

JIMMA UNIVERSITY

COLLEGE OF VETERINARY MEDICINE AND AGRICULTURE

SCHOOL OF VETERINARY MEDICINE

MVSc PROGRAM IN VETERINARY SURGERY AND DIAGNOSTIC IMAGING



**COMPILED CASE REPORTS ON MINOR AND MAJOR SURGICAL CASES ON
DIFFERENT SPECIES OF DOMESTIC ANIMAL PATIENTS IN AND AROUND
JIMMA TOWN, ETHIOPIA**

MVSC THESIS

BY

BILISA ALEMAYEHU SHITAYE

JUNE, 2024

JIMMA, ETHIOPIA

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MVSc Thesis

A Thesis Submitted to the Jimma University, College of Agriculture and Veterinary
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Masters of Veterinary Science in Veterinary Surgery and Diagnostic Imaging.

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STATEMENT OF THE AUTHOR

First, I declare that this thesis is my *bonafide* work and that all sources of material used for this thesis have been duly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for an advanced (MVSc) degree at Jimma University, College of Veterinary Medicine and Agriculture, and is deposited at the University library to be made available to borrowers under the rules of the Library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate. Brief quotations from this thesis are allowable without special permission provided that accurate acknowledgment of the source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the head of the major department or the dean of the college when in his or her judgment the proposed use of the material is in the interests of scholarship. In all other instances, however, permission must be obtained from the author.

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BIOGRAPHICAL SKETCH

The author, Bilisa Alemayehu, was born in Bako Tibe Woreda, West Shoa Zone, and Oromia Regional State on December 22, 1986, G.C., from my mother, Abebech Buli, and my father, Alemayehu Shitaye. I attended my primary school at Tibe Lege Doke Primary School at Tibe 01 kebele and Junior Secondary School at Bako High School in Bako Town. After the completion of my high school education, I joined Alage ATVET College in 2005 G.C. and graduated with a diploma in animal health in July 2008 G.C. After graduation, I was employed by West Shoa Zone, Bako Tibe Woreda Livestock and Fishery Resource Development Office, from 2009 to 2017 G.C., as animal health expert, and I served as an animal health assistant. I joined Jimma University in 2018 G.C. and graduated with a BVSc degree in Veterinary Science on May 20, 2021 G.C. Then, I returned to Bako Tibe Woreda Livestock and Fishery Resource Development Office and served as an Animal health expert until I joined again Jimma University College of Agriculture and Veterinary Medicine to follow my Master's degree in Veterinary surgery and Diagnostic imaging at school of veterinary medicine in December 2022 G.C. In conclusion, after completing my class course and research work, to day I am here to defend my MVSc thesis.

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DEDICATION

This paper is dedicated: to my mother, Abebech Buli, and my father Alemayehu Shitaye, who never went to school themselves for raising me up and sending me to school, and supporting me financially and morally throughout my academic career. Also to my wife, Aster Boka, and my kids; Beka and Hawi Bilisa for their all-rounded support, without their permission I wouldn't be here today.

LIST OF ABBREVIATIONS

Cm	Centimeter
CRT	Capillary Refill Time
CVP	Cervico-Vaginal Prolapse
HR	Heart Rate
HCl	Hydrogen Chloride
ICD	Incomplete Cervical Dilation
IM	Intramuscular
IV	Intravenous
JUCAVM	Jimma University College of Agriculture and Veterinary Medicine
Kg	Kilogram
Km	Kilometer
Mg	Milligram
ml	Milliliter
mm	Millimeter
NaCl	Sodium Chloride
NSAID	Non-steroidal anti-inflammatory drug
OVH	Ovariohysterectomy
POP	Pelvic Organ Prolapse
PR	Pulse Rate
RR	Respiratory Rate
W/w	Weight per weight

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ABSTRACT

The livestock subsector has made enormous contributions to Ethiopia's national economy and livelihoods of many Ethiopians. However, there are various bottle neck that affect the effective and efficient utilization of this valuable subsector. Out of these, there is a limited coverage of veterinary services especially in relation to veterinary surgical management and corrections of different deformities and injuries that can save the lives of animals and serve as chemotherapy for controlling livestock diseases. The study was conducted from April, 2023, to February, 2024, at JUCAVM Open-air Clinic with the objectives of documenting and describing various surgical procedures, techniques as well as outcomes in small and large domestic animals. During the study period, out of a total of nineteen different domestic animals 11 cattle's, 4 equines, 1 small ruminant, 2 canines, and 1 swine were admitted to the stated veterinary services centers and had undergone different surgical corrections and managements. Before admission to any surgical treatment and management, each and every case has undergone through history and general physical examinations. Patients were aseptically prepared, anesthetized with safe anesthetic protocols, and controlled in appropriate direction depending on animal species and the type of surgical intervention going to be performed. During the study period, surgical managements such as horn amputation, herniorrhaphy, cesarean sections, ovariohysterectomy, rumenotomy, wound and abscess management, paraphimosis, open castrations, rectal, uterine, and cervicovaginal prolapse were performed. From all of the animals undergone surgical operations, (18/19) recovered, whereas (1/19) died. Besides; post-operative complications were recorded for each and every surgical patient. Generally, swelling, irritation, seroma, inflammation and bloat were observed in some of the patients and recorded as postoperative complications. This finding shows that surgical intervention performed by well-trained veterinary surgeons under proper aseptic techniques is crucial for saving a significant number of animals affected by life-threatening conditions.

Keywords: *Animals, Case report, Jimma, Surgery, Surgical treatment, Surgical outcome*

1. INTRODUCTION

Ethiopia has the largest livestock population in Africa: 70,291,776 cattle, 42,914,865 sheep, 52,463,535 goats, 2,148,492 horses, 382,784 mules, 10,791,896 donkeys, 8,146,790 camels, 56,992,987 poultry, and 6,986,100 beehives. The Jimma zone has one of the largest livestock populations in Ethiopia. With its livestock population estimated at 2,560,207 heads of cattle, 859,914 heads of sheep, 570,387 heads of goats, 68,664 heads of horses, 21,395 heads of mules, 191,054 heads of donkeys, 2,235,702 heads of poultry, and 532,728 beehives (CSA, 2021). The livestock subsector has made enormous contributions to Ethiopia's national economy and livelihoods, and many Ethiopians are still promising for accelerating the economic development of the country (Clapham, 2023). Livestock play vital roles in generating income for farmers, creating job opportunities, ensuring food security, providing services, contributing to assets, social, cultural, and environmental values, and sustaining livelihoods (MoA, 2013). Cattle as a source of meat, milk, drought power, income, and foreign exchange significantly contribute to the Ethiopian economy. Sheep and goats are major sources of income (cash) for poor rural farmers in most parts of the tropics, including Ethiopia (Worku, 2023). Furthermore, livestock plays an important role in providing export commodities such as live animals, hides, and skins to support foreign exchanges (Kubkomawa, 2017).

The livestock population of Ethiopia is large; however, the country gains little profit from this enormous livestock population due to various constraints, of which livestock diseases are the main factor. However, providing quality veterinary clinical services, including veterinary surgery is essential to controlling livestock diseases. In Ethiopia, there has recently been an increase in demand for better veterinary services due to the increasing awareness of the importance of treating individual animals in both rural and urban communities (Nyokabi *et al.*, 2023). The growing trend of keeping pure or crossbred companion pets, especially dogs, in urban areas has also contributed to the increased demand for the veterinary care of individual animals (Wallis *et al.*, 2018). Surgical operation is one method for treating animal patients. Thus, it requires specialized skills in addition to adequate knowledge. The practice of practical surgical operations is essential to learning and developing experience. Surgery is a skill- and equipment-based technique that involves the use of sutures, incisions, excision, manipulation, or other invasive procedures, as well as, local, regional, or general anesthesia for patient management (Braham *et*

al., 2014). Surgery places a heavy demand on space, equipment, and personnel proficiencies for patient management and could be used as an index of high-profile clinical veterinary practice especially in poor resource settings, as observed in many developing countries of Africa and Asia (Eyarefe & Dei, 2014). Surgical disorders are the major causes of fatality in animals if not treated in time. However, surgical disorders are a major economic threat, and surgical intervention failure provides no alternative except for culling or eventual loss of a productive or valuable animal through death (Craig *et al.*, 2007). Surgical disorders can also hinder the growth, performance, and economic value of animals (Arju *et al.*, 2014).

Surgery is one of the oldest and most common techniques employed in all species of animals to correct acquired functional and structural disturbances as well as genetic defects affecting the health, welfare, and productivity of individual animals (Hussen, 2018). The common surgical conditions previously handled at the JUCAVM Open-air Clinic were wound, horn fracture, penile and/or preputial injuries, traumatic hernia, congenital hernia, uterine prolapse, cervicovaginal prolapse, rectal prolapse, dystocia, abscess, orchitis and request for sterilization (ovariohysterectomy and open castration). Surgical procedures are the best means of treating certain health conditions such as rumen impaction, dystocia, hernias, and prolapse of internal organs through natural orifices. The surgical conditions, methods employed, and associated outcomes of these patients have rarely been systematically reported and documented in the field of study. A few veterinary surgical cases have been published. However, detailed surgical procedures and postoperative management are rarely discussed. However, the documentation of veterinary surgical cases serves as a suggestion for future improvements.

Therefore, the objectives of this case report were as follows:

- ✓ To document and describe the various surgical procedures and techniques as well as their outcomes in small and large domestic animals at veterinary clinics.
- ✓ To acquire knowledge and surgical skills on various aspects of common surgical treatments and management in domestic animals in particular.

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted from April 1, 2023, to February 30, 2024, in Jimma town which is located in the southwestern part of Ethiopia in the Oromia regional state (Figure 1). Jimma town is located approximately 352 km from Addis Ababa, the capital city of Ethiopia (Duguma & Janssens, 2016). Geographically, it is located at 7°13' and 8°56'N latitude and 35°52' and 37°E longitude. The area has an altitude ranging between 880 and 3358 m above sea level. The annual rainfall ranges from 1200mm–2000mm; and the annual temperature of the area ranges 7°C–30°C. The agricultural production system in the area is mixed crop and livestock production system. Although the area is well known for its coffee production, still livestock production is one of the most important agricultural activities. Furthermore, the zone is well known for livestock production, which can be estimated at approximately 2,212,962 cattle, 866,561 sheep, 457,311 goats, 96,782 horses, 17,644 mules, 77,767 donkeys, 1,951,129 poultry and 546,722 beehives (Abdela *et al.*, 2018).

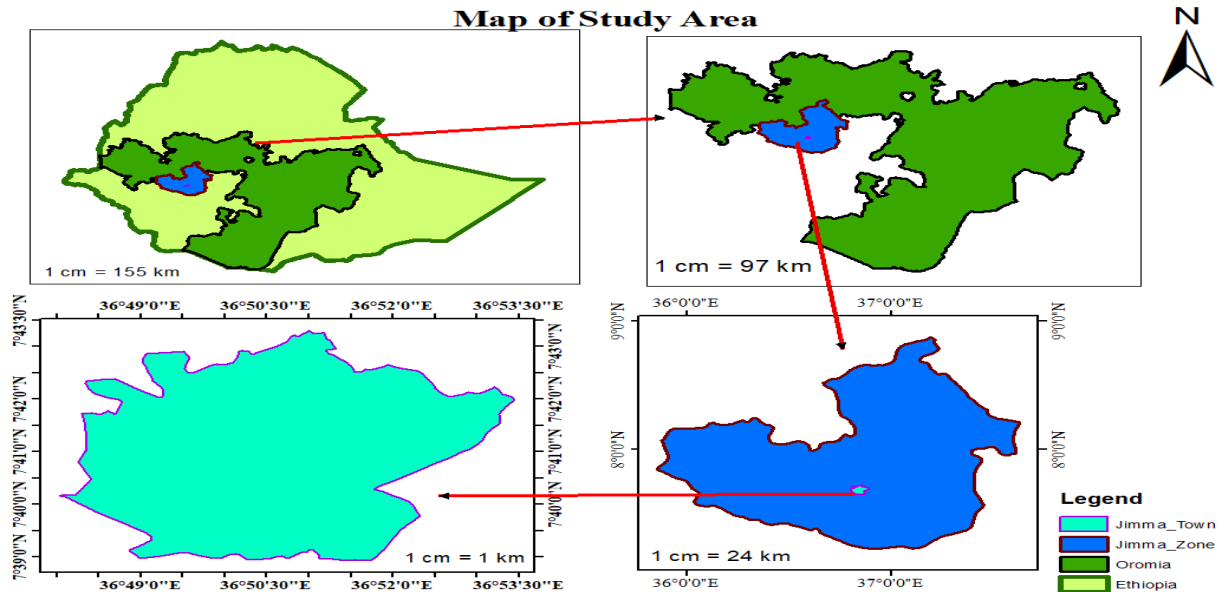


Figure 1: Map of the study area (map created by ArcGIS® software Esri version 10.8).

2.2 Study Population

The study populations were included different domestic animals species (small and large ruminants, equines, and companions), age, breeds, and sex originated from in and around Jimma town that were admitted to Jimma University College of Agriculture and Veterinary Medicine Open air Clinic or animals found on farms or owner's premises for which owners requested for surgical treatment. Targeted animals included in this case report were brought from different management systems for various surgical treatments from in and around Jimma town. Local breed cattle, caprine, mule, donkeys, and swine were kept under extensive and semi-intensive husbandry systems, and small animals like dogs were kept as companion animals. The surgical interventions were performed at Jimma University College of Agriculture and Veterinary Medicine Open air Clinic or premises of farm owner's.

2.3 Study Design

A descriptive study was used to compile and document the conducted various surgical cases on different domestic animals that were admitted to Jimma University College of Agriculture and Veterinary Medicine Open air Clinic or surgical cases conducted at premises of farm owner's from in and around Jimma town starting from April 1, 2023, to February 30, 2024. History of the patient, physical examination, pre-operative animal preparation, surgical operation, postoperative care, postoperative complication, and outcome of an individual case were included in each case report.

2.4 Study Method

The different domestic animals were brought to the respective JUCAVM Veterinary Open air Clinic and various surgical cases requiring minor or major surgery for either elective or emergency treatment were subjected to thorough medical evaluation. Accordingly, each patient was assessed and evaluated, and findings pertaining to different clinical parameters, such as patient signalment, medical history and physical examination, were recorded. In addition, the patient was pre-evaluated for anesthesia and surgical risk. Depending on the examinations and clinical findings, specific surgical manipulations and management were prescribed and performed under aseptic conditions and with safe anesthetic protocol as per the presented patients' requirements. All animals that underwent the surgical treatments were also followed

through phone call communication and physical presence, in addition to peri-, intra-, and post-operation data, for any discomfort or related complications and the capture of captioned photos for all patients. Later all the relevant data were compiled, and surgical case reports were prepared and reported according to the relative similarity of animal species and the presence of the same or/and different animal species concerning the respective outcomes.

2.5 Clinical Parameters Recorded

The different surgical patients treated were brought to the JUCAVM Veterinary Open air Clinic, or treated at owners' property in and around Jimma town with a history of various surgical problems either for elective or emergency treatment. Domestic animal patients were recorded by using an individual case recording sheet. The weights of the animals were estimated. The owner was asked about his/her complaints on the animal presented. The owner's complaints related to the case and all relevant information were recorded. The patient was subjected to a detailed clinical examination according to (Elhiblu *et al.*, 2015). The patient was subjected to a detailed clinical examination such as; heart rate (beats/min), respiratory rate (breaths/min), rectal temperature (0°C), mucus membranes and general body condition were recorded. In addition, the patient was pre-evaluated for anesthesia and surgical risk. After the compilation of case history and clinical examination, surgical cases were judged as elective or emergency. Depending on the examinations and clinical findings, specific surgical manipulations and management were prescribed and performed under aseptic conditions and with a safe anesthetic protocol as per the presented case requirements (Tran, 2010). Postoperative care was given for each patient and postoperative outcomes in each case were recorded if any. Additionally, after the end of postoperative care, follow-up of the outcomes was performed through phone call communication with the owners and with a home visit.

2.6 Case Reporting Outline

2.6.1 Patient history and clinical parameters

The signalment of all study animals such as species, age, breed, sex, and health status, were recorded at the time of presentation. The following features were recorded for each patient: duration of the illness, severity of the problem, history of previous ailment, and medication. Clinical symptoms such as anorexia, depression, loss of appetite, distension of the abdomen,

abnormal uterine, cervicovaginal, rectal and penile abnormal protrusion, vaginal discharge, and any changes in animal behavior, horn fracture, laceration wounds, swelling, pain, and other conditions were recorded. Physical parameters, such as respiratory rate (Yeturi *et al.*), pulse rate (Madbouly *et al.*), heart rate, rectal temperature, and mucous membrane color, were recorded. Each patient was closely inspected for any structural and/or functional disorders of the affected region. The affected parts and/or lesions were palpated and manipulated to detect their nature, consistency and tenderness. Exploratory puncture was performed whenever indicated to reveal the physical characteristics of the fluids or contents present in the examined lesions.

2.6.2 Surgical prescriptions

postoperative preoperative preparation of surgical sites and minor or major surgeries were performed as dictated and demanded by each patient (Smith & Swindle, 2020). Animals at high surgical and anesthetic risk were stabilized before surgical interference. For example, dehydrated animals were rehydrated first via the administration of warm, sterile isotonic fluids parenterally before and during surgery. The surgical sites were prepared by shaving the hair from the surgical site and its surrounding 15 to 20 cm in diameter followed by surgical scrubbing starting at the proposed surgical site and working in circles of increasing diameter to the edge of the clipped area using antiseptic solution such as 0.05% chlorhexidine gluconate. Ruminant animals were secured and restrained in a crush zone with the help of a rope in addition to the application of a local anesthetic block or infiltration at the surgical site (Simões *et al.*, 2021). Accordingly, desensitization of the operative site was achieved either by epidural nerve block or local infiltration using the appropriate amount of 20 mg/ml lignocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd. India) to affect the recommended site for the given surgical procedure. For example, local infiltration was performed at the broad base of a swelling site, and stab skin incisions were made over the swollen mass for minor surgeries such as abscess drainage whereas an inverted L block was used for rumenotomy. In the case of small animals, general anesthesia using injectable anesthetic agents was employed. Based on the temperament of the animal, either of the two types of anesthetic protocols was used. The animals were premedicated with atropine sulfate at 0.04 mg/kg I.M. The first protocol employed xylazine @ 1-1.5 mg/kg and tramadol @ 2 mg/kg IM. (Khelik *et al.*) as premedication, and ketamine hydrochloride @ 10 mg/kg and xylazine @ 1-2 mg/kg intramuscular (Khelik *et al.*) for induction

(Yeturi *et al.*) for maintenance while the second protocol employed xylazine @ 1-2 mg/kg and tramadol @ 2 mg/kg (Khelik *et al.*) for premedications, and ketamine hydrochloride @ 5 mg/kg and diazepam @ 0.2 mg/kg combined in the same syringe for both induction and maintenance (Yeturi *et al.*). Intravenous fluid was administered at maintenance rate of 60 ml/kg/24 hours to all animals operated on under both protocols using an 18 G IV cannula. All surgical procedures were performed according to halsted's eight surgical principles, including proper apposition and gentle handling of tissues, avoiding tension, decreasing dead space, abiding by aseptic principles, and hemostasis (Brunn, 2023). Hypothermia was prevented by placing the animals on a padded surface and supplied with extra bedding or supplemental heat, as needed, by taking care to prevent thermal burns and hyperthermia. Surgical records were obtained for each surgical patient and parameters such as body temperature, respiratory pattern, heart rate, mucous membrane color, and capillary refill time protective reflexes were recorded every 10 minutes. Drugs administered, dosages, routes of administration and all complications that arose during the procedure were also recorded in each surgical patient's case book.

2.6.3 Postoperative management and follow-up

Animals were visited daily at the clinic for 3-5 days and antiseptic dressing of the surgical wound was applied. The owners were encouraged to maintain the animals in hygienic clean comfortable places. An appropriate course of analgesia (tramadol @ 1 mg/kg), disinfectant (2% iodine solution and topical cyclo spray), antibiotic and supportive therapy (oxytetracycline 10%, antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (Pro&Strep; Hebei Yuanzheng Pharmaceutical Co., Ltd.) at 1 ml/25 kg, 300,000 IU/ml, procaine penicillin, 4 mg/ml dexamethasone, 0.9% NaCl or lactated Ringer's and multivitamin complex) were given until complete recovery. The skin stitches were removed within 8-17 days postoperatively. Postoperative follow-up was performed in all patients via telephone communication with the family veterinarian and/or during a home visit.

2.6.4 Outcome and prognosis

The outcome was recorded as a good prognosis whenever the operated animal survived and a poor prognosis whenever the operated animal died. Additionally, the animals were recorded as having successfully recovered, and the wounds were healed successfully upon the restoration of

function, the recovery of organs, which is based on cells and tissues regaining biological integrity by healing from wounds; when no infection was present, the presence of new epithelium around the wound edge, epithelization, neovascularization and contraction with normal physiological parameters and a normal appetite was observed.

