days of operation.

Verma (1973) obtained omental adhesions in caprimes following laparohysterotomy on the suture line which constituted a prominent feature when catgut was used as a suture material to approximate the uterine wound. Though after one month, catgut was seen to be undergoing absorption, Vetafil and Serafil incited minimum tissue reaction when compared with catgut.

The effect of different suturing patterns of uterine healing following laparohysterolomy was studied by Mogha et al. (1983). The effect of different suturing patterns on uterine
healing was studied in 16 adult goats. Sixtyfour identical uterine incisions, 4 in each animal were performed and repaired by single layer lemert, lock stitches, double layer lemert and interrupted lemert suturing techniques. Adhesions with adjacent organs was observed in interrupted lemert lock stitches and single layer lemert pattern (in decreasing order). Necrosis and inflammatory reactions were greatest with double layer lemert. Serosal continuity was established after 3 days (5 days with interrupted lemert sutures). No muscular reunion occurred within 3 weeks. The bursting pressure was highest with the double layer lemert technique in early days of healing. In later days interrupted and single layer lemert patterns had a greatest bursting pressure than lock stitches and double layer lemert techniques. Organization of the vascular pattern and crossing over of the arterial system commenced a week after operation. A vascular linear shadow was demonstrated at the incision site after 21 days with double layer lemert.

Iyer et al. (1985) sutured on uterus of bovine with lemert sutures using NO 11 chromic catgut. Streptopenicillin was sprinkled in the abdominal cavity. The laparotomy wound was sutured with two layers of continuous sutures on the muscles and horizontal mattress sutures on the skin.

SyA AL Dahash et al. (1989) conducted an experiment to study the uterine healing and tissue reactions to suture materials and suture patterns in ewes. The authors made uterine
incisions equally in 9 adult ewes within 4 hour of parturition. Those wounds were closed by single layer in version, double layer inversion and schmeiden patterns using chromic catgut, silk and nylon, on day 7th, 14th and 21st. The authors recorded that omental adhesions were more with Schmeiden technique and around sutures of catgut than other suture patterns and suture. All sutures induced varying tissue reactions with peak on day 7th. However, it was more intense to catgut and was the least to nylon. At later stages, reaction to catgut remained the same, while it regressed progressively to nylon. Schmeiden and double layer inverting techniques evoked more cellular reaction than single-layer inversion. Uterine healing was observed earlier in single-layer and double layer inversions than in Schmeiden technique. The healing was better, where nylon and silk were used as suture material. Union of uterine wounds was chiefly by fibrous connective tissue with no sign of smooth muscle regeneration.

V. Clinical and haematological pictures following laparchysterotomy

Limited informations are available in the literatures as regards clinical and haematological pictures following laparchysterotomy particularly in sheep and goat.

Dag 1986 while conducting his Ph.D. thesis work entitled "Effect of multiple laparotomy and hysterotomy in canines" made attempt on one of the parameters on clinical condition of.
animals after operation and the author recorded that increase of temperature, pulse and respiration and decrease in body weight, loss of appetite were also transitory, and that too observed in experimental does only.

Degradation and destruction of tissue after operation appears to stimulate leukocyte production as observed by Anderson (1969), may also be another cause of increased leukocyte count after each operation.

Verma and Tyagi (1973) reported that leukocytosis and neutrophilia were evident 12 hour following laparohysterotomy procedures in goats. Though after 24 hr following surgery a decline in total leukocytic count was obvious, neutrophilia following caesareotomy persisted up to 48 hours. However by the 8th post-operative day these counts were within the physiological norms.

VI. Macroscopical and Microscopical healing process

Localic et al. (1943) found that increase in strength of the wound sutured by catgut did not occur till 5th post-operative day. Localic et al. (1943) also found that by 13th day oedema and fibrin had disappeared and only small fragments of chromic catgut with giant cells and fibroblasts were seen about the suture line.
Tyagi and Lumb (1961) observed that, after hysterotomy in goat, the edges of the wounds throughout the entire line of incision were held together by early proliferation of fibroblasts and blood capillaries. Definite scar-tissue could be seen fourteen to twenty seven days post-operatively.

Smith (1974) performed caesarean sections successfully in thirty four bitches and twenty two rabbits to study the effects of scarring. Deformity of the scar and investigation into the lumen in 70% of the cases with considerable thickness of uterine wall was found after suturing the incision including the mucosa.