3. COMPILED CASE REPORTS ON MINOR AND MAJOR SURGICAL CASES ON DIFFERENT SPECIES OF DOMESTIC ANIMAL PATIENTS

3.1 Case Reports on Cattle

3.1.1 Surgical management of dystocia in cow

Abstract

Dystocia arises from maternal and calf physical factors. Dystocia can be relieved by different obstetric methods, including cesarean section and fetotomy. Cesarean section is widely used as an emergency operative technique for the surgical delivery of cows affected by dystocia. There are three main goals in performing cesarean section: for the survival of the dam, for the survival of the fetus, and for the maintenance of fertility. The owner was brought an eight-year-old local breed cow weighing 200 kg at Jimma University, a Veterinary Open air Clinic with a history of difficulty in birth that lasted for 12 hours. The cow was placed in right lateral recumbency with the aid of personnel rope casting, and after the surgical site was prepared aseptically, the cow was anesthetized via the inverted L-block technique using 2% lidocaine hydrochloride. Part of the gravid uterus containing the fetus was exteriorized following a flank incision. Then, a linear incision was made on the least vascular area of the uterus, and a live fetus was removed. Then, all incised uterine and layers were sutured properly. However, surgery was performed after difficulty of natural delivery in the present case. The animal recovered without profound complications, except for local swelling and surgical site inflammation, which regressed within 4-5 days. The wound had completely healed by the 30th day. In conclusion, the successful recovery of the patient in the current case might be related to proper aseptic procedures followed during case handling and good postoperative care given after the procedure. The owner was also advised to provide good nutrition and good management to facilitate wound healing.

Keywords: *Cesarean section, Cow, Dystocia, Maternal factors, Obstetric technique*

Introduction

Dystocia is defined as an abnormal and difficult birth in which the first or especially the second stage of parturition is markedly prolonged and subsequently found impossible for the dam to deliver without artificial aid (Adugna *et al.*, 2022). The causes of dystocia are divided into maternal and fetal causes. Maternal causes of dystocia arise from maternal-related factors such as improper cervical dilation, failure of uterine expulsive contraction, and neoplasms of the vagina, vulva, and uterus (Weldeyohanes & Fesseha, 2020). The most common fetal-related causes of dystocia are head deviation, forelimb flexion, breech presentation, dog-sitting position, and fetal malformations, as well as hydrocephalus, ascites, anasarca, and hydrothorax (Ismail, 2017). The pelvic size at birth is affected by the size of the fetus and the fatness of the dam, which might partially obstruct the birth canal (Abdela & Ahmed, 2016). The physical factors of a calf, such as a calf that is too large or mal-present, contribute to a mismatch between the size of the calf and the birth canal of the dam. These morphological factors also depend on different variables, including age, breed, and parity of the dam, twinning, the sex and weight of the calf, the sire and breed of the calf, and the nutrition of the dam during gestation (Hossein-Zadeh, 2013).

A lack of uterine contractions, incomplete dilation of the cervix and vagina due to stenosis (narrowing and stiffening of the tissue), and uterine torsion are other causes of dystocia (Abdela & Ahmed, 2016). Hormonal imbalances may reduce the expression of oxytocin receptors in the uterus, resulting in weak uterine contractions and weak dilatation of soft tissues. Dystocia can be relieved by different obstetric methods, including cesarean section and fetotomy. Currently, the cesarean operation is one of the most common surgical procedures performed by veterinarians and is considered a routine obstetric technique (Vermunt, 2008). It has high maternal and fetal survival rates and is often less exhausting, faster, and safer than fetotomy. Fetotomy should be considered only when the fetus is known to have died. Fetotomy is performed using the embryotome or the fetotome (Yeturi *et al.*, 2017). Forced extraction/traction during delivery may cause severe trauma to the dam and the fetus (Mekonnen & Moges, 2016). There are three main goals in performing cesarean section: for the survival of the dam, for the survival of the fetus, and for the maintenance of fertility.

A prompt decision to perform a cesarean operation is important for optimum success. Ideally, it is carried out when a live calf cannot be delivered after 15-20 minutes of manipulation.

Patient history and physical examination

The owner was an eight-year-old local breed cow weighing 200 kg in its first parity to the Jimma University Veterinary Open air Clinic with a history of straining for 12 hours for parturition. There was a ruptured fetal membrane 12 hours before the presentation, and there was vaginal discharge. On clinical examination, the cow was standing and restless. The cow was straining, but no progress could be seen. Peri-vaginal examination revealed that the fetus had lateral head deviation, and the forelimbs of the calf were not detected in the birth canal. Manual traction of the fetus was very difficult due to the abnormal posture and narrow pelvis of the cow. The above findings and a history of training for more than 12 hours without any progress confirmed that dystocia was related to a narrow pelvic canal. Thus, an appraisal of the presented case indicated the need for emergency surgery, and a decision was made for surgical intervention to perform a cesarean section and save the life of the fetus and the dam.

Preoperative preparation of patients

Cows were immobilized by using a physical restraint method by casting the animals on the ground. Then, the left paralumbar fossa area was prepared aseptically by washing it with soap and tap water. The hair was shaved from the skin that covers the left paralumbar fossa area. Then, the area was again washed with an antiseptic solution (savlon) to remove any hair. Finally, the surgical site was scrubbed with 2% povidone iodine in a circular manner starting from the center to allow it to be removed and made ready for aseptic surgery. The cows were administered broad-spectrum antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (Pro&Strep; Hebei Yuanzheng Pharmaceutical Co., Ltd.) at 1 ml/25 kg intramuscularly as a prophylactic.

Anesthesia and animal control

The cow was placed in right lateral recumbency with the aid of personnel rope casting, and the surgical site was anesthetized by inverted L-block local analgesia using 2% lidocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd., India) at a dose of 10 mg/kg

body weight in the lower left paralumbar fossa. The surgical site was draped in a single position without any movement and secured to the skin with towel forceps. Finally, the surgical site was given a final scrub with 2% povidone iodine before proceeding to surgery.

Surgical procedure

After the surgical site was prepared aseptically and appropriate analgesia was achieved, a flank laparotomy was performed by incising the skin on the left oblique celiotomy (Figure 2A). The subcutaneous fascia was bluntly dissected using blunt Mayo scissors. The three abdominal muscles were gently incised using a scalpel blade. The peritoneum was grasped by using serrated tissue forceps and tented. Then, a small incision was made on the peritoneum using a scalpel blade. Finally, two fingers were inserted through the small incision, the peritoneum was tented up to extend the incision between the two fingers down and up by using blunt Mayo scissors and the abdominal contents were exposed. To control bleeding, simple swabbing, ligation, and twisting of blood vessels with hemostatic forceps were performed depending on the size of the blood vessel and the amount of blood oozing out to obtain a very clean surgical field. After the gloved hand was inserted through the incision, the gravid uterus was removed, and the surgical field was gently removed. Then, the uterus was swapped with gauze, and an incision was made on the greater curvature parallel to the blood vessel. After the incision of the uterus was completed, the live fetus was removed (Figure 2B). Independent transfixation of the umbilical cord was performed by using absorbable suture material (Chromic surgical cut gut 2-0). The uterus was lavaged externally with warm normal saline. Then, the uterus was sutured with a continuous inverting pattern (Cushing) followed by a Lembert suture pattern (Figure 2C). After the suturing of the uterus was completed, any bleeding was checked, and the uterus was cleaned and returned to the abdominal cavity. Finally, the surgical field was cleaned, the muscles were sutured in two layers, the peritoneum and transverse abdominus muscle, together, and the external and internal oblique muscles were sutured in a continuous ford interlocking suture pattern using chromic catgut 2-0 (Figure 2D). The skin and subcutaneous tissue were closed with cross-mattress sutures using silk sutures. Immediately after surgery, the dam licked her calf (Figure 2E).



Figure 2: Surgical management of dystocia in local breed cow

(A) A ventral left flank oblique skin incision was made, (B) the live fetus was removed, (C) the uterine wall was closed, (D) the peritoneum and all abdominal muscles were closed, (E) the newborn calf and dam were normal after the completion of C-section, and (F) the surgical suture was removed after the 15th day.

Postoperative care and complications

Postoperative treatment included the administration of an antibiotic combination of Procaine penicillin G and dihydrostreptomycin sulfate @ 1 ml/20 kg (Pro&Strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) through the I.M. for five consecutive days. The wound was properly dressed with 2% povidone-iodine solution, and an oxytetracycline HCL spray (Oxy Viocid 3.58% (w/w)) (manufactured by Provet Veterinary Products Industry, and Tic. Inc. Ankara, Turkey) was applied for five consecutive days. The animal recovered without profound complications, except for local swelling and surgical site inflammation, which regressed within 4-5 days. Finally, the skin sutures were removed on the fifteenth postoperative day. The wound completely healed on the 30th day, and there was a good prognosis (Figure 2F).

Discussion

Cesarean section is widely used as an emergency operative technique for the surgical delivery of cows affected by dystocia (Kumar & Purohit, 2022). In the present cases, surgery was performed within 12 hours after a natural delivery failure. Thus, the duration of surgical intervention determines the chances of survival of both the dam and calf. The recumbent left oblique celiotomy approach under inverted L-block local analgesia using 2% lidocaine hydrochloride at the lower left paralumbar fossa was used previously. This approach readily permits easy manipulation and exteriorization of the uterus, making it suitable for the exteriorization of very large calves (Schultz *et al.*, 2008). There is a significantly lower risk of herniation or evisceration, and this approach does not require much more assistance than a standard standing left approach. However, the upper left flank approach for exteriorization of the uterus is often difficult because the gravid uterus falls away from the incision, and wound closure is more difficult due to increased tension on the muscle layers. In the present case, cesarean sections were obtained since the cows failed to expel the fetus.

Common complications associated with cesarean section include peritonitis, hemorrhage, and wound dehiscence. In the present case, such complications were not recorded except for local swelling and surgical site inflammation, which regressed within 4-5 days, and the patient fully recovered 15 days postoperatively. The wound had completely healed by the 30th day. In conclusion, the successful recovery of the patient in the current case might be related to proper aseptic procedures followed during case handling and good postoperative care given after the procedure. The owner was also advised to provide good nutrition and good management to facilitate wound healing.

3.1.2 Surgical management of ventral abdominal hernia an ox

Abstract

Hernias have several effects on affected animals, such as lowering productivity, pain, anorexia, weight loss, or dystocia when a gravid horn is herniated. Hernias of the abdominal wall are common in all domestic species. Surgical repair of large and complex hernias may require supporting material (hernioplast) mesh. A ventral abdominal hernia is acquired in nature and is

more common in older patients than in younger patients. In the present case, an eight-year-old local ox breed with a history of horn thrust injury and large palpable swelling at the right ventral abdominal region was brought to the Veterinary Open air Clinic of Jimma University. According to the physical examination findings, there was no pain or reducible hernia content and a wide hernial ring in the ventral abdominal region. Based on the patient's medical history and physical examination, the patient was diagnosed with a ventral abdominal hernia, and the surgical site was prepared aseptically. Therefore, open herniorrhaphy was performed under local infiltration anesthesia and sedation to obliterate the hernia sac. Following successful hernia replacement, seroma and excessive postoperative swelling occurred as postoperative complications. Postoperatively, antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) at 1 ml/25 kg were administered, and an oxytetracycline HCL spray was applied to the wound for five consecutive days. The suture was removed after 14 days, and good progress was achieved on the 30th day. In conclusion, early diagnosis and treatment of ventral abdominal hernia were performed to improve the patient prognosis and prevent the adhesion of contents to the sac. The owner should feed the patient only light feed for up to 8 days after surgery. After that day, the amount of other feed was reduced by half for approximately five days.

Keywords: *Ox, Overlapping, Reducible, Ventral abdominal hernia*

Introduction

Surgical disorder of the digestive tract in ruminants are numerous and represent a major clinical problem, and abdominal surgery generally constitutes the single largest group of operations carried out in ruminants (Dwibedy *et al.*, 2018). Hernia is the protrusion of the body cavity through a defect in the body wall (Procter *et al.*, 2009). This may be due to accidental or normal anatomical opening, which does not completely fulfill its physiological function. A typical hernia always consists of the hernia ring, hernia sac, and hernia content. The hernia sac is usually made up of the skin, muscle fibers, or fibrinous connective tissue and sometimes the peritoneum, while the hernia content may be a loop of intestine, omentum, peritoneal fluid, urinary bladder, stomach, or the gravid uterus. Hernias may be acquired or congenital, and when congenital, they are inherited as a dominant characteristic (Tanko *et al.*, 2015). This can be caused by many factors, such as horn goring, falls, kicks, automobile accidents, and increased intra-abdominal

pressure. Factors such as wound dehiscence, obesity, the weight of the rumen, continuous standing on slopping rumps, naval infections, and pregnancy generally predisposes the animals to hernia. Depending on the anatomical site of herniation, hernias can be classified as external (ventral, umbilical, inguinal, scrotal, perineal, or femoral) or internal (diaphragmatic). Hernias have several effects on affected animals, such as lowering productivity, causing pain, anorexia, weight loss, or dystocia when a gravid horn is herniated (Fesseha & Kidanemariam, 2020). The common risk factors for developing hernia are sex (scrotal hernia), age difference (umbilical and perineal hernia), and animal management system (ventral hernia). Hernias of the abdominal wall are common in all domestic species. When the hernia ring puts pressure on the mesentery and obstructs the blood vessels and cuts blood supplies to the contents of the hernia, necrosis and gangrene occur.

Surgical repair of large and complex hernias may require supporting material (hernioplast) mesh. Using mesh provides additional support to weakened or damaged tissue. Hernia should be differentiated from abscesses, tumors, hematomas, and cysts (Hassen *et al.*, 2017). Abscesses, tumors, and cysts develop slowly, whereas hernias occur suddenly. Unilateral ventral hernias commonly occur in ruminants on the right side of the abdominal floor and occur infrequently in advanced pregnancy in cows, sheep, and goats. These kinds of hernias are usually due to trauma, the increased weight of the gravid uterus and fetus, and possibly due to other changes, such as a weak abdominal floor, characterized by unilateral ventral sagging of the abdominal floor. Conditions such as hydrothorax, aspiration pneumonia, cardiac diseases, and foreign bodies in the esophagus should be differentiated from diaphragmatic hernia by lateral and ventrodorsal radiography of the thorax. A ventral abdominal hernia is acquired in nature and is more common in older patients than in younger patients (Amare & Haben, 2020). The incidence of abdominal hernias was greater in females than in males. Hernia is commonly treated surgically in domestic animals (Farman *et al.*, 2018). In this case report, successful surgical treatment of a ventral abdominal hernia caused by a horn thrust injury in the ox was reported.

Patient history and physical examination

An 8-year-old local breed ox weighing 250 kg was brought to the Veterinary Open air Clinic of JUCAVM; with a history of horn thrust injury and large palpable swelling in the right ventral abdominal region. The owner also complained that the swelling in the ventral abdomen had increased over time since one month had passed (Figure 3A). When the animal was examined while it was in dorsal recumbency, the hernial ring was appreciated just ventral to the abdomen of the ox. A small, lacerated wound in the right ventral abdomen was observed. When attempts were made to feel the swollen part with the finger, it was found to be reducible. On physical examination, nonpainful and reducible hernial content was detected, and a wide hernial ring was observed on the ventral abdominal region. All vital signs were within the normal range. The patient was diagnosed with a ventral abdominal hernia involving excessive enlargement of the ventral abdominal wall. The animals were fed and ruminated regularly.

Preoperative preparation of patients

One day prior to surgery, the owner was advised to keep the ox off feed for 24 hours and water for 12 hours. After proper ox immobilization via a physical method, the surgical site after swelling and its adjacent parts were aseptically prepared by washing with soap and tap water followed by shaving of the hair. Then, the area was again washed with an antiseptic solution (savlon) to remove any hair. Finally, the surgical site was scrubbed with 2% povidone iodine in a circular manner starting from the center to the peripheral area.

Anesthesia and animal control

The ox was physically controlled in the dorsal recumbent position with the aid of rope casting on the ground. Field block anesthesia was induced by infiltration of walls with 2% lidocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd. India) at a dose of 10 mg/kg body weight enclosing the hernial borders.

Surgical procedure

After the surgical site was prepared aseptically and appropriate analgesia was achieved, two elliptical skin incisions were made on either side of the ring (Figure 3B). The skin was bluntly dissected from the underlying tissues, and the incision was continued through the abdominal

muscle to expose and open the hernial sac. Following blunt dissection of the skin and subcutaneous tissue, the condition of the hernial sac and wide hernia ring was examined to confirm any adhesions in the abdominal organs (Figure 3C). There were no adhesions, and the contents were pushed back to the abdominal cavity. Then, the diameter of the hernial ring was measured, and a portion of the sac was carefully incised at the junction of the body wall and the sac. Finally, the edges of the hernial rings were exposed and freshened before closure. Thus, the hernial ring was closed with overlapping sutures in a horizontal mattress pattern between the hernia ring and abdominal wall by using sterile silk, and the muscle and subcutaneous tissue were closed with a lockstitch pattern by using sterile absorbable chromic catgut suture material (size no. 2-0). During subcutaneous and muscle layer suturing with the lock stitch pattern, proper care was taken to avoid the formation of excessive dead space (Figure 3E). After that, the skin edges were closed with a horizontal cross mattress suture with silk (Figure 3D).



Figure 3: Surgical management of ventral abdominal hernia in ox

(A) Presented animal with ventral abdominal hernia, (B) elliptical skin incision over herniated in progress, (C) obliteration of hernia sac and hernia ring, (D) closing of hernia ring in progress, (E) closing of skin on progression and (F) fully recovered animals on the 30th day

Postoperative care and complications

The wound was observed daily to determine whether swelling or discharge had developed. Proper postoperative care with antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (Pro&Strep; Hebei Yuanzheng Pharmaceutical Co., Ltd. China) at 1 ml/25 kg were administered, and an oxytetracycline (HCL) spray was applied to the wounds for five consecutive days. Analgesic pain management was given using tramadol hydrochloride (manufactured by Human Well Pharmaceutical Plc. Ethiopia) at 2 mg/kg for two consecutive days. Since the operation took a long time, bloat was observed during and at the end of the operation. Complications in ox-treated patients who underwent surgery for ventral abdominal hernia included seroma and excessive postoperative swelling. The suture was removed after 14 postoperative days, and good progress was achieved on the 30th day (Figure 3F).

Discussion

Hernias may be congenital or acquired, and they may occur as isolated defects or may be associated with defects in other parts of the body (caused by a tear in the abdominal wall) (Tanko *et al.*, 2015). The results of the present case report indicated that the patient had acquired a ventral abdominal hernia in ox. Hernias have several deleterious effects, such as lowering the productivity and reproductivity of affected animals. Any trauma caused by a kick in the horse, horn thrust in cattle or small ruminants, or violent contact with blunt objects in the abdominal cavity may lead to weakening of the abdominal muscles, leading to ventral hernia. Ventral hernia is commonly observed in the ventral abdominal wall near the midline, and the size of the hernia opening varies in diameter, and the nature of the hernia contents depends on the site of the herniation (Fesseha & Kidanemariam, 2020). A similar location was also noted in the present case, and there was a large hernial ring through which the abdominal viscera protruded, especially through mild adhesions, and the muscles around the protrude area were affected by the mass in this case. There are many treatment options for ventral abdominal hernia that depend on the size of the hernia opening (Fesseha & Kidanemariam, 2020). The application of bandages, clamps, or ligatures may be helpful in a few cases where the hernial ring is small, and surgical intervention (herniorrhaphy) is useful in the case of large hernia opening. Skin incisions over the hernia sacs were made, and the hernial ring was closed by direct suture approximation of the local tissues. Knowledge of the anatomy of the area is necessary so that sutures can be placed in

specific anatomical structures that have sufficient holding power to resist disruption. A large hernia requires safe closure to avoid wound dehiscence, recurrent hernias, and no healing of the wound due to tissue ischemia with the sutures cutting through the soft tissue. When a large defect makes the approximation of local tissue impossible without tension, prosthetic implants are used. The most commonly used synthetic material is a monofilament plastic mesh made of polypropylene or polyethylene, which is well tolerated in wounds, does not disintegrate with age, and can stretch in two directions to distribute the load more evenly. A common complication after hernia repair is swelling at the surgical site.

Most of the time, hernias are often ignored by farmers until serious problems arise, which increases the difficulty of determining the prognosis of ventral abdominal hernia repair without hernioplasty. Although the exact cause of the hernia in the present case could not be traced, it could have occurred due to a gore by horn, as there was no open injury at the site of the hernia. Complications in ox-treated patients who underwent surgery for ventral abdominal hernia included seroma and excessive postoperative swelling. All animals recovered satisfactorily except for those with the abovementioned complications (Farman *et al.*, 2018). Due to the absence of incarceration and intestinal perforation in this reported case, the prognosis was evaluated to be good. In contrast, Farman *et al.* (2018) reported uncomplicated surgical management of ventral abdominal hernias in cattle.

In conclusion, early diagnosis and treatment of ventral abdominal hernia were performed to improve patient prognosis and prevent the adhesion of contents to the sac. The owner should feed the patient only light feed for up to 8 days after surgery. After that day, the amount of other feed was reduced by half for approximately five days.