Das, while conducting his Ph.D. thesis work entitled the "Effect of multiple laparotomy and hysterotomy in canines", made an attempt on histological findings on healing and the author recorded that the skin was found to have developed adhesion with fascia and the latter with underlying muscles. The muscles in their turn were found to be adhered to the peritonium. There was no notable adhesion found in any other tissue. There was however, no appreciable adhesion between the urinary bladder and the uterus. Both the organs were freely mobile.
CHAPTER III

MATERIALS AND METHODS
Materials and Methods

Nine healthy post-puberal virgin Black Bengal goats aged in between 12-14 months and maintained under the same standard of feeding and management were considered as the experimental animals for the present. Those animals had to pass through a standard pre-experimental examination and tests to prove their normal physical as well as clinical condition. The routine examination of urine and faecal samples were made for 3 consecutive days before commencement of experimental work. Necessary deworming was done according to the findings of faecal examination in standard dose schedule.

All the animals were randomly divided into 3 groups each containing 3 as follows:
### Grouping of the Experimental Black Bengal goats

<table>
<thead>
<tr>
<th>Group</th>
<th>Identification No.</th>
<th>No. of animal</th>
<th>Name of approach for laparohysterotomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>E/1, E/3 and E/4</td>
<td>3</td>
<td>Mid ventral</td>
</tr>
<tr>
<td>II</td>
<td>E/2, E/5 and E/8</td>
<td>3</td>
<td>Right flank</td>
</tr>
<tr>
<td>III</td>
<td>E/6, E/7 and E/9</td>
<td>3</td>
<td>Left flank</td>
</tr>
</tbody>
</table>

### A. Clinical and haematological studies before surgery

All the animals under 3 groups as detailed above were clinically examined for their pulse rate, respiration rate, body temperature, food habit and general conditions. Total leukocytic count, differential leukocytic count and estimation of haemoglobin content for all the animals were made following the standard procedures as described by Kolmar et al. (1952).

### B. Surgical technique

All the animals under groups I - III were subjected to the following pre- and post-operative routine procedures:

The animals were kept under glucose water for 24 hours prior to surgery as advocated by Gill (1960). Evacuation of bowel was done 12 hours before surgery. Warm water enema was given three hours and thirty minutes before operation.
Fig. 1 Picture shows preparation of the midventral approach in dorsal recumbency of the tranquilised animal.

Fig. 2 Exposure of the abdominal cavity through left flank approach.
(Richardson et al., 1982). To check hyperexcitability, the animals were premedicated 30 minutes prior to the surgery with triflupromazine hydrochloride N.F. (Siquil - M/s Sarabhai Chemicals, Boroda containing 20 mg/ml of triflupromazine hydrochloride) at the rate of 0.5 mg/kg body weight intramuscularly for each animal.

The area around the mid ventral line for each animal under group-I was prepared for aseptic surgery in usual standard procedures and kept covered with sterile gauze. Ten minutes before surgical operation, linear infiltration anaesthesia with 2% Lidocaine Hydrochloride (Xylocaine 2% - M/s. Suhrid Ceigy Ltd., Baroda, each ml containing Lidocaine Hydrochloride - 20.0 mg, Sodium chloride - 6.0 mg and Methyprlene 1.0 mg) at the rate of 10 ml for each animal.

After tranquillisation the animals of group-I were secured on dorsal recumbency. The abdomen was opened by the mid ventral through linea alba incision. The uterus was exposed and exteriorised. The abdominal cavity was then packed around the exposed uterus with sterile drapes soaked in luke warm sterile normal saline solution. An incision measuring about 1.5 cm was given on the dorsal surface of the corpus uteri and kept in that condition with sterile mop soaked in normal sterile saline solution or it for 10 minutes. Then the mop was removed out from within the uterine wound and was closed by lambert suture using chromic cat-cut No.2/0. Supracent solution (a
Fig. 3  Picture shows full view of the uterus (Horns, ovaries and the corpus)

Fig. 4  Picture shows closure of the wound on the corpus of the uterus by left flank approach
Fig. 5  Closure of the uterine wound after right flank approach

Fig. 6  Picture shows closure of the right flank incisional approach after operation
Fig. 7  Picture shows closure of skin suture after left flank approach.
product of Parker Robinson, containing Gentamycin Hydrochloride was applied before closure of the different abdominal wounds. Peritonium and muscles were sutured by interrupted suture with chromic cat-gut No. 2/0. The wound of the skin was closed by horizontal mattress suture using monofilament nylon. Nebasulph powder (a product M/s Dumex Pharmaceuticals, Bombay, containing Neomycin, Eacitracin and Sulphacetamide) was insufflated over the wound created on the skin after closure. Skin wound was covered by gauge and necessary bandage. Intra-muscular administration of conampi-1000 (a product of M/s concept Pharmaceuticals containing 1000 mg of Ampicillin per vial) divided in 2 doses were made daily for each animal from the day of operation upto the 6th post-operative day. Hostacortin H (a product of M/s Hoechst India Ltd. containing Prednisolone Acetate 1 P-10mg and Benzyl Alcohol as preservative) was given intra-muscularly to each animal at the rate of 1 ml on the first day just after operation. 150 ml of 5% dextrose saline drip was given to each animal daily from 1st to 3rd post-operative day. The surgical dressing of parietal wound in standard technique, with supragent lotion and Nebasulph powder was done on every alternate day post-operative and continued till opening of the stitches on 7th day post operative.

The same schedule of pre- and post-operative procedures were taken up in Group-II and Group-III animals with exception as to the other two different approaches in respect of laparohysterotomy so that for group-II animals the positioning of
the animal was left lateral recumbancy and group-III animals positioning was right lateral recumbancy. Asepsis and anti-sepsis were maintained as far as possible in every steping of those operations.

C. Clinical study of the experimental animals after laparohysterotomy

The experimental animals were examined clinically and pulse rate, respiration rate and body temperature of each animal were recorded at regular intervals i.e., 24 hours, 48 hours, 72 hours, 120 hours and 8th day post-operation respectively. The general condition and appetite of animals after operation were also recorded.

D. Haematological study of the experimental animals after laparohysterotomy

In all the experimental animals, haematological studies in respect of haemoglobin content, total leukocyte count and differential leukocyte count were made after operation as per Kolmar et al. (1952) for convenience of comparison with the findings recorded before surgery. The haematological study was made at regular intervals as in the case of clinical study.
E. Macroscopical study of the tissue changes on 15th day post-operative

Two goats out of 3 in each group were sacrificed by bleeding through carotid artery after tranquillisation using Sigul in proper dose on 15th day post-operative and macroscopical study in respect of changes in colour, evidence of oedema, presence of echymosis, adhesions between internal organ or organs and peritoneum and any other macroscopical tissue changes occurred in any area of the uterus including other associated organs exhibiting differences from normal appearance was made and recorded. The said macroscopical study was completed within half an hour to avoid morbid tissue changes and shrinkage therefrom.

F. Microscopical study of the tissue changes

After sacrificing of each animal, the portion of skin and underlying muscle was sampled out and fixed in 10% neutral formol-saline for histopathological study. The fixed tissues were subjected to the usual laboratory processing for histopathological study and the sections were examined microscopically after staining with Haematoxyline and Eosin stain as per the methods of Lillie and Rao (1962). The findings therefrom were recorded.
G. Future reproductive efficiency after laparohysterotomy

One goat in each group under the study was not slaughtered on 15th day after laparohysterotomy with a view to observe the future reproductive efficiency. Those goats were allowed to be mated with healthy buck of the same breed in the late hours of second post-operative estrum which was recorded to be varying from 36 to 48 hours.
CHAPTER IV

RESULTS AND DISCUSSION
RESULTS AND DISCUSSION

A. Clinical condition of the experimental animals before and after laparohysterotomy

Clinical condition as observed in experimental Black Bengal goats before and after operation by different approaches have been represented in Table 1-3. Table 1 revealed that the general condition of the experimental animals in all the 3 groups were all good and their appetite was normal before surgery. Moreover, rumen movement, defaecation and micturation all were normal before surgery. It was recorded that on 24th hour after laparohysterotomy by different approaches 5 (55.44%) out of 9 goats were dull in appearance. Their appetite, rumen movement, defaecation and micturation were found to be reduced. Those abnormalities could not be noticeable in remaining (44.56%) animals, of which was subsequently monitored by clinical observation. While considering the number of such abnormalities among the 3 groups of animal under the study it was noticed that number of animals exhibiting the abnormalities after operation were equal being 2 in Group I and II by
### Table 1: Clinical condition of experimental Black Bengal goats before and after laparohysterotomy by different approaches

<table>
<thead>
<tr>
<th>Name of approach</th>
<th>Group</th>
<th>Sl. Goat No.</th>
<th>Pre-operative</th>
<th>Post-operative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24 Hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Gene-Apperal tite</td>
<td></td>
</tr>
<tr>
<td>Mid-ventral</td>
<td>I</td>
<td>1 E/1</td>
<td>Good Normal</td>
<td>Dull Reduced</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 E/3</td>
<td>Good Normal</td>
<td>Good Normal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 E/4</td>
<td>Good Normal</td>
<td>Dull Reduced</td>
</tr>
<tr>
<td>Right flank</td>
<td>II</td>
<td>1 E/2</td>
<td>Good Normal</td>
<td>Good Normal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 E/5</td>
<td>Good Normal</td>
<td>Dull Reduced</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 E/8</td>
<td>Good Normal</td>
<td>Dull Reduced</td>
</tr>
<tr>
<td>Left flank</td>
<td>III</td>
<td>1 E/6</td>
<td>Good Normal</td>
<td>Good Normal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 E/7</td>
<td>Good Normal</td>
<td>Dull Reduced</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 E/9</td>
<td>Good Normal</td>
<td>Good Normal</td>
</tr>
</tbody>
</table>

*Gene-Apperal tite Cond.: General Condition.*
midventral and right flank approach. This could not be compared due to lack of specific works in goats as revealed from the available literatures.