3.1.3 Surgical management of umbilical hernia in a calf local breed

Abstract

An umbilical hernia is a condition in which abdominal contents protrude through a weakened area of the body wall of the umbilical region and is frequently observed in young calves. The research confirmed that umbilical hernias usually accrue in calves due to failure to close the

umbilical cord. This case reports the successful surgical management of a congenital umbilical hernia in a male bovine calf. A three-month-old male calf weighing approximately 30 kg, with a history of swelling in the umbilical region from birth for the last few months, presented at the Jimma University Veterinary Open air Clinic. The patient was diagnosed with hernia by case history, inspection, and palpation. All the other physiological parameters were within the normal range. Prior to surgery, the prepared surgical area was anesthetized with 2% lidocaine hydrochloride at a dose of 10 mg/kg body weight. The condition was corrected using the herniorrhaphy procedure, and the patient was treated with antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) @ 1 ml/25 kg IM for five consecutive days after the operation. The calf recovered without any postoperative complications or recurrence after two weeks of surgery. This case report discusses the successful management of an umbilical hernia. In conclusion, surgical correction, along with the administration of antibiotics, and anti-inflammatory medication, is effective for preventing infection, managing pain, and reducing inflammation for the successful management of umbilical hernia. The owner was advised to closely monitor the calf to perform exercise and provide good nutrition to facilitate wound healing.

Keywords: *Calf, Hernia, Herniorrhaphy, Umbilical*

Introduction

A hernia is the protrusion or displacement of an organ, part of an organ, or tissue outside the abdominal cavity through an abnormal opening in the abdominal wall, which can be noted from the outside of an animal's body and can be detected with an external examination (Yasin, 2017). There are different types of hernias in small and large animals that can be classified according to the following: the anatomical site of herniation (ventral or lateral abdominal hernia, diaphragmatic, inguinal or scrotal, umbilical, perennial, pelvic and femoral hernia); the cause of hernia (congenital verses acquired hernia); the type of herniated tissue, such as enterocele (containing a portion of the intestine), epiplocele or omentocoele (of the omentum), enteroepiplocele (of the intestine and omentum), Gastrocele (of the stomach), vesicocoele (of the bladder), hepatocoele (of the liver), or hysterocoele (of the uterus); and the presence of an external or internal hernia (Suryawanshi *et al.*, 2019). An umbilical hernia is the most common form of

congenital hernia in calves (Akter, 2023). However, many umbilical hernias are secondary to umbilical sepsis. An umbilical hernia is caused by the failure of the abdominal musculature to close properly around the umbilical structures; however, the mechanism or reasons for closure failure are not known (Haben Fesseha, 2020). In addition, heritable factors, inflammation and sepsis of the umbilicus, post-calving infection of umbilical infection, breakage of the umbilicus during manual traction of the fetus, external trauma to the umbilicus, excessive straining, cloned calves (less collagen in the ventral abdominal wall), hypoplasia of the abdominal musculature, and multiple births (twins, triplets, *etc.*) are considered the cause and predisposing factors for umbilical hernia.

According to previous reports, umbilical hernia occurs more frequently in the Holstein Friesian breed calves (Haben Fesseha, 2020). However, it can occur in any breed of cattle. Males are much more frequently affected than females (Salim *et al.*, 2015). An umbilical hernia can be symptomatic or asymptomatic upon clinical presentation and is usually observed shortly after birth. In addition, it is usually painless if it involves non-strangulated or noninfected hernias. Umbilical hernia can be divided into three categories: uncomplicated umbilical hernia, umbilical hernia with subcutaneous infection (abscess), and umbilical hernia with umbilical remnant infection. The omentum, small intestine, or abomasum, are the most common contents that appear in most cases of umbilical hernia. The size and shape of the hernial ring vary from a ring diameter of less than 2 cm to 2-5 cm to a ring diameter greater than 5 cm (Haben Fesseha, 2020). Moreover, the nature of the umbilical ring determines the degree of fibrosis and the possibility of suture retention. The condition can be easily diagnosed by observing clinical signs through external digital palpation and ultrasonography (especially for non-reducible hernias to identify contents of the hernial sac and differentiate it from umbilical abscessation). It can be managed using various medical and surgical methods. The prognosis depends on the type and condition of the hernia. In addition, early diagnosis and treatment of the condition improve the outcome of umbilical hernia. The umbilical hernia should be differentiated from disease conditions such as omphalitis, omphaloarteritis, omphaloarteritis or phlebitis, omphalophlebitis, acquired hernia, rupture of the abdominal wall, umbilical abscess and urachal cysts or rupture (Haben Fesseha, 2020). Most hernias enlarge over time, and if not repaired surgically, they may cause pain, anorexia, and weight loss, or they may cause dystocia when a gravid horn is found in the hernial

sac. Thus, open herniorrhaphy surgery is the best option for the majority of symptomatic or asymptomatic umbilical hernias and is one of the most common surgical procedures performed (Henriksen *et al.*, 2020). The present case report describes the successful management of an umbilical hernia in a local breed calf.

Patient history and physical examination

A three-month-old male local breed calf weighing 30 kg, with a history of swelling around the umbilical cord since birth and an increase in size over the last few months, was brought to the Jimma University Veterinary Open air Clinic. On clinical examination, the calf had no pain upon palpation of the swelling, the swelling was reduced, the calf protruded approximately 8 cm from the umbilicus, and the hernial ring of approximately three fingers could be easily palpated (Figure 4A). Her clinical parameters, such as rectal temperature, heart rate, and respiratory rate, were within normal ranges, and her body condition was good. Based on the clinical examination, the patient was diagnosed with an umbilical hernia, and an open herniorrhaphy procedure was planned.

Preoperative preparation of patients

Food was withheld for 24 hours, and water was available for 8 hours before surgery. After the calf was restrained physically by the assistants in the dorsal position, the surgical site (umbilical area) was aseptically prepared by clipping, shaving, scrubbing with 2% povidone iodine and draping using a sterile surgical towel. The site was finally painted with 2% povidone iodine.

Anesthesia and animal control

After aseptic preparation of the surgical site, local anesthesia was induced via a ring block at the incision site by injecting 2% lidocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd., India) at a dose of 10 mg/kg body weight.

Surgical procedure

After aseptic preparation of the surgical site and restraint of the animal in the dorsal position, elliptical skin incisions were made around the base of the swelling site (Figure 4B), and the

eviscerated part of the small intestine was introduced back into the abdominal cavity through manual manipulation. There were no adhesions, and the contents were replaced into the abdominal cavity. The hernial ring was exposed and freshened before suturing (Figure 4C) and finally closed by placing a series of overlapping mayo-mattress sutures through its edges using no. 2 silk (Figure 4D). The subcutaneous tissues were then sutured using no. 2-0 chromic catgut with a simple continuous suture pattern. The skin flaps were opposed by a simple interrupted suture pattern using no. 2 silk (Figure 4E), and the surgical site was properly cleaned and dressed with a 2% povidone iodine solution.



Figure 4: Surgical management of umbilical hernia in local breed calf

(A) Clinical presentation of large swelling at the umbilical region of a calf, (B) Elliptical skin incisions were made on the swollen area, (C) The hernia sac was exposed after the incision was made, (D) Overlapping Mayo-Mattress sutures were placed on the hernial ring, (E) Simple interrupted sutures were placed to close the skin incision after the placement of subcutaneous sutures, and (F) Postsurgical presentation of corrected hernia.

Postoperative care and complications

Postoperatively, the wound was dressed using a 2% povidone-iodine solution. In addition, the calf was kept on broad-spectrum antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (Pro&Strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) at 1 ml/25 kg was given intramuscularly for five consecutive days, and tramadol hydrochloride (manufactured by: Human Well Pharmaceutical PLC., Ethiopia) at 2 mg/kg IM for two consecutive days. Oxytetracycline HCL sprays (Oxy Viocid 3.58% (w/w)) (manufactured by the Provet Veterinary Products industry and Tic. Inc. Ankara, Turkey) was also applied over the wound area for five consecutive days. Complete healing was recorded on the 14th day post operation without recurrence or other complications. There was good postsurgical resolution of the corrected calf hernia (Figure 4F). Finally, the skin sutures were removed on the 14th postoperative day.

Discussion

Hernias have different congenital and acquired causes that have several deleterious effects, such as lowering the productivity and reproductivity of the affected animals (Amare & Haben, 2020). Hernias, either congenital or acquired, may occur independently or are associated with defects in other body parts (Doijode, 2019). The umbilicus in newborn calves consists of the urachus (a tube that attaches the fetal bladder to the placental sac) and the remnants of the umbilical vessels that transport blood between the fetus and its mother. Umbilical hernias are quite commonly observed in young calves (Haben Fesseha, 2020). Mostly, umbilical hernias are congenital, and congenital umbilical hernias were reported in the present case. Similarly, in the current case report, congenital umbilical hernia was presented in a young local breed calf with a three-finger breadth. Hernias are composed of the hernia sac and peritoneum and may contain peritoneal fluid and viscera (Hassen *et al.*, 2017). Hernias may be small at birth and enlarge with age and should be differentiated from umbilical sepsis. The umbilical opening in the calf should be closed a few days after birth. Failure of this opening to close properly results in an umbilical hernia, and its cause might be either congenital or acquired factors that hamper this closure, such as omphalitis or abscesses (Akter, 2023). Roberts (1999) described the predisposing cause of hernia as imperfect closure of an embryonic defect, e.g., imperfect closure of the umbilicus predisposing patients to an umbilical hernia, and imperfect formation of the diaphragm predisposing patients to diaphragmatic hernia. Venugopalan (2000) reported that the predisposing cause of hernia is

weakness of the abdominal wall due to contusions, local inflammation, etc. Umbilical hernia can be managed using different treatment options depending on the size of the hernial ring (Sutradhar *et al.*, 2023). Smaller hernial rings can be easily managed through the application of bandages, clamps, or ligatures. The goal of surgical repair is to obliterate the hernia sac and repair the defect in the abdominal wall (Earle & McLellan, 2013). Local or regional anesthesia is safe and effective and is still the most desirable procedure in many situations. The present case report indicates that local infiltration anesthesia with 2% lidocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd., India) at a dose of 10 mg/kg body weight was sufficient for surgical repair.

In this case report, the umbilical hernia was corrected using an open herniorrhaphy procedure with an overlapping pattern, and nonabsorbable (silk) suture materials were used for correction. Complications may develop in congenital umbilical hernias, which can significantly increase the complexity and expense of repair. In this case report, there was no accumulation of fluid postoperatively because proper drainage was provided. There were no postoperative complications, and the calf showed good recovery within a few days. The results of this case report suggest that open herniorrhaphy may be a suitable and satisfactory surgical treatment for reducible umbilical hernias in bovine calves. In conclusion, surgical correction, along with the administration of antibiotics, and anti-inflammatory medication, is effective for preventing infection, managing pain, and reducing inflammation for the successful management of umbilical hernia. Delayed response and ineffective treatment may lead to serious complications, which may ultimately lead to the death of the animal. The owner was advised to closely monitor the calf to perform exercise and provide good nutrition to facilitate wound healing.

3.1.4 Surgical management of rumen impaction in cow

Abstract

Rumen impaction due to metallic or nonmetallic foreign bodies is among the most common causes of gastrointestinal disorders in ruminants. The ingestion and lodging of foreign bodies are common in bovines, primarily due to their indiscriminate feeding habits. Animals with nutritional deficiencies may also ingest various types of foreign bodies deliberately. An eight-year-old local breed cow weighing 200 kg was brought to the Jimma University Veterinary

Open-air Clinic with a history of plowing, and both the right and left abdomen showed pendulous distention and loss of appetite. Rumenotomy is a routine procedure for the removal of foreign bodies that obstruct the reticulo-omasal orifice. The cow was placed in right lateral recumbency with the aid of personnel rope casting, and the surgical site was anesthetized by inverted L-block local analgesia using 2% lidocaine hydrochloride. A skin incision was made at the midpoint of the tuber coxae and ventral to the transverse process of the lumbar vertebrae. The rumen was exteriorized, fixed to the skin, and incised. After foreign material removed the edge of the rumen was cleaned and sutured with 2/0 chromic catgut first by Cushing suturing and finally by the Lembert suture pattern. After all the muscle was sutured, the skin was sutured by interrupted cross-stitch mattress suture using silk suture. The cow was administered broad-spectrum antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) at 1 ml/25 kg with daily dressing of surgical wounds, and an oxytetracycline HCL spray (Oxy Viocid 3.58% (w/w)) was sprayed on the wound after the end of the procedure. Postoperative inability to stand, surgical site inflammation, bloating, and absence of rumen motility were the main complications encountered. Postoperatively, after 12 hours, the animal died. There was a poor prognosis.

Keywords: *Cow, Foreign body, Rumen impaction, Rumenotomy*

Introduction

Rumen impaction due to metallic or nonmetallic foreign bodies is among the most common causes of gastrointestinal disorders in ruminants (Zakir & Abdo, 2022). Due to the absence of garbage recycling industries, plastic materials are usually not disposed of in a correct manner; hence, they are eaten by grazing animals (Asa, 2016). These plastic bags are indigestible, and their accumulation in the rumen of grazing animals may lead to adverse effects on health. Ruminants are notorious for ingesting foreign bodies related to nutritional deficiencies and feeding management (Tesfaye & Chanie, 2012). Foreign bodies are the root causes of various problems in different organs of animals. The entry and migration of foreign bodies through body tissues can lead to many complications based on the nature of the entrance of the foreign body into the tissues (Rafique, 2008). Reports from cattle and sheep reared in urban and suburban environments indicated that the impaction of the rumen from the accumulation of foreign bodies

such as plastic bags interferes with the flow of ingesta, leading to the distention of the rumen and the absence of defecation (Anwar *et al.*, 2013).

The bovine fore stomach is highly affected by ingested foreign bodies, which are the subject of attention worldwide and are of major economic importance due to severe loss of production and production ability and, in some cases, death of the animal (Priyanka & Dey, 2018). In addition, industrialization and mechanization of agriculture have further increased the incidence of foreign bodies in these animals. Their indiscriminate feeding habits and mineral deficiency make them susceptible to inadvertent ingestion of foreign materials (Sharda *et al.*, 2017).

Rumen impaction due to plastics, ropes, and leather in the rumen leads to anorexia, decreased production, and progressive loss of body condition (Fasil, 2016). Clinical rumen indigestible foreign body impaction is characterized by a pale mucous membrane, a reduction in milk yield, complete cessation of rumination, an impacted rumen, atony, reduced rumen motility, a lack of feces, and inappetence (Asrat & Velappa, 2016). The most common symptom observed in animals in plastic bags was bloat, which was characterized by abnormal bulging of the paralumbar fossa on the left side of the abdominal wall (Zahra, 2016).

Rumenotomy is a routine procedure for the removal of foreign bodies such as baling twine, nylon ropes, or plastic bags that obstruct the reticulo-omasal orifice (Asrat & Velappa, 2016). Carbohydrate engorgement frequently occurs in the rumen and can also be corrected by rumenotomy (Asrat & Velappa, 2016).

Patient history and physical examination

An eight-year-old local breed cow weighing 200 kg was brought to the Jimma University Veterinary Open-air Clinic with a history of plowing, and both the right and the left abdomen showed pendulous distention and loss of the appetite. The condition started to occur a couple of weeks ago. The animals were treated for approximately five days with the antibiotics and digestion powder for the abdominal distention. When the animal was observed for examination, the right and left abdominal distention and the scant feces were also observed. Additionally, the animal was recumbent and unable to stand. The contents of the rumen would therefore be excreted through the mouth and nose. When vital parameters were taken, there was a reduction

in temperature (350°C), the heart sounds were not properly recovered, the respiration was also slightly decreased (20 breaths/minute), and the mucous membrane was pale. The cow was slightly depressed. There was no ruminal motility, and when the distention was palpated, it was firm. A rumenotomy was performed to treat the patient for urgent treatment.

Preoperative preparation of patients

The upper left paralumbar fossa was washed with water, shaved with a blade, rinsed and scrubbed using iodine. The cows were provided with Ringer's lactate solution (manufactured by: Pharmacure Plc. Addis Ababa, Ethiopia) was secured through the jugular vein with an 18-gauge IV cannula @ 60 ml/kg/hr. Body weight was calculated at 5 drops/2 seconds before the operation and until substituting the total loss of fluid of the patient for 12 hours.

Anesthesia and Animal Control

The cow was placed in the right lateral region by personnel rope casting, and the surgical site was anesthetized by inverted L-block local analgesia using 2% lidocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd. India) at a dose of 10 mg/kg body weight at the left paralumbar fossa.

Surgical procedure

After the surgical site was prepared aseptically and appropriate analgesia was achieved, a skin incision was made at the midpoint of the tuber coxae and ventral to the transverse process of the lumbar vertebrae (Figure 5A). Other muscle layers and the peritoneum were incised in the direction of the skin incision. The rumen was exteriorized, fixed to the skin, and incised. When the content was removed, indigestible feed and different foreign materials, such as plastic bags, sack threads, and rope, were obtained (Figure 5B). The edge of the rumen was cleaned and sutured with 2/0 chromic catgut first by a Cushing suture pattern and finally by a Lembert suture pattern (Figure 5C). The suture used for fixing the rumen was removed, and the rumen was replaced. After changing the pair of gloves, the transverse abdominus muscle with the peritoneum and the two oblique muscles together were closed by a continuous horizontal mattress followed by a continuous lock stitch pattern in two layers using a no. 2/0 chromic catgut

(Figure 5D). The skin was sutured by interrupted cross-stitch mattress suture using silk suture (Figure 5E).

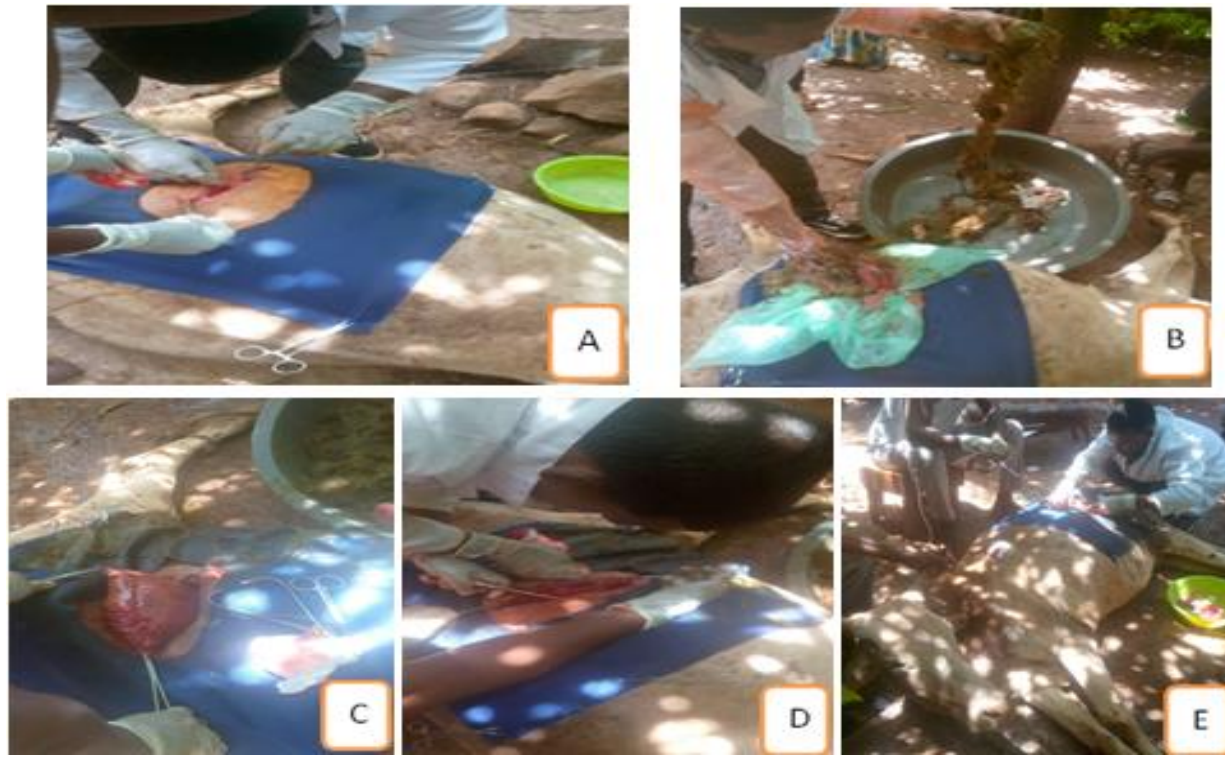


Figure 5: Surgical management of rumen impaction (rumenotomy) in cows

(A) Skin incision was made at the midpoint of the tuber coxae, (B) indigestible feed and different foreign materials, such as plastic bags, sack threads, and rope, were removed, (C) the rumen was sutured by using a 2/0 chromic cat gut, (D) the transverse abdominal muscle with the peritoneum was closed by a continuous horizontal mattress followed by a continuous lock stitch, and (E) the skin was sutured by using silk sutures.