The body temperature of the experimental goats (Table 2) in all the 3 groups was found to be increased at 24 hours after operation when compared to the same as obtained before surgery. But the degree in increase of body temperature of the animals under group II (right flank approach for laparohysterectomy) was found higher than those in other two groups. However, the body temperature of the animals in all the 3 group gradually decreased to normal with little fluctuations on 72 hours after operation and remained nearly same upto 15th day post-operative.

The present findings of the above study could not be compared due to lack of specific work as revealed from the available literatures. However, the hyperesthesia on the first 24th hour after surgery might be regarded as usual physiological process in surgical wound healing and related to post-operative tissue reactions linked to genetic makeup of the species and breed in particular.

The pulse and respiration rates of 9 experimental goats before surgery at specific intervals following surgery by different approaches recorded (Table 3) in the present study indicated that there was trend in increase of both
Table - 2: Body Temperature (in °F) of experimental Black Bengal goats before and after laparohysterectomy by different approaches

<table>
<thead>
<tr>
<th>Name of approach</th>
<th>Group</th>
<th>Sl. No.</th>
<th>Goat No.</th>
<th>Pre-operative Temperature</th>
<th>Post-operative Temperature</th>
<th>24 hours</th>
<th>48 hours</th>
<th>72 hours</th>
<th>120 hours</th>
<th>8th day</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/3</td>
<td>I</td>
<td>E/1</td>
<td>1</td>
<td>102.0</td>
<td>103.4</td>
<td>103.0</td>
<td>102.6</td>
<td>102.6</td>
<td>102.0</td>
<td>102.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E/3</td>
<td>2</td>
<td>102.2</td>
<td>102.8</td>
<td>102.8</td>
<td>102.6</td>
<td>102.6</td>
<td>102.2</td>
<td>102.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E/4</td>
<td>3</td>
<td>102.4</td>
<td>103.5</td>
<td>103.2</td>
<td>102.6</td>
<td>102.4</td>
<td>102.4</td>
<td>102.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td></td>
<td>102.2</td>
<td>103.2</td>
<td>103.0</td>
<td>102.6</td>
<td>102.2</td>
<td>102.2</td>
<td>102.2</td>
</tr>
<tr>
<td>S/3</td>
<td>II</td>
<td>E/2</td>
<td>1</td>
<td>102.4</td>
<td>102.8</td>
<td>102.6</td>
<td>102.4</td>
<td>102.2</td>
<td>102.2</td>
<td>102.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E/5</td>
<td>2</td>
<td>102.2</td>
<td>103.8</td>
<td>103.2</td>
<td>102.6</td>
<td>102.2</td>
<td>102.3</td>
<td>102.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E/6</td>
<td>3</td>
<td>102.0</td>
<td>104.0</td>
<td>103.0</td>
<td>102.7</td>
<td>102.2</td>
<td>102.4</td>
<td>102.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td></td>
<td>102.2</td>
<td>103.5</td>
<td>102.9</td>
<td>102.5</td>
<td>102.2</td>
<td>102.3</td>
<td>102.3</td>
</tr>
<tr>
<td>S/3</td>
<td>III</td>
<td>E/6</td>
<td>1</td>
<td>102.5</td>
<td>102.8</td>
<td>102.6</td>
<td>102.6</td>
<td>102.6</td>
<td>102.5</td>
<td>102.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E/7</td>
<td>2</td>
<td>102.4</td>
<td>103.2</td>
<td>103.0</td>
<td>102.5</td>
<td>102.4</td>
<td>102.5</td>
<td>102.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E/8</td>
<td>3</td>
<td>102.6</td>
<td>102.8</td>
<td>102.6</td>
<td>102.5</td>
<td>102.5</td>
<td>102.6</td>
<td>102.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td></td>
<td>102.5</td>
<td>102.9</td>
<td>102.7</td>
<td>102.5</td>
<td>102.5</td>
<td>102.5</td>
<td>102.5</td>
</tr>
</tbody>
</table>
Table 3: Pulse and Respiration rate per minute of experimental Black Bengal goats before and after laparohysterotomy by different approaches

<table>
<thead>
<tr>
<th>Name of Group</th>
<th>Sl. No.</th>
<th>Goat No.</th>
<th>Pre-operative</th>
<th>Post-operative</th>
<th>8th day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid-ventral I</td>
<td>1</td>
<td>E/1</td>
<td>78</td>
<td>20</td>
<td>115</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>E/3</td>
<td>80</td>
<td>25</td>
<td>116</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>E/4</td>
<td>76</td>
<td>28</td>
<td>120</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td>78</td>
<td>24.33</td>
<td>117</td>
</tr>
<tr>
<td>Right flank II</td>
<td>1</td>
<td>E/2</td>
<td>74</td>
<td>28</td>
<td>130</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>E/5</td>
<td>78</td>
<td>28</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>E/6</td>
<td>78</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td>76.66</td>
<td>27</td>
<td>125</td>
</tr>
<tr>
<td>Left flank III</td>
<td>1</td>
<td>E/6</td>
<td>78</td>
<td>22</td>
<td>115</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>E/7</td>
<td>76</td>
<td>22</td>
<td>118</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>E/9</td>
<td>76</td>
<td>26</td>
<td>120</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td>76.66</td>
<td>23.33</td>
<td>117</td>
</tr>
</tbody>
</table>
pulse and respiration rates of all the animals in the initial stage at 24 hours of surgery by irrespective of approaches, and after 24 hours there was gradual decrease in both pulse and respiration rate becoming normal at 8th day post-operative. The findings could not be compared due to lack of similar works in literatures. However, this might be explained as sequelae to body tissue reactions in the process of healing after surgical injury as reported by Das (1986) in canines.

B. Haematological study on the experimental animals before and after laparohysterectomy:

The total count (leukocytes and haemoglobin content) recorded in the experimental goats under the study was presented in Table-4 revealed that mean values for the same were 11055 and 8.31 on 24th hours before commencement of surgery. The total leukocytic count in those goats after laparohysterectomy by irrespective of approaches in (table-4) were found to be recorded as 12060, 11577, 11489, 11249 and 11041 per cmm on 24th, 48th, 72th 120th and 8th day respectively. While comparing the effect of laparohysterectomy on the values of total leukocytic count obtained in those animals by 3 different approaches it was observed that the same did not differ significantly.
Table 4: Total leukocytic count (WBC) per cmmand haemoglobin content (g%) of experimental Black Bengal goats before and after laparohysterotomy by different approaches

<table>
<thead>
<tr>
<th>Name of Group</th>
<th>Sl. No.</th>
<th>Goat No.</th>
<th>Pre-operative T.C. Hb (WBC)</th>
<th>24 hours T.C. Hb (WBC)</th>
<th>48 hours T.C. Hb (WBC)</th>
<th>72 hours T.C. Hb (WBC)</th>
<th>120 hours T.C. Hb (WBC)</th>
<th>8th day T.C. Hb (WBC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midventral I</td>
<td>1 E/1</td>
<td>10500</td>
<td>8.9</td>
<td>11300</td>
<td>10000</td>
<td>10200</td>
<td>10400</td>
<td>10600</td>
</tr>
<tr>
<td></td>
<td>2 E/3</td>
<td>11000</td>
<td>8.5</td>
<td>12200</td>
<td>12000</td>
<td>12100</td>
<td>11900</td>
<td>11200</td>
</tr>
<tr>
<td></td>
<td>3 E/4</td>
<td>10900</td>
<td>9.0</td>
<td>11600</td>
<td>11000</td>
<td>10800</td>
<td>10600</td>
<td>10700</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td></td>
<td>10800</td>
<td>11700</td>
<td>11000</td>
<td>11033</td>
<td>10966</td>
<td>10833</td>
</tr>
<tr>
<td>Right flank II</td>
<td>1 E/2</td>
<td>10600</td>
<td>7.5</td>
<td>11200</td>
<td>11000</td>
<td>10900</td>
<td>10760</td>
<td>10200</td>
</tr>
<tr>
<td></td>
<td>2 E/5</td>
<td>12000</td>
<td>8.6</td>
<td>13300</td>
<td>12800</td>
<td>12500</td>
<td>12300</td>
<td>11900</td>
</tr>
<tr>
<td></td>
<td>3 E/8</td>
<td>11300</td>
<td>8.0</td>
<td>12900</td>
<td>12200</td>
<td>12350</td>
<td>12000</td>
<td>11550</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td></td>
<td>11300</td>
<td>12466</td>
<td>12000</td>
<td>11916</td>
<td>11686</td>
<td>11216</td>
</tr>
<tr>
<td>Left flank III</td>
<td>1 E/6</td>
<td>11300</td>
<td>8.2</td>
<td>12000</td>
<td>11870</td>
<td>11600</td>
<td>11200</td>
<td>11200</td>
</tr>
<tr>
<td></td>
<td>2 E/7</td>
<td>10900</td>
<td>8.0</td>
<td>11700</td>
<td>11300</td>
<td>11160</td>
<td>10890</td>
<td>10930</td>
</tr>
<tr>
<td></td>
<td>3 E/9</td>
<td>11000</td>
<td>8.1</td>
<td>12350</td>
<td>11000</td>
<td>11800</td>
<td>11200</td>
<td>11100</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td></td>
<td>11066</td>
<td>12016</td>
<td>11723</td>
<td>11520</td>
<td>11096</td>
<td>11076</td>
</tr>
<tr>
<td>Overall Mean</td>
<td></td>
<td></td>
<td>11055</td>
<td>12060</td>
<td>11577</td>
<td>11489</td>
<td>11249</td>
<td>11041</td>
</tr>
</tbody>
</table>