Postoperative care and complications

The cows were administered broad-spectrum antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (Pro&Strep; Hebei Yuanzheng Pharmaceutical Co., Ltd.). China) at 1 ml/25 kg and an oxytetracycline HCL spray (Oxy Viocid 3.58% (w/w)) (manufactured by Provet Veterinary Products Industry and Tic. Inc., Ankara, Turkey) was sprayed on the wound after the end of the procedure. Postoperative absence of rumen motility and bloating were the most complications encountered. Postoperatively, after 12 hours, the cow died due to misdiagnosis and delay in treatment. There was a poor prognosis.

Discussion

The prominent clinical signs observed in the present case report were a pale mucous membrane, absence of rumination, and reduced rumen motility (Vanitha *et al.*, 2010). Depression was observed in the affected animal and rectal examination revealed pellet mucous-coated dung. The clinical signs noted in the present case report were reported by Vanitha *et al.*, 2010, Reddy & Sasikala (2012), and Reddy *et al.* (2014). Reduced body temperature and distention of the left side of the abdomen were also observed in the present case. Rumenotomy is the only effective method for treating plastic foreign bodies, but early diagnosis is essential for favorable outcomes. Similarly, rumenotomy was also conducted in this case report to remove indigestible foreign materials. Non penetrating foreign bodies such as plastic bags, ropes, and sack threads were observed in this case report.

The present case reports are supported by the reports of Vanitha *et al.*, 2010, Reddy & Sasikala (2012), and Reddy *et al.* (2014), as they also noted plastic bags, rope, and sack thread. This similar case might be due to the environment being polluted by the same types of waste materials. When the patient was observed for approximately 12 hours, a poor outcome associated with the most common postoperative complications, such as the absence of rumen motility, bloating, and surgical site inflammation, was observed. There was also phone contact with the owner and again to obtain information about the patient. After 12 hours, the cow died due to the delay in treatment. In conclusion, for this case report, there is a limitation of the use of radiology (ultrasound) to confirm an exact diagnosis for the decision of surgical treatment.

3.1.5 Surgical management of uterine prolapse in a cow

Abstract

Prolapse is the abnormal repositioning of an organ from its normal anatomical position. Two distinct types of prolapse occur in the reproductive tract of cattle: vaginal or uterine. Both types require medical attention and correction; however, the timing of occurrence and prognosis differ. Uterine prolapse involves partial or complete turning inside the organ, in which the inside comes to the outside through the lips of the vulva and hangs down, sometimes as far as the hocks. This case report aimed to describe uterine prolapse management in seven-year-old local breed cow weighing 200 kg an estimated and with first parity; these cows were admitted to the Jimma

University Veterinary Open air Clinic and had a history of normal large male calf parturition followed by uterine prolapse after 12 hours. Upon thorough physical examination, a reddish mass was removed from the vagina with complete eversion of the uterus exposing its fetal membranes and maternal caruncles underneath. The cow was restrained in the standing position, and caudal epidural anesthesia was induced by using 2% lidocaine HCl at a dose of @0.22 mg/kg body weight. After aseptically preparing the prolapsed mass and stabilizing the cow, the uterus was replaced. After repositioning into the pelvic cavity, temporary retention suturing of the vulva with 2-0 silk suture material in the form of a horizontal mattress suture with one stitch by leaving small diameter orifices for urination was performed to prevent recurrence. After finishing the procedure, the cow was treated with antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) at 1 ml/25 kg through the IM for five consecutive days. The cow recovered from surgery without recurrence and postoperative complications. Finally, the suture was removed after seven days of successful recovery. On the 15th day, the cow was rechecked, and appeared clinically normal.

Keywords: *Cow, Surgical correction, Uterine prolapse*

Introduction

Prolapse is the abnormal repositioning of an organ from its normal anatomical position. Pelvic organ prolapse (POP) is the abnormal downward descent of pelvic organs, i.e., the bladder, uterus, and/or rectum, resulting in a protrusion through the vagina (Mori da Cunha *et al.*, 2021). Two distinct types of prolapse occur in the reproductive tract of cattle: vaginal or uterine. Both types require medical attention and correction; however, the timing of occurrence and prognosis differ. Uterine prolapse involves partial or complete turning inside the organ, in which the inside comes to the outside through the lips of the vulva and hangs down, sometimes as far as the hocks (Arero, 2022). Uterine prolapse is one of the most potentially dangerous complications associated with calving and involves complete prolapse of the uterus, vagina, and cervix (Chakma, 2021). The etiology of uterine prolapse is unknown, but many factors have been associated with some predisposing factors, such as uterine atony, prolonged dystocia, forcible traction during parturition, hypocalcemia, fetal oversize, retained fetal membranes, and chronic disease (Chakma, 2021).

Uterine prolapse may be avoided by reducing predisposing factors. It can vary in size from approximately 18 inches to 3-4 feet in a large cow. The success of treatment depends on the status of the case, the duration of the case, and the degree of damage and contamination. Early intervention and correction of cases of prolapsed uterine tissue is vital for ensuring good patient prognosis and survival (Hasan *et al.*, 2020). Poor or delayed intervention may result in edema, mucosal trauma, bleeding, and contamination resulting in infection, shock, gangrene formation, and death. Uterine prolapse in cattle may be treated by reduction or amputation. Euthanasia is the only treatment in which hemorrhage or other factors can result in a state of irreversible shock. The correction of a prolapsed uterus usually involves disinfection and washing the organ, reducing the size of the organ if it is edematous with glycerol, returning the organ, and applying stay sutures (Buhner's sutures) (Chakma, 2021). This case report highlights the procedures and techniques used for the management and correction of clinical cases of uterine prolapse in local breed cows that had given birth 12 hours before.

Patient history and physical examination

A seven-year-old local breed cow weighing 200 kg was brought to the Jimma University Veterinary Open-air Clinic with a history of normal parturition. History also revealed that the normal large male calf was born before 12 hours. The owner also reported that he performed forcible traction of the calf during parturition. In the absence of additional organs such as the bladder, the entire uterine mass prolapsed, as shown in (Figure 6A). Upon thorough physical examination, a reddish mass was removed from the vagina with complete eversion of the uterus exposing its fetal membranes and maternal caruncles underneath. A part of the retained placenta strongly adhered to the ovarian pole of the gravid uterine horn. The animal was in a standing position and showed continuous strain (Figure 6A). A physical examination of vital systemic parameters was also carried out. Temperature was 37.90°C, heart rate was 65, and respiratory rate 35 breaths/min and pulse rate was 123 beats/min, which is within the normal clinical range. The ocular mucous membrane was pale, and the prolapsed uterus mass was swollen and stained with dung materials and debris. Based on the clinical examination, the patient was diagnosed with uterine prolapse and underwent surgical manipulation after the original location was replaced.

Preoperative preparations of patients

After stabilizing the cow, the surrounding area was washed with clean water and soap. The prolapsed mass was lifted upward above the level of the ischial arch, and then the mass was washed and cleaned with warm clean water, followed by a sterile physiological saline solution to remove the debris and dung materials (Figure 6B). Cold water and sugar solution were poured on the uterine surface to decrease the number of edemas and to reduce the volume of the prolapsed uterus (Figure 6B).

Anesthesia and animal control

The cow was restrained in the standing position, and caudal epidural anesthesia was induced by using 2% lidocaine HCl (Lignocaine Injection Bp; Sakar Healthcare Ltd. India) at a dosage of 0.22 mg/kg at the level of the first sacrococcygeal space into the epidural space to block the coccygeal and sacral nerves to desensitize the tail, anus, perineum, vulva and vagina. After allowing 10 minutes for the anesthetics to take effect, sensitivity around the perineal region was assessed by pricking with a needle while the patient was in a standing position. Then, the device was ready for manual repositioning to the pelvic cavity.

Surgical correction

After the animal was properly restrained and anesthetized, the partially attached retained fetal membranes were gently detached manually with fingertips from the maternal caruncles to avoid injury and bleeding. The uterus was inspected for tears and disinfected with iodine solution. Then, the uterus was replaced gradually, starting at the upper and lower portions of the vulval lips (Figure 6C). The prolapsed uterus was pushed into the vagina by manual pressure, and the vulval lips were removed. One hand was inserted into the tip of both uterine horns to ensure that no remaining invagination could incite abdominal straining and prolapse (Fig. 6D). Finally, the uterus returned to its normal anatomical position. To prevent further complications and secondary bacterial contamination, an intrauterine metronidazole solution was administered. After repositioning into the pelvic cavity, the cow was recumbent laterally, and temporary retention suturing of the vulva with 2-0 silk suture material in the form of a horizontal mattress suture with one stitch by leaving small diameter orifices for urination was performed to prevent recurrence (Figure 6E). Finally, the area was disinfected with iodine solution.



Figure 6: Surgical management of uterine prolapse in local breed cow

(A) The entire uterine mass was prolapsed, (B) the prolapsed mass was washed with cold sterile water and sugar solution, (C) the uterus was replaced, (D) one hand was inserted into the tip of both uterine horns to ensure that no remaining invagination occurred, (E) temporary retention suturing of the vulva was performed using size 2–0 silk in a horizontal mattress suture pattern, and (F) the suture was removed after seven days of successful recovery.

Postoperative care and complications

After finishing the procedure, the cows were treated with systemic broad-spectrum antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (Pro&Strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) at 1 ml/25 kg through IM for five consecutive days. A second caudal epidural anesthesia session was required because the animal started straining again after a few hours. The suture line was dressed with iodine solution every two days. Immediately after surgery, the cow exhibited normal defecation and urination. Finally, the suture was removed after seven days of successful recovery (Figure 6F). The cow recovered from surgery without recurrence and postoperative complications. On the 15th day, the cows were rechecked, and they appeared clinically normal.

Discussion

A uterine prolapse is considered a medical emergency. This condition is life-threatening, and to ensure a good patient prognosis, early intervention is needed. Delayed intervention usually results in a poor prognosis due to the risk of hemorrhage, shock, and death from blood loss. In the present case report, the case was reported within 12-16 hours after prolapse (Chakma, 2021). The goal in the treatment of uterine prolapse is a replacement of the organ followed by a method to maintain it in the retained position. Caudal epidural anesthesia with 2% lidocaine hydrochloride is essential before the replacement of a uterine prolapse because it decreases strain and desensitizes the perineum. The uterine prolapse can be replaced with an animal in the standing or recumbent position (Bante *et al.*, 2023). In the present case, the condition was corrected successfully while the patient was in a standing position. The replacement of the uterus was performed gradually, starting at the upper and lower portions of the vulval lips (Ramsingh *et al.*, 2013). The prolapsed uterus was pushed into the vagina by manual pressure, and the vulval lips were removed.

This case management protocol agrees with the authors. Once the uterus is replaced, the operator's hand should be inserted into the tip of both uterine horns to ensure that no remaining invagination can incite abdominal straining and prolapse. This may be because if the uterus is completely and fully replaced by the tips of the uterine horns, prolapse is unlikely to occur. An injectable broad-spectrum antibiotic once administered for five days after replacement of the prolapse prevents secondary bacterial infection so that animals with uterine prolapse that are properly managed can conceive again without problems. Additionally, Peter and King (2021) successfully treated a case of postpartum uterine prolapse along with placental retention in a cow by applying horizontal mattress sutures in sterile plastic with four holes around the dorsal commissure of the vulva. Postpartum uterine prolapse is more common than prepartum prolapse mainly because of the abrupt increase in intra-abdominal pressure, uterine inertia, and loss of muscular tonicity (Ahuja *et al.*, 2016). In this case, the underlying cause was evaluated to be the absolute oversize of the fetus and the low nutritional status of the dam. Prolapse of the uterus normally occurs during the third stage of labor, at a time when the fetus has been expelled and the fetal cotyledons have separated from the maternal caruncles (Chakma, 2021).

In ruminants, postpartum uterine prolapse generally predisposes or results from long myometrial attachments, violent tenesmus, a relaxed atonic flaccid uterus, placental retention, excessive traction on the fetus, a retained fetal membrane, a low plane of nutrition, hypocalcemia and extreme laxity of the vulval lips (Utsav Sharma *et al.*, 2018). In this case, the prolapse was probably due to forcible traction of the calf during parturition, and the retained placenta was severely adhered to the ovarian pole of the gravid uterine horn. Approximately 12 hours after the surgical procedure was completed, the owner reported that the animal had stopped straining and had begun eating and drinking normally. In this case report, a horizontal mattress suture of the vulva was used to prevent the recurrence of prolapse (Peter & King, 2021). A satisfactory prognosis was observed after proper surgical correction and possible postoperative care. The patient was followed up for the next 7 days, and the suture was removed on the 7th day.

In conclusion, uterine prolapse may appear in the post parturient period. The diagnosis and treatment of uterine prolapse are very important tasks. Delayed correction may cause critical conditions, such as edema, fibrosis, necrosis, and septicemia. This case reported the outcome of a good-prognosis case of uterine prolapse in a cow. Cases of uterine prolapse are emergencies that should be promptly presented or reported to ensure a good prognosis and positive outcome. Therefore, farmers and veterinarians should be careful about early recovery, which will save cows from life-threatening conditions. The owner was also advised to provide good feed and management in addition to attending and inspecting the recurrence as well as any discomfort felt, such as during urination.

3.1.6 Surgical management of cervicovaginal prolapse in cow

Abstract

In this case report, successful surgical management of cervicovaginal prolapse in cows was reported. In dairy cows, reproductive disorders negatively affect their productive and reproductive performance. Genital prolapses are mostly observed in ruminants, especially cattle, buffalo, sheep, and goats. Among the reproductive disorders in dairy cows, cervicovaginal prolapse is considered one of the major problems. The exact etiology of cervicovaginal prolapse is unknown, but the factors that predispose individuals to genital prolapse are increased intra-abdominal pressure, obesity, extreme cold weather, excess perivaginal fat, poor vaginal

conformation, chronic coughing, chronic straining to urinate or defecate and prolonged tenesmus. Cervicovaginal prolapse is considered an emergency condition that requires immediate intervention. Many management and treatment options are available for vaginal and cervical eversions. A seven-year-old locally bred cow with a history of cervicovaginal prolapse from the last 12 hours was presented to the Jimma University Veterinary Open air Clinic. The body parameters that were measured were within normal ranges. The cow was restrained in a standing position in the crush and first anesthetized with 2% lignocaine hydrochloride at a dosage of 0.22 mg/kg at the first intercostal space. After aseptic preparation and application of glycerin jelly for lubrication on the prolapsed mass, the prolapsed mass was repositioned by initially pushing the lateral walls and middle portion followed by the roof of the cervix and vagina to their original position. Vulval retention sutures were applied over the vulvar lips to prevent recurrence. After complete repositioning of the prolapsed mass, the cow was treated with 1 ml/25 kg of injectable broad-spectrum antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) through the IM for three days, and the suture was removed on the 7th day of treatment. There was no complication or recurrence after correction of the prolapse in the vagina or cervix until the last visit day.

Keywords: *Cow, Correction management, Cervicovaginal prolapse*

Introduction

In dairy cows, reproductive disorders negatively affect their productive and reproductive performance (Hosseini-Zadeh, 2013). Genital prolapses are mostly observed in ruminants, especially cattle, buffalo, sheep, and goats (Islam, 2020). It may be defined as coming out of one or more of the pelvic structures (bladder, uterus, and vagina) from their normal anatomical position through the genital (vaginal) opening. In extreme cases, the entire vagina may prolapse, with the cervix displaying itself at the most caudal part of the prolapse (Kuijlaars, 2011). Among the reproductive disorders in dairy cows, cervicovaginal prolapse is considered one of the major problems (Parikh *et al.*, 2018). The majority of vaginal and cervical eversions occur in the last few weeks of pregnancy; however, they may occur several months before calving, and in some cows, they may occur during oestrus. In many cases, CVP is associated with incomplete cervical dilatation, which leads to dystocia (Balamurugan *et al.*, 2018). The incidence of prolapse has been well described in cows. With a hereditary basis, the disorder is chronic and recurrent in

nature. The exact etiology of cervicovaginal prolapse is unknown, but the factors that predispose individuals to genital prolapse are increased intra-abdominal pressure, obesity, extreme cold weather, excess perivaginal fat, poor vaginal conformation, chronic coughing, chronic straining to urinate or defecate and prolonged tenesmus (Vaid *et al.*, 2018).

Cervicovaginal prolapse is considered an emergency condition that requires immediate intervention (Peter & King, 2021). Moreover, trauma, lacerations, bleeding, and bacterial infections are inevitable and may lead to poor prognosis. If prompt attention is given, simple measures often succeed. Sometimes, prolapse may cause infertility in subsequent pregnancies (Vaid *et al.*, 2018). After proper reduction of the edematous, swollen prolapsed mass, various suturing techniques have been attempted. The objective of treatment in pregnant animals is to replace and retain the vagina and cervix within the pelvic canal and to deliver and wean live offspring (Peter & King, 2021). Many management and treatment options are available for vaginal and cervical eversions. Therefore, it is recommended to use a vertical mattress suture pattern and spread stent tension over the vulval lip (Parmar, 2023). This case reports the successful surgical management of cervicovaginal prolapse in a local breed of cow using the deep vertical mattress technique.

Patient history and physical examination

A seven-year-old local breed cow weighing 280 kg was presented to the Jimma University Veterinary Open air Clinic with a history of cervicovaginal prolapse from the last 12 hours. As the owner mentioned about his cow's condition, part of the vagina was exposed outside the perineum. The owner saw the condition in the morning when he was visiting his cows. The animal showed signs of discomfort and exhibited mild and intermittent straining. However, cows feed, defecate, and urinate normally. Physical examination revealed cervicovaginal prolapse (Figure 7A). The body parameters that were measured were within normal ranges (temperature 38.60°C, pulse rate 60 beats/minute, and respiration 30 breaths/minute).

Anesthesia and animal control

The cow was first anesthetized with 2% lignocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd. India) at a dosage of 0.22 mg/kg at the first intercostal space to prevent

straining and numbness of the pelvic sensation to insert the prolapsed mass back into its normal anatomical position.

Preoperative preparation of patients

As soon as the anesthetic progressed, the area around the vulva was removed, and the area around the vulva was washed with water and soap (Figure 7B). The exposed vagina and cervix were soaked in water containing sugar. The mass was then washed again with normal saline and potassium permanganate solution.

Surgical correction

After the animal was properly restrained and anesthetized, the prolapsed mass was cleaned thoroughly with clean water to remove dung and dirt. The mass was further washed with potassium permanganate solution (2% solution) to avoid contamination and lubricated with soap (Figure 7C). The protruding mass was gently elevated above the ischial arch to release the retained urine. After applying glycerin jelly for lubrication to the prolapsed mass, the prolapsed mass was repositioned by initially pushing the lateral walls and middle portion followed by the roof of the cervix and vagina to their original position (Figure 7D). A rectal examination was performed to confirm that the cervix was in place. Vulval retention sutures (deep vertical mattress suture pattern) were applied over the vulvar lips to prevent recurrence and further complications by using nonabsorbable suture materials (Figure 7E).



Figure 7: Surgical correction of cervicovaginal prolapse in cow

(A) Cow with cervicovaginal prolapse, (B) the prolapsed vagina and cervix were cleaned, (C) the vagina and cervix were lubricated with soap, (D) the prolapsed vagina and cervix were replaced, (E) the vulva lip was sutured via a vertical mattress suture pattern, and (F) the patient fully recovered, and the suture was removed on the 7th day of incidence.

Postoperative care and complications

After complete repositioning of the prolapsed mass, the cow was treated with injectable broad-spectrum antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (Pro&Strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) at 1 ml/25 kg through IM for three consecutive days to prevent further secondary bacterial infection. Meloxicam @ 0.2 mg/kg IM was administered for three consecutive days to reduce histamine release and inflammation. The topical application of an oxytetracycline HCL spray (Oxy Viocid 3.58% (w/w)) (manufactured by the Provet Veterinary Products Industry and Tic.Inc., Ankara, Turkey) was used externally over the vulval lips to prevent fly repellency. The sutured area was dressed daily for one week with 2% povidone iodine. On the third day of treatment, clinical observation revealed that all vital parameters were normal, the patient fully recovered, and the suture was removed on the 7th day after surgery (Figure 7F). There was no complication or recurrence after correction of the prolapse in the vagina or cervix until the last visit day.

Discussion

In this case report, successful surgical management of prepartum cervicovaginal prolapse in a local breed of cow was reported, and the vertical mattress suture pattern method was successfully used in dairy cows (Peter & King, 2021). Genital prolapse leads to septicemic conditions and is hence considered a life-threatening condition. Compared with that in heifers, genital prolapse commonly occurs during the last trimester of pregnancy, particularly in pluriparous animals (Kuijlaars, 2011). In cattle and sheep, cervicovaginal prolapse is usually observed in multiple women during the last trimester of pregnancy. Predisposing factors include increased intra-abdominal pressure associated with increased size of the pregnant uterus, intra-abdominal fat, larger fetus, twins, hilly habitat or rumen distention superimposed upon relaxation and softening of the pelvic girdle and associated soft-tissue structures in the pelvic canal and perineum mediated by increased circulating concentrations of estrogens and relaxing during late pregnancy (Jones & Moalli, 2010). The occurrence of postpartum cervicovaginal prolapse is mainly due to severe straining in response to vaginal trauma or infection, which may be a sequel of dystocia (Sharma *et al.*, 2017). Dystocia due to incomplete cervical dilation occurs because of changes in the activation of inflammatory mediators such as cytokines and an altered endocrine milieu during the process of parturition (Balamurugan *et al.*, 2018).