*p*
From the results it was evident that total leukocytic count was higher in 24 hours after operation by irrespective of approaches in comparison to that obtained in those animals before surgery and the same gradually decreased to near approximation to that obtained in the pre-operative state on the 8th day after surgery. This findings was in agreement with the reports of verma and Tyagi (1973). The trend in leukocytosis in the initial stage of surgery might be due to surgical trauma associated with physiopathology of surgical wound healing. The nearly normal value of leukocyte as obtained on 8th day post-operative might be considered as favourable indication of recovery as opined by Knowle's (1950).

The haemoglobin level (gm%) in experimental goats after laparohysterotomy by irrespective of approaches (Table - 4) showed that the mean values for the same were 8.72, 8.4, 8.5, 8.16 and 8.17 on 24th, 48th, 72th, 120th and 8th day respectively, while comparing the effect of laparohysterotomy on the values of haemoglobin obtained in those animals by 3 different approaches it was observed that the same did not differ significantly.

The overall results as represented in table also showed the haemoglobin level was remarkably higher in 24 hours after operation by irrespective of approaches in comparison to that obtained in those animals before surgery and the same
Gradually decreased to near approximation to that obtained in the pre-operative state on the 8th day after surgery. The findings as recorded in the present study might be due to haemococoncentration following laparohysterotomy as physiopathology of surgical wound healing as reported by Neima and Vasili (1973).

Table - 5 represents the results of differential leukocyte count in experimental animals before surgery and after surgery by different approaches at specific intervals till 8th day. It was revealed from the table that mean values of neutrophil and lymphocyte in animals before operation were 38.33% and 55.7% respectively.

But after laparohysterotomy by irrespective of approaches in specific intervals showed that the mean values of the neutrophil was: 59%, 55%, 46%, 42%, 36% and that of lymphocyte was 42% (neutrophil) and 36%, 40%, 49%, 52%, 59% (lymphocyte) on 24th, 48th, 72th, 120th, and 8th day respectively, after surgery.

There were no striking differences in values for neutrophil and lymphocyte in experimental animals in 3 different groups after laparohysterotomy by irrespective approaches. It was interesting to observe that on 5th day and onward neutrophil started returning to its normal level as obtained before surgery, whereas lymphocyte continued increasing in number from 48 hours.
Table 5: Differential Leukocytic count percentage of experimental Black Bengal goats before and after labarohysterectomy by different approaches

<table>
<thead>
<tr>
<th>Name of approach</th>
<th>Group</th>
<th>Sl No.</th>
<th>Coat No.</th>
<th>Pre-operative</th>
<th>Post-operative (Contd...)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>Midventral I</td>
<td>1</td>
<td>E/1</td>
<td>39</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>E/3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>E/4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Mean</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Right flank II</td>
<td>1</td>
<td>E/2</td>
<td>37</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>E/5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>E/8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Mean</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Left flank III</td>
<td>1</td>
<td>E/6</td>
<td>36</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>E/7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>E/9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Mean</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overall Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name of Group</td>
<td>Sl. No.</td>
<td>Goat No.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>--------</td>
<td>----------</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N</td>
<td>L</td>
<td>M</td>
</tr>
<tr>
<td>Mid ventral I</td>
<td>1</td>
<td>E/1</td>
<td>40</td>
<td>56</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>E/3</td>
<td>50</td>
<td>46</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>E/4</td>
<td>50</td>
<td>47</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>46</td>
<td>49</td>
<td>1.66</td>
</tr>
<tr>
<td>Right flank II</td>
<td>1</td>
<td>E/2</td>
<td>51</td>
<td>46</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>E/5</td>
<td>40</td>
<td>56</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>E/8</td>
<td>48</td>
<td>45</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>46</td>
<td>49</td>
<td>2.3</td>
</tr>
<tr>
<td>Left flank III</td>
<td>1</td>
<td>E/6</td>
<td>52</td>
<td>46</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>E/7</td>
<td>50</td>
<td>47</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>E/9</td>
<td>50</td>
<td>46</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>50</td>
<td>46</td>
<td>1.66</td>
</tr>
<tr>
<td>Overall mean</td>
<td></td>
<td></td>
<td>47.88</td>
<td>48.33</td>
<td>43.88</td>
</tr>
</tbody>
</table>

N = Neutrophil; L = Lymphocyte; M = Monocyte; E = Eosinophil; B = Basophil.
Fig. 8 Picture shows the healing process of the left flank operative site on 15th post-operative day prior to sacrifice.