Cervicovaginal prolapse is more common than uterine prolapse, and it appears as a pink mass of volleyball tissue (Sharma *et al.*, 2017, Amit Sharma *et al.*, 2017). Patients with cervicovaginal prolapse should receive intervention as early as possible for a better prognosis. Epidural anesthesia is mandatory before handling a prolapsed mass because it can lead to tenesmus. After the prolapsed part was repositioned to its normal anatomical position, a vulval retention suture (deep vertical mattress suture pattern) was applied over the vulvar lips to prevent reoccurrence and further complications by using nonabsorbable suture materials (Kuijlaars, 2011, Kersjes *et al.*, 1985). Peter, A. T. and E. H. King (2021) reported that successful surgical management of cervicovaginal prolapse can be achieved by retention suturing or the deep vertical mattress technique. The administration of supportive treatment with antibiotics and analgesics to prevent secondary bacterial infection to the prolapsed mass under field conditions was also performed. The effective management of cervicovaginal prolapse in cows depends on the degree of prolapse and the presence or absence of secondary complications (Markandeya, 2014). However, routine systemic antibiotic administration is necessary to prevent secondary vaginal and uterine infections that may predispose patients to infertility and death due to septicemia. In conclusion, cervicovaginal prolapse mainly occurs during the last trimester of gestation. The diagnosis and treatment of cervicovaginal prolapse is very important. Delayed correction may cause critical conditions, such as edema, fibrosis, necrosis, septicemia and myiasis. Therefore, farmers and veterinarians should be careful about early diagnosis, correction and management issues for recovery of the condition, which will save the cow from life-threatening conditions.

3.1.7 Surgical management of rectal prolapse in cow

Abstract

Pelvic organ prolapse is the abnormal downward descent of pelvic organs, i.e., the bladder, uterus, and/or rectum, resulting in a protrusion through the vagina. Rectal prolapse is a protrusion or eversion of the rectal mucous membrane from the anus. Prolapse of the rectum is commonly prevalent in very young and very old animals due to the loosening of the sphincter and rectal mucous membrane. A seven-year-old nonpregnant, local breed cow weighing approximately 250 kg was brought to the Jimma University Veterinary Clinic with a history of complete rectal prolapse for the last 12 hrs, severe straining, restlessness, severe tenesmus and reduced feed and water intake. The prolapsed rectal mass was washed and cleaned with soap, a

diluted solution of chlorhexidine solution, and glycerin jelly to remove debris. The animal was restrained to the standing position, and caudal epidural anesthesia was administered by using 2% lignocaine hydrochloride @0.22 mg/kg to reduce strain, facilitate repositioning of the prolapse, and permit surgical manipulations. After aseptically preparing the prolapsed mass, it was gently reduced to the original position without rectal resection. Therefore, a 2-0 purse-string suture using nylon was applied to retain the prolapsed mass in the pelvic cavity. The suture was made loose enough to leave the two-finger opening into the rectum of the cow by precaution. Postoperatively, the cow was treated with an intramuscular injection of broad-spectrum antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) at 1 ml/25 kg and a nonsteroidal anti-inflammatory drug (15 ml of Meloxicam®, Intas Pharmaceuticals). After careful observation for five days to confirm no recurrence of prolapse, the remaining purse-string suture was removed, and complete successful management of the rectal prolapse was achieved.

Keywords: *Cow, Prolapse, Purse string, Rectal resection.*

Introduction

Pelvic organ prolapse (POP) is the abnormal downward descent of pelvic organs, i.e., the bladder, uterus, and/or rectum, resulting in a protrusion through the vagina (Mori da Cunha *et al.*, 2021). Rectal prolapse is a protrusion or eversion of the rectal mucous membrane from the anus (Gourgiotis & Baratsis, 2007). Prolapse of the rectum is commonly prevalent in very young and very old animals due to loosening of the sphincter ani and rectal mucous membrane (Kalaiselvi *et al.*, 2010). However, animals of any age, breed, or sex may be affected. Prolapse of the rectum can occur in all species of domestic animals, commonly in pigs, occasionally in cattle, and rarely in goats and other species (Bhat *et al.*, 2022). It is subdivided into either complete or incomplete rectal prolapse, depending on whether it involves all layers of the rectum or just the rectal mucosa (Jena *et al.*, 2013). Furthermore, rectal prolapse has been categorized into four types. In type I rectal prolapse, only the rectal mucosa and submucosa project through the anus. A type II lesion represents a complete prolapse of the full thickness of all or part of the rectal ampulla. In type III prolapse, a variable amount of small colon intussuscepts into the rectum in addition to type II prolapse (Jena *et al.*, 2013). In type IV prolapse, the peritoneal rectum and a variable length of the small colon form intussusceptions through the anus. Type I and II prolapse are the most common (Miesner, 2009). Rectal prolapse may be a result of prolonged tenesmus or

increased intra-abdominal pressure due to bloat, trauma, colitis, proctitis, diarrhea, the act of parturition, dystocia, intestinal parasitism, or tail docking.

Other causes of straining include intestinal neoplasia, foreign bodies, perineal hernia, constipation, congenital defects, lower urinary tract, and prostatic diseases (Jena *et al.*, 2013). A diagnosis can be made based on the patient's medical history, physical examination, and clinical symptoms. On physical examination, a bulge of the cylindrical rectal mass through the anus appears. However, it must be differentiated from prolapsed ileocolic intussusception by passing a probe (blunt instrument or finger) between the prolapsed mass and the inner rectal wall (Kumar *et al.*, 2020). It is the most common surgical procedure involving the rectum of cattle. In rectal prolapse, the probe cannot be inserted because of the presence of the fornix. Treatment of rectal prolapse comprises nonsurgical and surgical means, viz. reduction, retention (by purse string suture or the use of a truss), and amputation, respectively (Kumar *et al.*, 2020). Treatment depends on the degree of damage to the mucosal layers.

Usually, manual repositioning and suture retention of the prolapse can be carried out (Singh & Jain, 2013). However, amputation of the prolapse is indicated when repositioning is impossible (because of severe swelling or adhesions) or when perforating injuries or necrosis of the mucosal layers are present. Any delay in treatment may lead to edema, ischemia, laceration, hemorrhages, and shock, resulting in a poor to hopeless prognosis (Kashyap *et al.*, 2019, Singh & Jain, 2013). In this case, due to prolonged tenesmus or increased intra-abdominal pressure, there may be an interruption of normal innervations of the external anal sphincter, which results in prolapse. This case report describes the surgical management of rectal prolapse in a local breed of cow.

Patient history and physical examination

A seven-year-old nonpregnant, local breed cow weighing approximately 250 kg was brought to the Veterinary Open air Clinic of Jimma University; this cow had a history of complete rectal prolapse (Figure 8A) for the last 12 hrs, severe straining, restlessness, severe tenesmus and reduced feed and water intake. The owner reported that the cause of the problem was prolonged tenesmus or increased intra-abdominal pressure due to diarrhea. Physical examination revealed a prolapsed rectal mass hanging from the anus without any necrosis or ulceration. In addition, the prolapsed mass was differentiated from ileocolic intussusception by passing through a finger between the prolapsed mass and the inner rectal wall. Clinical examination revealed a body temperature of approximately 37.60°C, a pulse heart rate within the normal range, and pain in the abdomen. Based on the examinations and clinical findings, the patient was diagnosed with complete rectal prolapse and decided to undergo surgical manipulation for repositioning.

Preoperative preparation of patients

After the animals were properly restrained and anesthetized, the prolapsed rectal mass was washed and cleaned with soap, a diluted solution of potassium permanganate (2% solution) and glycerin jelly to remove debris (Figure 8B and C). The drain on the prolapsed rectum was removed after the tail was tied in one direction and was ready for retraction into the pelvic cavity. The area where the epidural space was injected was also disinfected by using a scalpel after shaving.

Anesthesia and animal control

The animal was restrained to the standing position, and caudal epidural anesthesia was administered by using 2% lignocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd. India) at a 0.22 mg/kg dosage rate through the intercoccygeal space to reduce straining, facilitate repositioning of the prolapse, and permit surgical manipulations. The effect of analgesia on the perineum was verified by pricking the area with a sterile needle. The animal was manipulated in the standing position after holding his horn with the animal owner.

Surgical correction

After aseptically preparing the prolapsed mass and anesthetizing it, it was gently reduced to the original position without rectal resection (Figure 8D). Therefore, a purse-string suture using nylon 2-0 was applied on the anus to retain the prolapsed mass in the pelvic cavity (Figure 8E). The suture was made loose enough to leave the two-finger opening into the rectum of the cow by precaution. Finally, the area was scrubbed with iodine.



Figure 8: Rectal prolapse and surgical management in cows

(A) Presentation and appearance of the prolapsed rectum, (B and C) the prolapsed rectal mass was washed and cleaned, (D) manipulation and replacement of the prolapsed organ, (E) placement of a purse string suture on the anal orifice, and (F) careful observation for 5 days confirmed no recurrence of prolapse.

Postoperative care and complications

Postoperatively, the cows were treated with an injection of broad-spectrum antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (Pro&Strep; Hebei Yuanzheng

Pharmaceutical Co., Ltd., China) at 1 ml/25 kg through IM and NSAID (15 ml meloxicam, Intas Pharmaceuticals) IM for three consecutive days. There were no postoperative complications except for straining 12 hours after the procedure. Careful observation for 5 days confirmed no recurrence of the prolapsed organ, and the remaining suture was removed after 5 days of the procedure (Figure 8F). Complete successful management of the rectal prolapse was achieved, and the patient had a good prognosis.

Discussion

Rectal prolapse is one of the lower gastrointestinal tract upsets in bovines and arises from different factors (Battersby, 2015, Blowey & Weaver, 2011). Once the condition is met, it should be managed early before the prolapsed mass desiccates and becomes contaminated in addition to being infected with flies. Prolapse of the rectum is due to excessive and persistent straining, which can become common in clinical conditions such as diarrhea, tenesmus, lower urinary tract disease, prostatic disease, parturition, and constipation, and it is reportedly more common in young, parasitized animals, especially those with severe diarrhea (Arora & Makker, 2021). Incomplete rectal prolapse arises due to the backward gliding of the submucosa and mucous membrane on the muscular coat to form a circular protrusion (Monsang *et al.*, 2014). In contrast, a wholly prolapsed mass is generally more prominent and cylindrical because it involves the eversion of other visceral organs (Marderstein & Delaney, 2007). The management of rectal prolapse usually depends on the degree of prolapse, the viability of the tissue, and the number of episodes (Wassef *et al.*, 1986). Manual reduction followed by the application of a purse-string suture is effective in clinical patients who present at the first occurrence, along with signs of viable rectal mucosa (Dean & Dawson, 1913). On the other hand, colopexy can be a better surgical technique when rectal prolapse is recurrent and not reducible (Bordeianou *et al.*, 2014).

The usual procedure for the correction of rectal prolapse is reduction via gentle massage, repositioning, and retention via the application of a purse-string suture pattern using appropriate tape or fibers (Čech *et al.*, 2010). A one/two-finger opening should be left when tying the purse string according to the animal size (Čech *et al.*, 2010). This agrees with the care case at hand in which it was managed in such a way. However, surgical correction is often necessary due to various causes of prolapse (large edema, laceration, rupture, infection, and necrosis) (Samy *et*

al., 2022). After physical restraint and stabilization, the animal was controlled in the standing position and administered caudal epidural analgesia with 2% lignocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd. India) at a dosage rate of 0.22 mg/kg. The treatment chosen was manual repositioning of the prolapsed rectum because part of the prolapse was not ulcerated and did not occur repeatedly (Altomare *et al.*, 1999, Madhu *et al.*, 2014).

A purse string stitch was applied to the edge of the anus to prevent the rectum from reopening. The sutures were released on the fifth postoperative day, and the rectum was no longer removed. In addition, according to Huck (2022) and Navarre & Pugh (2002), animals must be given soft food for two weeks after surgery. In conclusion, carelessness and delayed treatment of prolapsed masses may cause irreversible damage to organs, leading to economic loss. Hence, timely and appropriate interventions are required for restoration to minimize losses. In the present case, the owner was advised to improve management practices such as increasing the feeding frequency, increasing the height of the rear portion of the animal, performing sufficient exercise, avoiding poor-quality straw feeding, and orally administering calcium preparations to prevent recurrence of the prolapsed tissues and thereby minimizing economic losses to the herd. Additionally, the owner was advised to apply 2% lignocaine HCl gelly to the anal sphincter after defecation and to maintain the animal on a laxative diet for one week. Paraffin oil was also administered to lubricate the gastrointestinal lining to easily evacuate the feces.

3.1.8 Surgical management of large subcutaneous abscess in ox

Abstract

An abscess is a collection of pus in confined tissue spaces that is usually caused by bacterial infection. The present case report describes the successful surgical management of abscess in the subcutaneous upper part of the left shoulder region in cattle. A twelve-year-old local breed ox weighing approximately 350 kg was brought to the Veterinary Open air Clinic of Jimma University, with a history of swelling in the upper part of the left shoulder region for the last 2-3 months. On clinical examination, the masses were warm, hard, and painful in the initial stages and became fluctuating and soft during maturation. The symptoms and signs of subcutaneous abscesses were pain, heat, swelling, tenderness, and redness. Her body parameters were within normal ranges. The ox was controlled in the standing position by physical and chemical methods,

and the operation site was achieved by local infiltration (line block) with 2% lidocaine hydrochloride at a dose of 10 mg/kg body weight. Fluid aspiration was also conducted by using a sterile needle to observe and confirm whether the fluid was pus. Surgical drainage of the abscess was selected for treatment with antibiotic injection. Drainage and disinfection of the wound were conducted continuously for five days, and antibiotics were also administered on these days. When the animal was visited on the 25th day, the animal completely recovered.

Keywords: *Abscess, Antibiotic, Ox, Surgical drainage*

Introduction

An abscess is a collection of pus in confined tissue spaces, usually caused by a bacterial infection (Fesseha, 2020b). Most subcutaneous abscesses are the result of traumatic skin penetration with resulting infection. In addition, most abscesses are caused by bacterial infection. *Staphylococcus* is the most common bacterial cause of skin abscesses and occurs when *Staphylococcus aureus* bacteria enter the body through a hair follicle or through a wound or injury that has punctured or broken the skin (de la Fuente *et al.*, 2017). In rare cases, an abscess may be caused by a virus, fungi, or parasites. A skin abscess, also called a boil, is a bump that appears within or below the skin's surface, and it is a common type of abscess that appears externally as a swollen, pus-filled lump under the surface of the skin (Rahman & Shaifur, 2020). Skin abscesses most commonly develop on the head, neck (dewlap), back, chest, or limbs.

Abscesses of the lymph nodes in the head and neck region (often referred to as grass seed abscesses) and of the skin (skin abscesses) are commonly observed in the export process as a consequence of abrasions or penetrations of the oropharynx or skin from grazing prickly plants, seed penetrations or vaccination needles (Ovi, 2008). Abscesses are usually soft to firm swellings that gradually increase over days to weeks. The symptoms and signs of cutaneous and subcutaneous abscesses are pain, heat, swelling, tenderness, and redness (Hassan *et al.*, 2019). The diagnosis of cutaneous and subcutaneous abscesses is based on physical examination, and deep abscesses often require imaging (ultrasonography examination) (Subramaniam *et al.*, 2016). A superficial abscess should be differentiated from other swellings by exploratory puncture, which reveals synovial fluid in bursitis, serous fluid in cysts, blood in hematoma, and nothing or intestinal content in the hernia. In most cases, it is recommended to double-check that the swelling is fluid-filled and not an indurated fibrous lump, hernia, or hematoma before incising.

However, there are cases in which an abscess can lead to serious, potentially life-threatening complications if left untreated (Fesseha, 2020b). Sometimes, skin abscesses are more difficult to treat and may require laceration or drainage. Abscesses can be treated in several different ways, depending on the type of abscess and how large it is (Herrera *et al.*, 2000).

The abscesses contain purulent material, are well encapsulated, and must be surgically drained and treated as open wounds (Orsini *et al.*, 2016). Medical therapy with parenteral antimicrobial agents and iodine is ineffective. Aseptic procedures that reduce further infection and increase the prognosis of the condition should be followed during the procedure (Fossum, 2012). A small skin abscess may drain naturally and dry up and disappear without any treatment, but in the case of a large subcutaneous abscess, the infection may need to be cleared by using antibiotics, and pus may drain through an incision that creates a ventral drainage hole and is thoroughly flushed with clean water under moderate pressure from a hose or syringe using a gloved finger for removal of the pus.

The basic purpose of drainage is to facilitate healing by obliterating dead space or by removing unwanted material from a particular location (Hendrickson, 2013). The simplest method of wound drainage is the open technique, in which the skin is left unsutured. This technique is commonly used in large animal surgery when primary closure cannot be performed. Drains are beneficial in postoperative situations in which seroma formation is a potential problem or when complete obliteration of dead space is not possible (Ladlow, 2009). The widespread use of drains has given rise to complications in veterinary patients (Reiffel *et al.*, 2013). The present case report describes the successful surgical management of abscess in the subcutaneous upper part of the left shoulder region in cattle.

Patient history and physical examination

A twelve-year-old local breed ox weighing approximately 350 kg was brought to the Jimma University Veterinary Open air Clinic, with a history of swelling in the upper part of the left shoulder region over the last 2-3 months (Figure 9A). On clinical examination, the masses were warm, hard, and painful in the initial stages and became fluctuating and soft during maturation. Fluid aspiration was also conducted by using a sterile needle to observe and confirm whether the fluid was pus. It can be differentiated from other masses or swelling conditions, such as tumors and hematomas, by palpation and aspiration of fluid. All physiological parameters were normal (body temperature 38.40°C, respiratory rate 32 breaths/minute, heart rate 60 beats/minute, and pulse rate 60 beats/minute). The color of the mucous membrane and the patient's hydration status were normal. Therefore, based on the clinical history, clinical findings, and exploratory puncture, the patient was diagnosed with a subcutaneous abscess. The patient was previously treated with antibiotics and anti-inflammatory drugs, but the swelling did not subside. Finally, surgery was performed for complete evacuation of the pus to relieve the patient from this condition.

Preoperative preparation of patients

The animal was restrained and stabilized physically in the crush zone, and the area surrounding the swelling zone was prepared aseptically by washing with soap and tap water. The hair was shaved from the skin that covered the swollen area and surrounding area (Figure 9B). Then, the area was again washed with an antiseptic solution (savlon) to remove any hair. Finally, the shaved area was scrubbed with 2% povidone iodine in a circular manner starting from the center to allow it to be removed and made ready for aseptic abscess management.

Anesthesia and animal control

The ox was controlled in the standing position by using physical and chemical methods. For physical restraint, the ox was handled with rope assisted by personnel to adequately restrain it in the standing position during a crash. Chemically, the operation site was achieved by local infiltration (line block) with 2% lidocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd. India) at a dose of 10 mg/kg body weight.

Surgical procedure

After the surgical site was prepared aseptically and appropriate analgesia was achieved, abscess management was performed. Surgical management of the abscess was then performed by incising the ventral side of the swollen region with a disposable sterile scalpel (Figure 9C). The pus was drained by milking the swollen region until all the accumulated abscess was evacuated (Figure 9D). The cavity was irrigated with 2% povidone iodine to disrupt the pyogenic membrane and prevent the refilling of the cavity (Figure 9E). Additionally, the peripheral area of the incised swollen area was sprayed with cyclo-spray to prevent bacteria from entering the skin.



Figure 9: Surgical management of abscess in ox

(A) Examination of the swelling, (B) shaving of the abscess area, (C) making the incision vertically on the swollen part, (D) removal of the pus, (E) disinfecting inside the cavity, and (F) recovery on the 25th day.

Postoperative care and complications

The ox was treated with antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (Pro&Strep; Hebei Yuanzheng Pharmaceutical Co., Ltd.) at 1 ml/25 kg through the I.M. route for five consecutive days to control secondary bacterial infection. The abscess was drained, and the wound was regularly cleaned by using a scalpel and dressed with 2% povidone-iodine

solution for five days daily. Then, the gauze soaked in 2% povidone-iodine was changed daily by reducing the size of the soaked gauze in the cavity daily. Additionally, an oxytetracycline HCL spray (Oxy Viocid 3.58% (w/w)) (manufactured by the Provet Veterinary Products industry and Tic. Inc., Ankara, Turkey) was applied to the wounds for five consecutive days. Little skin bleeding was noticed postsurgery, but it was normal and helped to heal the wound without continuing for a long period. There were no postoperative complications (Figure 9F). Finally, the wounds successfully recovered after 25 days without any signs of recurrence.

Discussion

An abscess is a circumscribed inflammatory lesion that consists of pus collected in confined tissue spaces as a result of infection, trauma caused by sharp objects, and bacterial migration in circulation, causing septicemia and necrosis of tissue, leading to migration to the area of least resistance to abscess formation (Studdert *et al.*, 2020). There were more abscess cases in males than in females due to the use of males for draught purposes in the area and fighting between them. Cattle are the species predominantly used in agricultural operations to pull agricultural implements (e.g., plow, weeder, puddler, etc.) (Mehta, 2022). This finding is in agreement with the current case report in terms of the sexwise incidence of the patient. In the present case report, an abscess was also found subcutaneously on the upper part of the left shoulder. The symptoms and signs of subcutaneous abscesses were pain, heat, swelling, tenderness, and redness in the present case, and these findings were in agreement with those of Stephen and Edward (2010) and Hassan *et al.* (2019), who encountered similar signs. In the present case, the swelling was diagnosed by location, size, consistency of the swelling, and aspiration of its contents to differentiate it from the tumor, hernia, hematoma, and cyst.

This finding agrees with the reports of Misk *et al.* (2016), who stated that the species of the affected animals and locations of the swelling as well as the size, consistency, nature, and color of its contents will help in the diagnosis and differential diagnosis of body surface swelling. However, this finding strongly agrees with the report of Fesseha (2020), who stated that exploratory puncture was a highly diagnostic tool in the case of abscesses. On the other hand, this finding disagrees with the report of Sadan (2019), who stated that ultrasonography was found to have a specificity of 100% for the diagnosis of hernias, urethral diverticula, and tumors

and a lower specificity of 80% for hematomas and 93% for abscesses when used for the evaluation of superficial swellings. Treatment was conducted by surgical drainage of the pus followed by packing of gauze soaked in 2% povidone-iodine and administration of antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (Pro&Strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) at 1 ml/25 kg through I.M. for five consecutive days. The progress was satisfactory, and there was complete healing. This finding was in agreement with other studies by Radostitis (2007), Thorat *et al.* (2008), and Hassan *et al.* (2019), who employed similar surgical techniques and achieved the same outcome. In conclusion, at the field or farm level, successful management of superficial skin abscesses in cattle can be attained through proper/regular drainage of the pus followed by antiseptic gauze packing to allow drainage of pus so that the parental administration of antibiotics is effective. The owner was advised to subjectively assess discomfort, pain, unpleasant discharge, and inflammation at the wound site.

3.1.9 Surgical management of paraphimosis in bull

Abstract

Paraphimosis is an ailment in which the protruded penis is unable to return into the prepuce following trauma or any other disease. Congenital conditions such as narrowness of the preputial orifice or a shortened preputial sheath may predispose patients to paraphimosis. There are several methods used for treating paraphimosis, and this involves reassuring the patient, reducing preputial edema, and restoring the prepuce to its original position. A 5-year-old 150-kg local breed bull was presented to the Jimma University Veterinary Open-air Clinic with a history of sustained penile protrusion from the preputial orifice. The bull was restrained both physically and chemically to the right lateral region for detailed clinical examination and treatment. After the edema was reduced, the glans penis was repositioned by sliding it into the preputial cavity, and a retention suture was applied using purse-string sutures to the preputial orifice by letting a hole small for urination. Postoperatively, the bull was treated with antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) at 1 ml/25 kg for three consecutive days; then, on the 4th day, the owner reported that the bull had completely recovered with normal physiological functions without any complications. The current case report discusses the successful management of acute paraphimosis in bulls. Therefore, paraphimosis should be

corrected by repositioning and retaining the paraphimosis in the preputial cavity as early as possible to prevent necrosis and further damage to the penis.

Keywords: *Bull, Glans penis, Paraphimosis, Preputial orifice, Purse string sutures*

Introduction

Injuries to the reproductive tract are frequent and have the potential to end the functional use of a bull (Hopper, 2016). Elite breeding bulls of high genetic potential have always been of sufficient economic value to justify efforts at medical and surgical restoration (Hopper, 2016). Paraphimosis is a medical emergency in which the foreskin cannot return to its normal location once it is retracted (Chakma, 2019). Paraphimosis is an ailment in which the protruded penis is unable to return into the prepuce following trauma or any other disease (Kutzler, 2022). This may be due to either the constriction of the penis behind the glans penis or swelling of the glans penis, making it impossible to draw the organ back through the naturally small preputial orifice (Mallesh *et al.*, 2017). It is most often observed after semen collection or coitus, i.e., after penile erection.

The other reasons for paraphimosis are the presence of foreign priapism around the penis and/or the use of an acepromazine/phenothiazine tranquilizer and a constricting band of hair at the prepuce orifice (Paul *et al.*, 2020). Generally, trauma to the penis and prepuce, inflammation of the penis, neoplasia of the penis, inflammation of the prepuce, and infection of the prepuce are considered the most common predisposing factors for paraphimosis in most domestic animals. In addition, breed, excessive amounts of parietal preputial epithelium, and the absence or lack of development of the caudal prepuce muscle are also predisposing factors for paraphimosis. Paraphimosis may be congenital or acquired. Congenital conditions such as narrowness of the preputial orifice or a shortened preputial sheath may predispose patients to paraphimosis (Paul *et al.*, 2020). On the other hand, acquired paraphimosis may occur due to trauma and infection (Hussen, 2018). Accordingly, a traumatic injury that is mostly associated with false copulation is caused when the penis strikes the pelvis of the cow or the cow kicks the bull penis, which results in enlargement or swelling of the distal penis, preventing the penis from being retracted back into the prepuce. The clinical signs may vary depending on the extent of constriction of the penis and the duration of occurrence (Köhn & Schuppe, 2022). There are several methods used for treating

paraphimosis, and these include reassuring the patient, reducing preputial edema, and restoring the prepuce to its original position and condition (Fesseha, 2020a). Ice packs, penile wraps, and manual compression mechanically disperse penile and preputial edema, while osmotic agents, such as granulated sugar or mannitol, have been reported to be effective agents for reducing swelling. Hence, the present case reports the successful surgical correction and management of an acute case of paraphimosis in a local bull.

Patient history and physical examination

A 5-year-old local breed bull weighing 150 kg was presented to the Jimma University Veterinary Open air Clinic with a history of sustained penile protrusion from the preputial orifice, and the bull was unable to retract the penis since 24 hours after coitus (Figure 10A). The protruding glans penis was edematous and was soiled with dirt and debris. Partial anorexia was also reported; however, the bull was able to pass through his urine normally. The other clinical parameters were within the normal physiological range. The patient was diagnosed with paraphimosis and underwent surgical management.

Preoperative preparation of patients

After physical restraint and stabilization of the animal, the hair surrounding the prepuce was aseptically prepared by clipping, shaving, scrubbing, and washing with water and savlon.

Anesthesia and animal control

The bull was restrained both physically and chemically to the right lateral region for detailed clinical examination and treatment. For physical restraint, the bull was handled with rope assisted by personnel to adequately restrain it to the right lateral recumbency position. Chemically, the bull preputial area was desensitized, and pain was alleviated during the surgical procedure by using 2% lidocaine HCl (Lignocaine Injection Bp; Sakar Healthcare Ltd. India) at a 0.22 mg/kg dosage rate at the level of the first sacrococcygeal space into the epidural space to block the coccygeal and sacral nerves to desensitize the tail, anus and perineum.

Surgical correction

Following proper physical and chemical restraint and aseptic preparation of the surgical site (prepuce), the protruded penis was washed with saline solution to decrease edema. Then, it was washed with a savlon solution to remove the dirt, dung, and dust, and the penis was painted with 2% povidone-iodine solution (Figure 10B). After the edema was reduced, the glans penis was repositioned by sliding it into the preputial cavity (Figure 10C), and a retention suture was applied using purse-string sutures (Figure 10D) to the preputial orifice by letting a small hole for urination. Finally, the area was properly cleaned, dressed with a 2% povidone-iodine solution (Figure 10E), and the patient was admitted to the home.

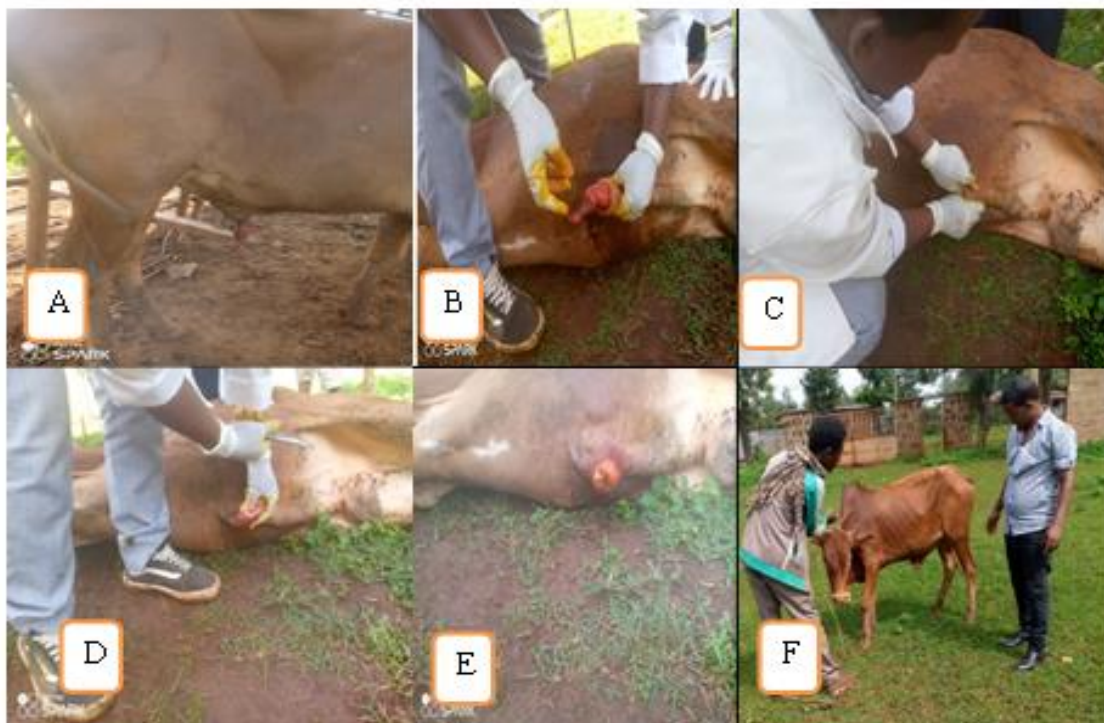


Figure 10: Surgical management of paraphimosis in bulls

(A) Protruded penis, (B) penis was painted with 2% w/v povidone-iodine solution, (C) glans penis was repositioned into the preputial cavity, (D) purse-string suture was applied, (E) the area was properly cleaned and dressed with a 2% povidone-iodine solution, and (F) on the 5th day, the bull completely recovered.

Postoperative care and complications

Postoperatively, the bull was treated with antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (Pro&Strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) at 1

ml/25 kg through the IM for three consecutive days to reduce postoperative complications. Dexamethasone was also administered intramuscularly at a dose of 0.2 mg/kg for three consecutive days to reduce swelling of the glans penis. The owner was advised to use an antiseptic spray of oxytetracycline HCL (Oxy Viocid 3.58% (w/w)) (manufactured by Provet Veterinary Products Industry and Tic. Inc. Ankara, Turkey) locally three times daily. On the 5th day, the owner reported that the bull had completely recovered (Figure 10F) with normal physiological functions without any complications. The retention suture was removed on the 10th day from the preputial orifice.

Discussion

Paraphimosis is the failure to fully retract the penis into the preputial cavity. The principal goal in treating acute paraphimosis is to reduce edema and reposition the prolapsed penis to the preputial cavity as soon as possible to protect it from further injuries (Hussen, 2018). Accordingly, in the present case, the protruding penis was washed with both saline water and 2% potassium permanganate solution to minimize edema and remove dirt, dung, and dust, respectively. This finding is in line with the previous reports of Nevi *et al.*, Ravikumar *et al.*, and Adeola and Enobong, who used similar case-handling procedures to manage cases in different domestic animals. According to different findings, trauma to the penis during coitus is considered the most common cause of paraphimosis. In addition, paraphimosis in bulls is also associated with penile injury, preputial trauma/lacerations and/or diseases, and damage to penile innervation (Fesseha, 2020a). This trauma to the penis results in the loss of penis innervation, leading to the paralysis of penile retractor muscles (Schumacher, 2014).

Similarly, in the present case, paraphimosis was caused by trauma. The occurrence of paraphimosis in this patient agrees with the findings of Nevi *et al.*, Ravikumar *et al.*, and Adeola and Enobong, where paraphimosis is most commonly observed in bulls and dogs, and diagnosis is primarily determined by physical examination of the prepuce and penis at the time of presentation. In the present case, purse-string sutures were applied to manage acute paraphimosis in the bull and the preputial orifice, and the penis was repositioned into the preputial cavity. This finding is in agreement with the report by Fossum that a temporary purse string is considered one of the best options for surgical treatment of paraphimosis. Furthermore, an immediate attempt to correct paraphimosis has a great impact on the prognosis of the condition, and further delay may

result in adhesion, prolonged entrapment, and strangulation that cause venous and lymphatic compromise that leads to penile necrosis. Similarly, immediate action was taken to handle the case. In the reported case, the paraphimosis was managed initially by reducing the swelling followed by retention in the preputial cavity by purse-string suture to the preputial orifice by letting a hole small for urination, as described by Nevi *et al.* (2015). Postoperatively, a 2% povidone-iodine solution was applied to the prepuce of the bull. Similarly, Kumaresan *et al.* applied purse-string sutures for retention of the penis, whereas Adeola and Enobong used a tension release incision with simple interrupted sutures for the treatment of paraphimosis in dogs. Then, antibiotics and anti-inflammatory drugs were used to facilitate the recovery and prevention of secondary bacterial infection.

The current case report discusses the successful management of acute paraphimosis in a local bull. In conclusion, trauma during coitus or erection of the penis may cause paraphimosis, which should be considered an emergency urological condition because there is an obstruction of urine flow and further damage or necrosis of the penis. Therefore, paraphimosis should be corrected by repositioning and retaining the paraphimosis in the preputial cavity as early as possible to prevent necrosis and further damage to the penis. Additionally, the client was advised to closely monitor the animal for any sign of straining and periodically assess the animal for penile coverage several times daily with friction-free movement of the prepuce over the penile shaft.

3.1.10 Surgical management of horn fracture in cow

Abstract

The horns of cattle are unique adaptations of the skin. The procedure of amputation of the horn involves the removal of the cornified epithelial tissue and the frontal bone core of the horn. A seven-year-old cow weighing 250 kg was presented to the Jimma University Veterinary Open air Clinic with history findings of a fracture of the right horn of the adult cow due to fighting by another cow. The cow was restrained adequately, and the circumferential skin surface of the base of the right horn was prepared aseptically by washing with soap and water. The base of the horn was desensitized using local anesthesia. 2 ml of 2% lidocaine hydrochloride was injected at the cornual nerve block to desensitize the zygomaticotemporal nerve and waited for 10 minutes. Half of the local anesthetic used to desensitize the cornual nerve was also infiltrated at and around the

incision site. The incision was extended in an elliptical manner, and the underlying tissues were separated at the base of the horn, forming a skin flap. After dehorning, the skin was sutured by a near-far-far-near pattern using silk no. 1. An oxytetracycline HCL spray (Oxy Viocid 3.58% w/w) was applied to the wound, and the base of the horn was properly bandaged with elastic bandages. After two months, the cow was healed completely without any complications, and the prognosis was good. Therefore, correction of a contaminated fractured horn by amputation as early as possible to prevent any complications is advisable. The present communication describes a horn fracture case in a local breed cow due to a fracture of the horn and its successful surgical management.

Keywords: *Cow, Dehorning, Horn fracture*

Introduction

Horns are the pairs of hard, bonelike, permanent growth projecting from the heads of cattle (Baco *et al.*, 2020). The horns of cattle are the unique adaptations of the skin. The horn-generating cells are located between the junction of horns and skin known as the corium, which is the site for horn production (Jesse *et al.*, 2016). The procedure of amputation of the horn is the removal of the cornified epithelial tissue and the frontal bone core of the horn (Neely, 2013). Horn amputation is an animal husbandry procedure that is implemented in many dairy and beef cattle production systems every day. If amputation is not properly done with the removal of the whole corium, then horns can start regrowing. The horn is prone to various affections like avulsion, fracture, misdirected/overgrowth, sepsis, fissures, and cancer (Mulatu *et al.*, 2021). Most of these affections do not respond to routine medical management and demand amputation of the horn. Several management practices are used to remove horns in cattle and they vary based on age, breed, and degree of horn development (Huebner *et al.*, 2017). Primary methods for dehorning dairy cattle young stock typically include cautery removal of the horn bud or application of caustic pastes such as sodium hydroxide. Infection is a possible complication arising from horn amputation, but this occurs mostly following invasive procedures that expose the sinus cavity to the external contaminated environment. Normally, the wounds heal well with systemic treatment after amputation. However, the procedure may cause several postoperative complications including bleeding, bacterial infections, and fly contamination (Jesse *et al.*, 2016).

Operative animal requires 30-60 minutes for bleeding observation after amputation and tourniquets, clamps, or electric cauterizing help to reduce blood loss. For the prevention of fly contamination, fly repellent is advisable for 10-14 days. The present communication describes a horn amputation case in a local breed cow due to a fracture of the horn and its successful surgical management.

Patient history and physical examination

A seven-year-old local breed cow weighing 250 kg was presented to the Jimma University Veterinary Open air Clinic with a history of fracture of the right horn of the cow due to fighting with another cow (Figure 11A). The clinical examination of the animal revealed a normal body temperature of 38.20 °C, respiratory rate of 25 breaths per minute, and heart rate of 70 beats per minute, respectively. The animal was prepared for a horn amputation operation to avoid further complications.

Preoperative preparation of patient

The cow was restrained adequately, and the circumferential skin surface of the base of the right horn was prepared aseptically by washing with soap and water. The operation was performed in a left-lateral recumbency. Then the hair was shaved with a surgical blade and cleaned thoroughly with a Savlon solution. Finally, the area was scrubbed with a 2% povidone iodine solution and dried before being ready for dehorning.

Anesthesia and animal control

The base of the horn was desensitized using local anesthesia 2 ml of 2% lidocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd., India) was injected between the lateral canthus of the orbit on the upper third and base of the horn just under the shaft of the frontal crest at the cornual nerve block to desensitize the zygomaticotemporal nerve and waited for 10 minutes.

Surgical procedure

The surgical site was prepared for aseptic surgery and half of the local anesthetic used to desensitize the cornual nerve was also infiltrated at and around the incision site. After adequate desensitization, one incision was taken towards the poll, and another incision was taken towards the frontal ridge. These incisions were joined together by taking incisions on the anterior and posterior sides of the horn at the junction of the base of the horn and skin. Following the skin incision, the cornual artery was located and ligated by chromic catgut number 1-0 to prevent hemorrhages. The incision was extended in an elliptical manner, and the underlying tissues were separated at the base of the horn, forming a skin flap (Figure 11B). The horn was then amputated closely to its base by using the dehorning wire (Figure 11C). The entire skin flap was sutured by a near--far-near pattern using silk no. 1, and an oxytetracycline HCL spray (Oxy Viocid 3.58% w/w) (manufactured by Provet Veterinary Products Industry and Tic. Inc., Ankara, Turkey) was applied to the wound (Figure 11D). Then, a protective bandage was applied to the wound (Figure 11E).



Figure 11: Unilateral right horn amputation in cow

(A) Fractured horn, (B) underlying tissues a skin flap, (C) horn was then amputated closely to its base by using the dehorning wire, (D) cyclo-spray was applied on the wound, (E) a protective bandage was applied, and (F) after two months the cow was healed completely

Postoperative care and complication

A little bleeding was noticed following the horn amputation, but it is normal and helps to clean the wound unless continued for a long time. The dressing of the wound was done with a 2% povidone-iodine solution at three, fifth, and seventh days, up to fourteen days until healed. Post-operatively, the cow was administered antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (Pro&Strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) at 1 ml/25 kg through IM for five consecutive days. Pain management was given tramadol hydrochloride (manufactured by Human Well Pharmaceutical Plc., Ethiopia) at 5 mg/kg for two consecutive days. Fly repellent was also applied around the wound by using oxytetracycline HCL spray (Oxy Viocid 3.58% w/w) (manufactured by: Provet Veterinary Products Industry, and Tic. Inc., Ankara, Turkey). The skin suture was removed on the 17th postoperative day. After two months, the cow was healed completely without any complications, and the prognosis was good (Figure 11F).

Discussion

Horned cattle are perceived by beef producers to be more aggressive than polled (Goonewardene *et al.*, 1999). Horned animals have more problems due to the risk of injuries caused by horn thrusts amongst the animals, which can occur especially when they are kept in loose housing and during transport. Cow horns have caused facial lacerations and fractures of facial bones, abdominal injuries, ano-rectal injuries, urethro-rectal injuries, and non-obstetric vulvo-vaginal injuries (Ibrahim & Olusanya, 2014). In this case, the cow broke its horn while fighting with another cow. Dehorning is a delicate procedure that requires professional skill and expertise because; poor technique and management of wounds may result in ample complications that will lead to septicemia and may be death of the animal in addition to delayed healing (Jesse *et al.*, 2016). Horn amputation was done by the standard procedure (Flap Method) as suggested by Kumar (2005). Several dehorning methods such as using chemical agents, including sodium

hydroxide and calcium hydroxide are commonly used to burn the corium. Similarly, an electric hot-iron device is also used on calves up to twelve weeks of age (Marquette *et al.*, 2023a).