Fig. 9 Picture shows the healing process of the mid-ventral operative site on the 15th post-operative day.
This neutrophilia and lymphopenia on 24th hour after operation and subsequent gradual neutropenia and lymphocytosis from 48th hour and onwards upto 8th day as recorded in the present study was in agreement with the reports of Verma and Tyagi (1973) in goats. This neutrophilia in early phase of surgery might be due to immediate impact of surgical stress and lymphocytosis and neutropenia in the later phase of surgical intervention might be indicative of favourable sign of post-operative wound healing process as per Knowles (1950).

6. Macroscopical study of the wounds created on laparohysterotomy by different approaches

Macroscopical study on the superficial skin incision made during laparohysterotomy in goats by different approaches revealed that there was no pathological lesions on the skin wounds and its surroundings in all the cases were appeared to be approximated very nicely. Further detailed examination after sacrificing 2 animals, out of 3 in each group on 15th day after surgery (Table - 6) showed that the skin was found to have developed mild adhesion with fascia and underlying muscles. There was no visible adhesion found in any other tissue. There was no adhesions between the muscles and peritoneum and also between the uterus and peritoneum including any other associated structures. Uterine sutures underwent complete absorption and there were no pathological lesions along the
Table 6: Macroscopical tissue changes in experimental goats following Laparchysterotomy by different approaches

<table>
<thead>
<tr>
<th>Name of approach</th>
<th>Group</th>
<th>Sl. No.</th>
<th>Goat No.</th>
<th>Day of sacrifice</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Midventral I</td>
<td>1</td>
<td>E/1</td>
<td>15th day post-operative</td>
<td>1. Colour of superficial skin incisional line - No abnormality.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>E/4</td>
<td></td>
<td>2. No pathological lesion on skin and underlying structures</td>
</tr>
<tr>
<td></td>
<td>Right flank II</td>
<td>1</td>
<td>E/2</td>
<td>15th day post-operative</td>
<td>3. Mild adhesion of skin with fascia and underlying muscles.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>E/5</td>
<td></td>
<td>4. No visible adhesion in between the uterus and peritonium and associated organs.</td>
</tr>
<tr>
<td></td>
<td>Left flank III</td>
<td>1</td>
<td>E/6</td>
<td>15th day post-operative</td>
<td>5. Uterine sutures found disappeared and appeared uneventful healing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>E/9</td>
<td></td>
<td>6. Both intra-pelvic and intra-abdominal organs are free and mobile.</td>
</tr>
</tbody>
</table>

* One out of 3 in each group was not sacrificed for future observation in respect of reproductive efficiency.
Fig. 11 Section of incision showing immature fibroblastic cell proliferation

Fig. 12 Section of incision showing mature and well defined scar tissue formation
course of incision over on the uterine wall. Uterus and other internal organs both pelvic and abdominal were all free and mobile. The present findings on 15th day post-operative in coat could not be compared due to lack of specific works in goats as revealed from available literature. Das (1986) while working in canines performed this type of works to show the indications in relation to effectiveness of surgery.

D. Microscopical study on superficial skin and underlying muscles

Histological examination of the skin and underlying muscles on day 15th post-operative revealed proliferation of immature fibroblasts, presence of a few thin-walled new blood capillaries and well defined scar tissue (Fig.112).

Histological findings as recorded above in experimental goats was fully indicative for uneventful surgical wound healing. Though this type of work could not be compared, due to lack of specific works in goats as revealed from the available literatures yet, this type of histological pictures indicative of uneventful healing was recorded by Das (1986) in canines.
Fig. 10 Picture shows pregnancy in a goat after mid-ventral operation.
E. Future reproductive efficiency after laparohysterotomy

It was recorded that 2 out of 3 goats which mated in second post-operative estrum became pregnant and they were good in all respect (Fig. 10). Though, this result could not be compared due to lack of specific works as revealed from available literatures yet, it might be concluded that if the laparohysterotomy in virgin goats could be done in usual surgical technique following all the pre- and post-operative consideration, the animals could be pregnant as usual phenomenon.
CHAPTER V

SUMMARY

AND

CONCLUSION
Nine healthy post-puberal virgin Black Bengal goats aged about 12-14 months and of body weight varying from 10-12 kg maintained under the same standard of feeding and managemental practises were selected for the present study. Those animals were divided into 3 groups that is- viz group-I, group-II and group-III, each containing 3 animals for laparohysterotomy by 3 different approaches. In the group-I animals site of incision was midventral and the same were right flank and left flank in animals under group-II and group-III respectively.