However, this method has certain drawbacks as it is also considered to be relatively painful. But in adult ones, it is not advisable rather use other methods such as dehorning wire and saw after administering appropriate local anesthesia and sedation. This agrees with the current case management in terms of age and surgical management. Horn amputation then leaves an open hole that reaches down into the sinuses of the head (Irrgang, 2013). Hay or other food particles should be prevented from being thrown on the head of freshly amputated cattle at feeding time. Therefore, the entire skin flap of the horn should be sutured by a near-far-far-near pattern using silk number 1/0 and a protective bandage should be applied with gauze or cotton to keep out debris (Baird, 2013). During dehorning, some behavioral signs observed include; head movement, tail wagging, tripping, and rearing (M'hamdi *et al.*, 2013). However, head rubbing, head shaking, extension of the neck; ear and tail flicking, and reduced rumination are postoperative signs and similar signs also reported by Sutherland *et al.*, 2002. On the contrary, the complication was not seen in this case and the wound was healed safely. In conclusion, dehorning is a delicate procedure that requires professional skill and expertise. So for early recovery and positive outcomes of the procedure, it should have to be managed early and regularly monitored for the progression of healing. Poor management of wounds may also result in grave complications that will lead to septicemia and death of the animal. Proper wound management and medication will give a better prognosis of the case. The owner was also advised to avoid leaving the cow in the yard after dehorning and additionally, to supplement good nutrition to facilitate wound healing.

3.1.11 Surgical management of orchitis in bull

Abstract

The castration of male cattle intended for beef production is a common practice in many countries. The most common techniques are surgical removal of the testicles (orchidectomy) and bloodless castration by crushing the spermatic cord with a burdizzo clamp. Besides its being a management practice in cattle production, there are other pathological conditions such as neoplastic growth, chronic orchitis, irreparable damage to the testicle or the scrotum, and

gangrenous orchitis in which open castration is recommended. A four years old local breed bull weight 180 kg was brought to the Veterinary Open air Clinic of Jimma University, with a history of unilateral swelling of the testicle. The owner was advised to withhold the bull from feed and water for 24 hours and 12 hours respectively before surgical operation. The bull was controlled and physically restrained with the aid of rope casting. After physically controlled, direct intratesticular injection of 2 ml of 2% lidocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd. India) to each testis was used to block the spermatic nerve and to minimize pain during surgical operation. After the surgical site was prepared aseptically and appropriate analgesia was achieved, the incision was made on the cranial surface of the affected testicle in the middle between the median line and the lateral margin. The testis was squeezed out through the incision. The two transfixation ligatures were put using 1-0 chromic catgut and the swollen spermatic chord was bluntly dissected out to remove the testicle. The second testis was removed through the other incision and a similar procedure was followed. In this case report, minor post-operative complications observed were inflammation at the surgical site and discomfort that regressed by itself after the fourth day. The incisional wound was healed on the 20th post-operative day.

Keywords: *Bloodless castration, Bull, Castration, Testes*

Introduction

The castration of male cattle intended for beef production is a common practice in many countries (Coetzee *et al.*, 2010). Castration decreases the management problems associated with aggressive and sexual behavior and the incidence of dark-cutting meat is lower among castrated than among intact male cattle (Foos, 2017). In addition, utilization of grazing land shared with female cattle is only possible if the sexual activity of young males is prevented. Castration is considered a stressor and potentially painful experience for the animal. Animal welfare concerns thus warrant that surgical procedures are performed in a way that causes the least stress and pain (Pieler *et al.*, 2013). Options for pain mitigation include local anesthesia and the use of analgesics such as non-steroidal anti-inflammatory drugs, opioid drugs, and α 2-adrenergic receptor agonists. To choose the least stressful by inference and least painful method castration techniques in cattle have to be compared concerning animal stress and pain (Marquette *et al.*, 2023b). The most common techniques are surgical removal of the testicles (orchidectomy),

bloodless castration by crushing the spermatic cord and thus inhibiting testicular blood supply with a burdizzo clamp, or inhibition of testicular blood supply with rubber rings placed on the neck of the scrotum (Ewoldt, 2008).

Besides its being a management practice in cattle production, there are other pathological conditions in which open castration is recommended (Guatteo *et al.*, 2012). Neoplastic growth, chronic orchitis, irreparable damage to the testicle or the scrotum, and gangrenous orchitis are common indications for complete orchidectomy in domestic animal species (vega, 2004). There is no enough literature on indications of open castration in bovine except as a management practice.

Patient history and physical examination

A 4-year-old local breed bull weight 180 kg was brought to the Veterinary Open air Clinic of Jimma University, with a history of unilateral swelling of the testicle (Figure 12A). According to the owner, the swelling occurred over two weeks and the animal resents manipulation. All vital signs were found to be in the normal range. The animal was feeding, ruminating, defecating, and urinating as normal. On examination, one testicle is considerably larger than the other. On further examination, the swelling was spread continuously throughout the body of the testicle and it extends up to the spermatic chord. There were no abnormalities detected on the scrotal skin and the penis (no signs of trauma or wound). Then it was decided to medically treat the condition with antibiotics and anti-inflammatory for three consecutive days before opting for surgery. But no recover what so ever was observed by the end of this treatment and therefore decision was made to surgically remove both testicles.

Preoperative preparation of patient

The owner was advised to withhold the bull from feed and water for 24 hours and 12 hours respectively before surgical operation. Upon arrival on the day of the appointment, the bull was rechecked for its vital health parameters. As the bull was found healthy and fit for the procedure, the decision was made to proceed to castrate the bull. The surgical site was prepared aseptically by washing with tap water and scrubbing with a 2% povidone iodine solution.

Anesthesia and animal control

The bull was controlled in lateral recumbency with adequate visualization of both testicles by extending and tying the hind limb with the corresponding forelimb by using rope casting. Then direct intratesticular injection of 2 ml of 2% lidocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd. India) to each testis was used to block the spermatic nerve and to minimize pain during surgical operation.

Surgical procedure

After the surgical site was prepared aseptically and appropriate analgesia was achieved, the incision was made on the cranial surface of the affected testicle in the middle between the median line and the lateral margin (Figure 12B). The skin, tunica dartos, and scrotal fat were incised and the tunica vaginalis was incised carefully so as not to prick the inside layer. The testis was squeezed out through the incision. Two forceps were applied to the swollen spermatic chord. Since in this case the testis was considerably enlarged extension of the incision was required. The two transfixation ligatures were put using no. 1-0 chromic catgut (Figure 12C) and swollen spermatic chord was bluntly dissected out (Figure 12D). The spermatic chord of the diseased testis was so thick that these ligatures were not secure enough; therefore the blood vessels were isolated and ligated separately and again transfixed with the whole chord. By using a surgical blade the vas deferense between the two ligatures and the spermatic chord was severed. The stump was checked for active bleeding and put back in place. The second testicle was removed through the same incision by incising in the middle between the median line and the lateral margin and the testicle was removed accordingly. Blood clots and excess tissue were removed from the scrotal sac, then it was flushed with normal saline and oxytetracycline HCL spray (Oxy Viocid 3.58% (w/w) (Manufactured by: Provet Veterinary Products industry, and Tic. Inc. Ankara, Turkey) was applied inside the scrotum. The surgical incision was left open to heal by the second intention. It took the animal approximately 1/2 hours after surgery to come into a standing position and walk without staggering.

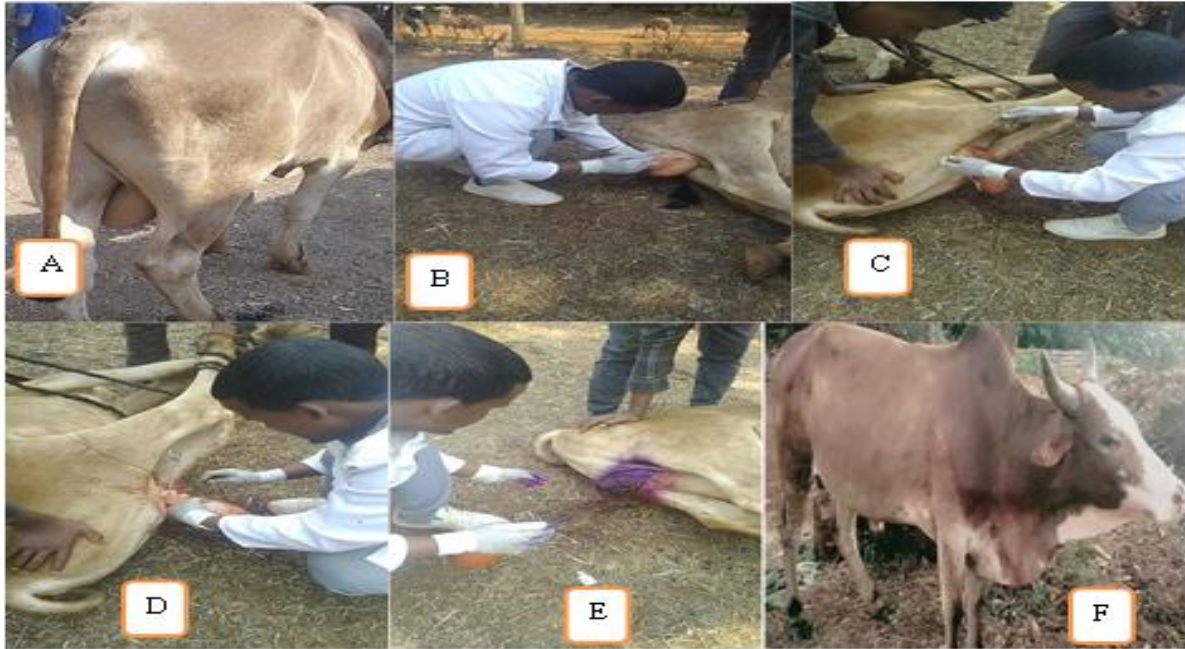


Figure 12: Surgical management of orchitis in bull

(A) Unilateral swelling of the testicle, (B) an incision was made on the affected testicle, (C) spermatic chords were sutured by two transfixation ligatures using no. 1-0 chromic catgut, (D) the spermatic chord was bluntly dissected out & testicle removed accordingly, (E) the wound was dressed daily using 2% povidone-iodine solution, and (F) the bull was recovered completely.

Postoperative care and complications

The wound was checked for bleeding and oxytetracycline HCL sprays (Oxy Viocid 3.58% (w/w) (manufactured by: Provet Veterinary Products Industry, and Tic. Inc. Ankara, Turkey) was applied to the wound to prevent secondary infection. An antibiotic (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (Pro&Strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) at 1 ml/25 kg IM was administered for three consecutive days. The wound was dressed daily using a 2% povidone-iodine solution (Figure 12E). Few post-operative complications were observed, and inflammation at the surgical site and discomfort was observed. On the 20th day of follow-up, the scrotal incision was completely closed. When the animal was visited on the 30th day the bull recovered completely without any additional complication (Figure 12F).

Discussion

The castration of male cattle intended for beef production is a common practice in many countries (Coetzee *et al.*, 2010). Castration decreases the management problems associated with aggressive and sexual behavior and the incidence of dark-cutting meat is lower among castrated than among intact male cattle (Marquette *et al.*, 2023b). Cattle are castrated in the field using either a closed or open castration technique that leaves the scrotal incisions open to heal by second intention (Stafford *et al.*, 2021). Irrespective of the chosen technique, the incidence of castration-related complications is generally regarded as low. The most common complications following castrations of cattle are excessive swelling, hemorrhage, incisional infection, scirrhous cords, and eventration (Abou-Ahmed *et al.*, 2012). In this case report, the owner was advised to withhold the bull from feed and water for 24 hours and 12 hours respectively before surgical operation. The bull was controlled and physically restrained with the aid of rope casting. After physically controlled, direct intratesticular injection of 2 ml of 2% lidocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd. India) to each testis was used to block the spermatic nerve and to minimize pain during surgical operation. After the surgical site was prepared aseptically and appropriate analgesia was achieved, the incision was made on the cranial surface of the affected testicle in the middle between the median line and the lateral margin. The testis was squeezed out through the incision. The two transfixation ligatures were put using 1-0 chromic catgut and swollen spermatic chord was bluntly dissected out to remove testicle. The second testis was removed through the other incision and similar procedure was followed. Generally, in this case report, minor post-operative complications observed were inflammation at surgical site and discomfort, that regressed by itself after fourth day. The incisional wound was healed on the 20th post-operative days.

In conclusion, castration is an elective procedure that is normally done to render the animal docile and easily controllable. Sometimes, castration is done to avoid accidental mating when the animal is not desirable for breeding purposes and in certain testicular abnormalities such as orchitis, irreparable traumatic injuries, and tumors. The standard surgical procedure involves open castration in which both scrotal sacs and the tunica vaginalis cavities are opened through two large incisions, the testes removed, and the wounds left open for postoperative care until complete healing takes place. Castration should be performed in young animals and if any complications are noticed like pain or inflammation it should be managed by proper use of

analgesics and anti-inflammatory. Improper castration in adult animals can lead to complications of orchitis. Based on the above conclusion, the following points were recommended: The procedure should be performed by observing the general surgical principles to minimize the complications of postoperative sepsis. The owner was advised to keep the bull restricted from meeting female animals until the wound was completely healed.

3.2 Case Reports on Small Ruminant

3.2.1 Surgical management of dystocia in doe

Abstract

Dystocia, or difficult birth, is a common condition in small ruminants (sheep and goats) resulting in huge economic losses to farmers either due to the death of newborns or dams or adversely affects dam fertility. Cesarean section refers to a surgical procedure in which an incision is given through the abdominal wall into the abdomen and uterus to deliver the kid. A five-year-old local breed goat weighting 40 kg estimated was presented to JUCAVM Veterinary Open air Clinic with a history of being unable to deliver the kid and frequent abdominal straining. The condition was tentatively diagnosed as a case of dystocia due to mal-position of the kid and incomplete cervical dilatation. It was decided to perform an emergency cesarean section to correct the condition. After the animal was physically restrained and the surgical site aseptically prepared, the surgical site was anesthetized by inverted L-block local analgesia of 2% lidocaine hydrochloride at a dose of 10 mg/kg body weight at left paralumbar fossa. Finally, the surgical site was painted using a povidone iodine solution. The incision, approximately 15 cm in length and running approximately vertically, was in the mid-paralumbar fossa. The skin was closed using nonabsorbable suture silk by an interrupted horizontal mattress suture pattern. Postoperatively, a doe was administered antibiotic (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) at 1 ml/25 kg through IM for five consecutive days to prevent secondary bacterial infection. In this case report, incomplete cervical dilatation and mal-position of the fetus were observed as the most common causes of dystocia in sheep and goats. In the present case, the left paralumbar fossa laparotomy approach was used for cesarean section in a recumbent doe to deliver a dead fetus.

Keywords: *Cesarean section, Dystocia, Goat, Small ruminant*

Introduction

In Ethiopia, small ruminants (sheep and goats) are reared for meat, manure, milk, skins, and wool (Mijena & Getiso, 2022). Small ruminants play a vital role in the rural economy, especially in areas where crop and dairy farming are not economical (El Aich & Waterhouse, 1999). Timely diagnosis and successful management of obstetrical emergencies in sheep and goats is critical for achieving a high survival rate in small ruminant practices. Due to the peculiar behavior of doe and ewe in expressing clinical signs, close observations become a necessity in identification of obstetric emergencies and their early interference. Dystocia is a common condition in small ruminants resulting in huge economic losses to farmers either due to the death of newborns or dams or adversely affects dam fertility (Al-Safi & Fahed, 2018). The incidence of dystocia is higher in goats compared to ewes. Dystocia may be of fetal or maternal origin (Ali, 2011). Fetal causes of dystocia include mainly oversize, mal-disposition, and monsters. Maternal causes of dystocia include mainly incomplete cervical dilatation (ring womb), narrow pelvis, and uterine torsion (Sharun & Erdoğan, 2019). Caesarian section is one of the most common surgical procedures performed by veterinarians in ruminant practice and is considered as a routine obstetric technique (Vermunt, 2008). It has high maternal and fetal survival rates, manages dystocia, and often it is less exhausting, speedier, and safer than fetotomy.

The goal of performing a cesarean section is also to maintain the future reproductive efficiency of the dam (Redden & Thorne, 2020). There are several types of anesthesia techniques used in the caesarian section such as proximal paravertebral nerve block, the distal paravertebral nerve block, the inverted L block, and infiltration of the incision or line block, etc. The inverted L block is a nonspecific regional block that locally blocks the tissue bordering the caudal aspect of the thirteenth rib and the ventral aspect of the transverse processes of the lumbar vertebrae (Edmondson, 2014). A successful prognosis depends on several factors, such as the skill of the surgeon, duration of dystocia, physical condition of the dam, surgical environment, concurrent disease, and presence of a live kid (Sultana, 2018). This case report describes a case of dystocia in doe due to malposition of the kid and incomplete cervical dilatation.

Patient history and physical examination

A five years old local breed goat weighting 40 kg estimated was presented at the JUCAVM Veterinary Open air Clinic with a history of being unable to deliver the kid and frequent abdominal straining (Figure 13A). Only the ear of the fetus was visible externally, and the doe vulva was swollen, which lasted over 24 hours without any progress. Vaginal palpation revealed a partially open cervix, and the head of the fetus was deviated downward towards the abdomen. A general physical examination revealed pale mucous membranes, normal respiration rates of 18 breaths/minute, an increased heart rate of 80 beats/minute, and a normal temperature of 38.5°C. Upon per-vaginal examination, only the forehead of the fetus was felt; no bad smell or lateral head deviation presentation of a dead fetus was confirmed, and it was difficult to remove the fetus by fetotomy due to incomplete cervical dilatation. The condition was tentatively diagnosed as dystocia due to the malposition of the fetus and incomplete cervical dilatation. It was decided to perform an emergency cesarean section to correct the condition.

Preoperative animal preparation

After proper restraining, the local breed of doe was placed on the right lateral recumbency, exposing the left flank. Shaving the hairs on the left paralumbar fossa, the surgical site was scrubbed with 2% povidone-iodine as an antiseptic. Finally, the surgical site was painted using a povidone-iodine solution. Before surgical intervention, the doe was given penicillin (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg) (Pro&Strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) at 1 ml/25 kg IM as prophylactic.

Anesthesia and animal control

Both physical and chemical methods were used to control the goat. The doe was placed in the right lateral recumbency with the aid of personnel rope casting to limit movement during surgery, and the surgical site was anesthetized by inverted L-block local analgesia of 2% lidocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd., India) at a dose of 10 mg/kg body weight at the left paralumbar fossa.

Surgical procedure

After the surgical site was prepared aseptically and appropriate analgesia was achieved, the incision was made in the mid paralumbar fossa approximately 15cm in length and running approximately vertically (Figure 13B and C). After the opening of the abdominal wall, the uterus

gravid horn was exteriorized using fetal extremities. Care was taken to prevent uterine wall rupture and spillage of contaminated fetal fluid into the abdominal cavity in cases of a dead fetus or delayed dystocia. The uterine wall was incised along the greater curvature of a pregnant horn, avoiding placentomes. The fetus was gently pulled out of the uterus by grabbing the hind legs (Figure 13D). The uterus is then flushed copiously using a sterile saline solution to remove all blood clots. The uterus was sutured with a continuous inverting pattern (Cushing pattern followed by a Lambert pattern) using natural absorbable suture catgut (size 1-0) suture material without penetration of the wall (Figure 13E). The incised peritoneum along with muscle layers was sutured using natural absorbable suture catgut (size 1-0) in a lock stitch pattern (Figure 13F). The subcutaneous tissue was also sutured with natural absorbable suture catgut (size 1-0) in a continuous pattern. The skin was closed using non-absorbable suture silk by an interrupted horizontal mattress suture pattern (Figure 13G).



Figure 13: Cesarean section in doe

(A) Per-vaginal examination, (B) skin incision is put on the left paralumbar fossa, (C) carefully dissected through subcutis and layers of muscles, (D) incision on the uterine body and removed the dead fetus by traction, (E) two-layer closure was used for uterus suturing, (F) the muscle layer was closed by lock stitch pattern, (G) skin and subcutaneous tissue were closed in

interrupted horizontal mattress suture pattern, (H) immediate after surgery the dam stood up, and (I) skin sutures was removed after 10 days of surgery.

Postoperative care and complications

Post-operatively, the doe was administered antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (Pro&Strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) at 1 ml/25 kg through IM for five consecutive days to prevent secondary bacterial infection. Daily dressing of the suture line was performed with 2% povidone-iodine (Betadine®, Win-Medicare) and oxytetracycline HCL spray (Oxy Viocid 3.58% (w/w) (Manufactured by: Provet Veterinary Products industry, and Tic. Inc. Ankara, Turkey) was sprayed until healing of the surgical wound. The animals were then monitored for 10 days to observe any complications until complete healing and follow were continued for two months. No apparent complications were observed for the time of a month post-operative follow-up. The animal recovered and started feeding the next morning (Figure 13H). Skin sutures were removed after 10 days post-operatively and the incision site healed completely at the end of the follow-up with minimum scarring (Figure 13I).