The parameters of the present study for the purpose were clinical conditions comprising of pulse, respiration, body temperature and other physiological, behaviour signs and symptoms like appetite, defaecation, micturation etc., haematological studies consisting of total leukocytic count, haemoglobin content and differential leukocytic count 24 hours before operation and at 24, 48, 72, 120 hours and 8th day post-operative, macroanatomical study of tissue changes and micro-

...
anatomical study of skin and underlying muscle after sacrificing 2 animals out of 3 in each group on 15th day after operations.

The operations in the respective sites under each group of animals were done by controlling and restraining with intramuscular injection of Trifluromazine hydrochloride and local infiltration of 2% Lidocaine hydrochloride on fulfilment of presurgical conditions.

Twenty four hours after operation, 5 out of (55.44%) goats were dull in appearance and their appetite, defaecation were found to be reduced, whereas in other 4 (44.56%) animals no such physiological deviations were noticed. The body temperature of the experimental animals in all the 3 groups was found to be increased at 24 hours post-operative from the base value. But degree of increase of body temperature of the animals under group-II (right flank approach) was more than these obtained in other two groups. Then the body temperature of all experimental animals in 3 group gradually decreased to normal with little fluctuation on 72 hours after operation. The pulse and respiration rate in all the groups of animals increased from the normal level on the 24th hours after laparohysterotomy by any approaches, yet the same, and was found to be gradually returned to normal from 48 hours onwards to 8th day post-operative.
Haematological findings as recorded in the present study showed that there was slight increase in total leukocytic count and haemoglobin content (gm%) at 24th hour after operation, and thereafter were gradually decreasing to nearly normal level before surgery at 8th day post-operative, following specific intervals under the study. Results of the differential leukocytic count as obtained in the present study revealed that there was initial neutrophilia with lymphopenia on 24th hour after operation in all the animals under group I - III and 48th onward there was gradual decrease in number of neutrophils with increase in number of lymphocyte up to day 8 post-operative, thus playing an usual role in surgical wound healing.

Macroscopical examination after sacrificing 6 goats out of 9 on 15th day post-operative by irrespective of approaches revealed uneventful surgical wound healing characterized by mild adhesion of skin with fascia and underlying muscles and presence of free and mobile uterus with absorption of suture material and other associated organs including free peritonium in the abdomen as well as pelvic cavities.

Microscopical study on the skin and underlying structures revealed uneventful healing of the incisional wounds.
Two out of 3 goats under group I to III in the present study became pregnant, which were mated in 2nd behavioural estrum following laparohysterotomy.

From the above studies following conclusions could be made:

1. The midventral, right flank and left flank approaches could suitably be carried out in field condition for the purpose of caesarean operation in goats.

2. Left flank approach might however lead to ruminal tympany if the operation took unusually long time.

3. Both left and right flank approaches were convenient for both the surgeon and patient when the operation could be done with paravertebral lumbar anaesthesia in standing position of the animal, thus avoiding excessive stress to the animal produced in recumbent position.

4. In the present study, while performing laparohysterotomy by mid-ventral approach a few difficulties were felt in management of keeping the voluminous abdominal contents in situ during the course of operation. There was also possibility of occurrence of incisional hernia following laparotomy by this approach which in this experiment luckily did not happen.
CHAPTER VI

FUTURE SCOPE
OF
RESEARCH
Due to the limitation of facilities and other handicaps many other aspects of the present work could not be completed in all respects. This type of work could be done when this was indicated in dystocia.

However, the future scope of studies may be carried out on the following aspects.

1. The animals under both control and experimental groups may be studied in large number under identical conditions indicative of laparohysterotomy.

2. As caesarean operation sometimes becomes obligatory in cows in field condition, similar corroborative studies are necessary in this species of animals.

3. Comparative study between epidural anaesthesia high and low, the paravertebral lumbar anaesthesia and segmental lumbar anaesthesia will be able to reveal the
comparative merits and demerits of anaesthetic procedures for the purpose of the operation.

4. Use of tranquilliser drugs at high dose like triflupromazine may affect the prenatal lives as the tranquilliser agents have the capacity to cross the placental barrier. Therefore, systemic studies may be felt necessary about choice of tranquillisers, analgesic and neuroleptanalgesic agents.

Trial with Pentazocine-Diazepam combination, Ketamin-Diazepam combination may be able to throw new light in the field of study.

5. Systematic studies with elective caesarean operation in indigenous cows under field condition with paravertebral anaesthesia in standing position either at right or left flank will be new chapter for investigation.


Knowles R.P. (1950) Clinical laboratory Interpretation
Vet. Med. 45: 75-78.

Histochemistry 3rd Ed, MCG raw Hell Book CO.


Rec. 63(39): 617-621.


Nayar, K.N.M.; K.P. Nair; Sarada Amma and K.M. Alikutty (1979),
Schistosomus reflexus in a goat-A casereport.

Parkinson, J.D. (1952) A comparison of the operation of caesarean section in the bovine and ovine species.
Vet. Rec. 64(50): 819-823.