Discussion

Dystocia or difficult birth is a common condition in small ruminants (sheep and goats) resulting in huge economic losses to farmers either due to the death of a newborn or dam or adversely affects dam fertility (Al-Safi & Fahed, 2018). Dystocia may be of fetal or maternal origin (Ali, 2011). Fetal causes of dystocia include mainly oversize, mal-disposition, and monsters. Maternal causes of dystocia include mainly incomplete cervical dilatation (ringwomb), narrow pelvis, and uterine torsion. Inadequate dilatation of the cervix has been reported as the most common reason for cesarean section in sheep and goats by various authors (Anderson, 2014, Anderson, 2012, Kumar *et al.*, 2013). In this case report, incomplete cervical dilatation and mal-position of a fetus were observed as the most common cause of dystocia in goats. In the present case, the left paralumbar fossa laparotomy approach was used for caesarean section in a recumbent doe to deliver died fetus using local infiltration anesthesia (inverted L-block) on the left flank.

The small and large intestines were well retained by the rumen, and the uterus was easily accessible. The uterine wall was incised along the greater curvature of a pregnant horn, avoiding placentomes. The fetus was gently pulled out of the uterus by grabbing the hind legs. The uterus is then flushed copiously using sterile saline solution to remove all blood clots to prevent adhesion formation. The uterus was sutured with continuous inverting pattern (cushing pattern followed by a lembert pattern) using natural absorbable suture catgut (size 1) suture material without penetration of the wall. The skin was closed using non-absorbable suture silk by interrupted horizontal mattress suture pattern. Antibiotic combination of procaine penicillin G and dihydrostreptomycin sulfate @ 1 mg/25 kg (Pro&Strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) were administered to prevent peritonitis resulting from contamination of the abdominal cavity with abnormal fetal fluids during the surgery, decrease the risk of incisional infection, and minimize the risk of endometritis associated with retained placenta. The most common complication recorded following surgery was retained placenta (Chenier, 2010). However, no complications occurred in the present case and the doe was fully cured up to 10 days of observation. Results suggested that cesarean section through the left paralumbar fossa is an effective method of resolving dystocia in small ruminants even if performed in delayed cases of dystocia. It was concluded from the presented case report that cesarean section was the fairly common surgical procedure to resolve dystocia due to incomplete dilation of the cervix and mal-disposition of the fetus. Double layer closure of the uterus with Cushing followed by Lambert suture pattern should be performed to prevent the leakage of fluid from the uterus and with stands quality from the contraction of the uterus, additionally resulting in normal healing for cesarean section. The successful preoperative and postoperative management and antiseptic dressing of surgical wounds for animals undergoing cesarean section is very important in preventing bacterial contamination of the wound.

3.3 Case Reports on Equines

3.3.1 Cesarean section in jenny

Abstract

Donkeys are economically very important animals in Ethiopia. The causes of dystocia are divided into those of maternal origin and those of fetal origin. The malposition of a long fetal

extremity or head deviation is the commonest cause of dystocia in equines. A twelve years old local breed jenny weighting 170 kg estimated and 4th parity was presented to the JUCAVM veterinary open-air clinic with a history of abdominal straining and dystocia. The donkey had been showing signs of parturition for the last 18 hours, and the water bags had ruptured within a few hours. Before the surgical operation, a general physical examination was evaluated, and there was a normal range. The surgical site was anesthetized by inverted L-block local analgesia using 2% lidocaine hydrochloride at a dose of 10 mg/kg body weight injection through subcutaneous and rope casting by personnel. The skin incision was made through the ventrolateral, and then subcutaneous tissue, external oblique muscle, internal oblique muscle, transverse muscle, and the peritoneum were incised layer by layer. The uterus was grasped and incised at a bloodless site, and the dead fetus was removed. The uterus was sutured in two layers using chromic catgut no. 1-0 in Cushing and, lastly, the Lambert pattern. The skin and subcutaneous were closed in a cross-mattress suture with non-absorbable suture material. A broad spectrum of antibiotics was administered post-operatively. The skin suture was removed after 12 days. The donkey was followed up and returned to full health without any postoperative complications.

Keywords: *Cesarean section, Dystocia, Equine, Jenny*

Introduction

Donkeys are economically very important animals in Ethiopia. The low-level development of the road transport network and the rough terrain of the country make the donkey the most valuable, appropriate, and affordable pack animal under the smallholder farming systems of Ethiopia (Wold *et al.*, 2004). There are an estimated 1.8 million horses, 377,000 mules, and 4.3 million donkeys working in Ethiopia harboring the largest population of donkeys in Africa and the second largest donkey population in the world after China. Equine species are seasonal, long-day breeding and parturition processes, and are very similar to other domestic animals in many ways, with some differences (Rezac *et al.*, 2013). Jenny is very similar to horse mares in many reproductive aspects. The gestation period is 365 to 376 days, but the variation is wide between 340 and 395 days, and birth is rapid and violent (Chauhan *et al.*, 2013). Although cases of dystocia or obstetrics in donkeys have been reported, their actual occurrence and nature are still

unknown, occurring in only 1–4% of all foals. The causes of dystocia are divided into those of maternal origin and those of fetal origin.

Maternal causes of dystocia arise from maternal-related factors such as improper cervical dilation, failure of uterine expulsive contraction (uterine inertia), and neoplasms of the vagina, vulva, and uterus. The most common fetal-related causes of dystocia are head deviation, forelimb flexion, breech presentation, and fetal malformations as well as hydrocephalus, ascites, anasarca, and hydrothorax (Khan, 2018). The pelvic size at birth is affected by the size of the fetus and the fatness of the dam which might partially obstruct the birth canal (Simões & Stilwell, 2021) (Khan, 2018). The present case was a record of abnormal head deviation with a narrowing pelvic cavity and its successful management to relieve dystocia surgically.

Patient history and physical examination

A twelve years old local breed jenny weighting 170 kg estimated and 4th parity, was presented to Jimma University Veterinary Open air Clinic with a history of abdominal straining and dystocia. The donkey was showing signs of parturition for the last 18 hours, and the water bags had ruptured within a few hours. There are no extremities of the fetus found at the vulvar orifice. On general physical examinations, the body condition of the donkey was good. Clinical findings: rectal temperatures were normal (37.50°C), respiration rates were 14 breaths/minute and heart rates increased to 55 beats/minute. During the per-vaginal examination, abnormal forelimbs and head deviation with a narrowing pelvic cavity and neck were palpated. So cesarean section was decided to perform due to vaginal delivery being difficult.

Preoperative preparation of patient

Before preparing the surgical site, Jenny was given prophylactic broad-spectrum antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (pro&strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) at 1 ml/25 kg IM. The Jenny was restrained in right lateral recumbence using rope casting by personnel to control the animal, and the left abdominal area was washed with water and soap, shaved, scrubbed with savlon, and then the surgical site was painted with povidone iodine solution.

Anesthesia and animal control

After the animal was physically restrained and the surgical site aseptically prepared, the surgical site was anesthetized by inverted L-block local analgesia using 2% lidocaine HCL (Lignocaine Injection Bp; Sakar Healthcare Ltd., India) at a dose of 10 mg/kg body weight.

Surgical procedure

After the surgical site was prepared aseptically and appropriate analgesia was achieved, a surgical operation was performed at the left ventrolateral oblique. The skin incision was made through the ventrolateral (Figure 14A) then subcutaneous tissue, external oblique muscle, internal oblique muscle; transverse muscle and the peritoneum were incised layer by layer (Figure 14B). The uterus was grasped and incised at a bloodless site (Figure 14C) then the dead fetus was removed (Figure 14D), placenta and evacuation of the fluid was practiced gently. After the evacuation of the uterus, it was sutured in two layers using chromic catgut no.1-0 in Cushing and lastly Lambert pattern (Figure 14E). Abdominal muscles were closed in two layers, peritoneum and transverse muscle together closed by simple interrupted with catgut no 1-0 and external and internal oblique muscles closed lockstitch pattern (Figure 14F). The skin and subcutaneous were closed in cross mattress suture with non-absorbable suture material and the wound was sprayed with cyclo spray drug (Figure 14G). The fetus was found dead following a cesarean section (Figure 14H).



Figure 14: Cesarean section in jenny

(A) The skin incision was made ventrolateral, (B) external oblique muscle, internal oblique muscle, transverse muscle, and the peritoneum were incised layer by layer, (C) the uterus was grasped and incised at the bloodless site, (D) dead fetus was removed from the uterus, (E) the uterus was sutured in two layers by Cushing and lastly Lambert pattern, (F) abdominal muscles were closed, (G) the skin was closed in cross mattress suture, (H) dead fetus and (I) immediate after surgery jenny stood up

Postoperative care and complications

After a few minutes the jenny stood up (Figure 14I) and was administered intramuscularly with injection analgesics tramadol hydrochloride (manufactured by: Human Well Pharmaceutical plc. Ethiopia) at 5 mg/kg for two days and post operatively antibiotic (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (pro&strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) at 1 ml/25 kg intramuscularly was administered for five consecutive days. The incision line was sprayed using oxytetracycline HCL (oxy viocid 3.58% (w/w) (manufactured

by: Provet Veterinary Products Industry, and Tic. Inc. Ankara, Turkey) and daily antiseptic dressing by povidone-iodine was continued until the wound heal. The skin suture was removed after 12 days. The donkey was followed up and returned to full health without complications.

Discussion

Dystocia in the equines occurs less frequently compared to other domestic animals, but when it occurs it is considered one of the true emergencies that equine practitioners encounter, where minutes make a difference in the survival of one of the patients (Purohit, 2011). The causes of dystocia in equine can be classified according to maternal and fetal associated origin, however, most records depict that fetal mal-disposition (flexion of limbs and deviation of head) and obstruction of the birth canal (Uterine torsion) are the most common cause of dystocia in equines. The report shows that the cause of dystocia was abnormal fore legs and head deviation that was palpated through peri-vaginally. Lateral head deviation of the head and neck appear to be the most common cause of severe dystocia in equines (Hassan *et al.*, 2020).

In this case report, after the animal was physically restrained and the surgical site aseptically prepared, the Jenny was anesthetized by inverted L-block local analgesia using 2% lidocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd. India) at a dose of 10 mg/kg body weight. Surgical site operation can be performed through a left ventrolateral oblique incision that enables easy access to the uterine body (Chandore *et al.*, 2013). The uterus was grasped and incised at a bloodless site, and then the dead fetus was removed. The uterus was sutured in two layers using chromic catgut no.1-0 in Cushing and lastly Lambert pattern. The skin and subcutaneous were closed in a cross mattress suture with non-absorbable suture material. The antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (Pro&Strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) at 1 ml/25 kg were administered post-operatively for five consecutive days. The skin suture was removed after 12 days. The fetus was found dead following a cesarean section. This might be due to failure of expulsion within normal time and suffocation before requesting assistance. In this case report, only the mare survived.

In conclusion, cesarean section is normally an emergency surgical procedure so it should be performed as early as possible for the life of the dam and/ or fetus under aseptic condition through a preferable incision site approach. The success of the operation depends on post-

operative care with antibiotics and management of the owner given to the patient. The owner was advised to post-operative care and management for a further few days.

3.3.2 Open castration in mule

Abstract

Equine castration is one of the most common male sterilization techniques performed in veterinary practice. The most common reason for equine castration is to prevent aggressive behavior, stop breeding animals with inferior pedigrees, and prevent testicular trauma, neoplasia, or inguinal herniation. The two most common techniques are either a closed or an open technique performed through two scrotal incisions made on either side of the median raphe. An eight years old mule weighing 250 kg estimated was presented to JUCAVM Veterinary Open air Clinic with the complaint of aggressive behavior to handle, and he asked us to resolve this problem. As the mule was found healthy and fit for the procedure, a decision was made to proceed to castrate the mule. The mule was controlled in lateral recumbency with adequate visualization of both testicles by extending and tying the hind limb with the corresponding forelimb. A direct intratesticular injection of 2 ml of 2% lidocaine hydrochloride at 0.5 mg/kg into each testis was used to block the spermatic nerve and to minimize pain during the surgical operation. The testis was prolapsed out of the tunic, and the spermatic cord was separated from the parietal tunic, cremaster muscle, and ductus deferens. The spermatic cord was ligated using cat gut no. 1-0, and below the ligature, both testes were removed. An oxytetracycline HCL spray (Oxy Viocid 3.58% (w/w)) was applied to the wound to prevent infection. An antibiotic (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) at 1 ml/25 kg was administered intramuscularly for three consecutive days. The incisional wound was healed without any postoperative complications after 20 days.

Keywords: *Aggressive behavior, Castration, Mule, Testes*

Introduction

Equine castration is one of the most common male sterilization techniques performed in veterinary practice (Klauser, 2014). The procedures are performed for the reasons to reduce or prevent aggressive behavior in animals unsuitable for breeding, testicular trauma, neoplasia, or

inguinal herniation. Several techniques have been described for castrations (Price *et al.*, 2005). The two most common techniques are either a closed or an open technique performed through two scrotal incisions made on either side of the median raphe (Ewoldt, 2008). Once the testicles are removed; the incisions are manually enlarged to facilitate drainage and prevent seroma formation or excessive swelling. Post-operative complications may occur due to the malpractice of equine practitioners. The majority of complications encountered after castration tend to be mild and resolve with minimal treatment, but more serious complications could be life-threatening (Kilcoyne, 2013). Complications that can arise following surgical castration include scrotal swelling or edema, excessive post-operative hemorrhage, infection, hydrocele, schirrous cord, peritonitis, penile trauma, omental herniation and eventration (Kilcoyne & Spier, 2021, Baldwin, 2024). Preoperative identification of risk factors for the development of complications can ensure that proper measures are taken to reduce these risks. The complications can be prevented by, appropriate general health evaluation of the animal and proper surgical technique like, careful ligation of spermatic cord, appropriate antibiotic therapy and during recovery period, by limiting exercise and avoiding keeping the animal with female animals (Kilcoyne & Spier, 2021).

Patient history and physical examination

An eight years old mule weighing 250 kg estimated was presented to JUCAVM Veterinary Open air Clinic with a history of aggressive behavior to handle. He asked us to resolve this problem. The mule was pre-surgically evaluated by various physiological parameters like heart rate, respiration rate, pulse rate, and mucous membrane color; they were found to be within the normal range. To manage aggressive behavior, open castration was decided.

Preoperative preparation of patient

As the mule was found healthy and fit for the procedure, a decision was made to proceed to castrate the mule. The incision site scrotal area was shaved and prepared aseptically by washing with tap water and savlon. Also, the incision site was scrubbed with a 2% povidone-iodine solution (Figure 15A).

Anesthesia and animal control

The mule was physically restrained with the aid of rope casting. The mule was controlled in lateral recumbency with adequate visualization of both testicles by extending and tying the hind limb with the corresponding forelimb. Direct intratesticular injection of 2 ml of 2% lidocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd., India) into each testis was used to block the spermatic nerve and minimize pain during the surgical operation.

Surgical procedure

After the surgical site was prepared aseptically and appropriate analgesia was achieved, the testicle was pushed to the tip by gently handling fingers to estimate the site and provide a sharp incision. Two parallel skin incisions were made parallel to the median raphe through the scrotal skin, tunica dartos, scrotal fascia, and parietal tunic, approximately 2 cm apart and 8cm long (Figure 15B). The testis prolapsed out of the tunic, and the spermatic cord was separated from the parietal tunic, cremaster muscle, and ductus deferens. The parietal tunic surrounding the testicle was freed of the scrotal fascia, and the parietal tunic of the cord was separated from the spermatic fascia, then two artery forceps were applied to the spermatic cord. The spermatic cord was ligated using catgut no. 1-0 (Figure 15C), and below the ligature, the testicle was severed by a surgical blade, and the testis was removed (Figure 15D). The second testis was removed through the other incision, and similar procedures were followed. The mule was standing immediately after castration, and there was no problem.



Figure 15: Open castration in mule

(A) Preparing the site of incision scrotal area, (B) placement of scrotal skin incision, (C) the spermatic cord ligation using catgut no. 1-0, (D) using a surgical blade the cord was severed below the ligature, (E) antibiotic was applied to prevent infection, and (F) on the 20th day, the scrotal incision was completely closed

Postoperative care and complications

The surgical site bleeding was observed, while oxytetracycline HCL sprays (oxy viocid 3.58% (w/w)) (manufactured by Provet Veterinary Products Industry and Tic. Inc., Ankara, Turkey) were applied on the wound to prevent infection (Figure 15E). An antibiotic (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (pro&strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) at 1 ml/25 kg was administered intramuscularly for three consecutive days. The wound was dressed for three days using a 2% povidone-iodine solution. On the 20th day of follow-up, the scrotal incision was completely closed (Figure 15F). The mule was recovered completely without any post-operative complications.

Discussion

The most common reason for the castration of equine is to prevent aggressive behavior and stop breeding of animals with inferior pedigree (Wilmot, 2007). The reason for the castration of a mule in this case was aggressive behavioral problems. Equines are castrated in the field using either a closed or open castration technique that leaves the scrotal incision(s) open to heal by the second intention. Irrespective of the chosen technique, the incidence of castration-related complications is generally regarded as low. In this case report, after the animal was physically restrained and the surgical site aseptically prepared, direct intratesticular injection of 2 ml of 2% lidocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd. India) to each testis was used to block the spermatic nerve and to minimize pain during surgical operation. The testicle was pushed to the tip by gently handling fingers to estimate the site and provide a sharp incision. Two parallel skin incisions were made parallel to the median raphe through the scrotal skin, tunica dartos, scrotal fascia, and parietal tunic, approximately 2 cm apart and 8 cm long.

The spermatic cord was ligated using catgut no. 1/0 and below the ligature surgical blade was used and the testis was removed. The surgical site bleeding was observed for a while and oxytetracycline HCL sprays (oxy viocid 3.58% (w/w) (manufactured by: Provet Veterinary Products industry, and Tic. Inc. Ankara, Turkey) were applied on the wound to prevent infection. An antibiotic (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (Pro&Strep; Hebei Yuanzheng Pharmaceutical Co., Ltd.) at 1 ml/25 kg was administered intramuscularly for three consecutive days. The most common complications following castrations of equines are excessive swelling, hemorrhage, incisional infection, scirrhus cords, and eventration (Searle *et al.*, 1999). The incisional wound was healed without any post-operative complication after 20 days. In conclusion, castration is an elective procedure that is normally done to render the animal docile and easily controllable. Sometimes, castration is done to avoid accidental mating when the animal is not desirable for breeding purposes and in certain testicular abnormalities such as orchitis, irreparable traumatic injuries, and tumors.

The standard surgical procedure involves open castration in which both scrotal sacs and the tunica vaginalis cavities are opened through two large incisions, the testes removed, and the wounds left open for postoperative care until complete healing takes place. Based on the above conclusion, the following points were recommended: The procedure should be performed by observing the general surgical principles to minimize the complications of postoperative sepsis.

The owner was advised to keep the mule restricted from meeting female animals until the wound gets completely healed.

3.3.3 Open castration in donkey

Abstract

Equine castration is performed to minimize aggressive animal behaviors that are unsuitable for the genetic pool and as a surgical intervention to treat testicular neoplasia, trauma, inguinal hernias, and torsion of the spermatic cord. The two most common techniques are either a closed or an open technique performed through two scrotal incisions made on either side of the median raphe. Five years old local breed male donkey weighing 200 kg was brought to JUCAVM Veterinary Open-air Clinic with a history of bites to the scrotum by a hyena. As the donkey was fit for the procedure, a decision was made to proceed to castrate the donkey. The scrotal area, which is bitten, was prepared by washing with tap water. The donkey was controlled both chemically and physically with the aid of rope casting. The testicle was pushed to the tip by gently handling it with fingers. The parietal tunic of the cord was separated from the spermatic fascia. The less vascular structures were ligated using Vicryl no. 2-0, and below the ligature, the testicle was severed by a surgical blade, and the testis was removed. The second testis was removed through another similar procedure. Then oxytetracycline HCL spray (oxy viocid 3.58% (w/w)) was applied to the wound to prevent infection. An antibiotic (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) at 1 ml/25 kg IM was administered for three consecutive days. The wound was dressed daily using a 2% povidone-iodine solution. After the third day, the swelling of the scrotum started decreasing and walked without reluctance after the 14th day of surgery. The scrotal wound was healed on the 25th post-operative day.

Keywords: *Aggressive behavior, Donkey, Open castration, Swelling, Testes*

Introduction

Equine castration is one of the most common male sterilization techniques performed in veterinary practice. Equine castration is performed to minimize aggressive animal behaviors that are unsuitable for the genetic pool and as a surgical intervention to treat testicular neoplasia, trauma, inguinal hernias, and torsion of the spermatic cord (Abou-Ahmed *et al.*, 2012). Several

castration techniques have been described in equines. The castration technique routinely used is based on second-intention healing of a scrotal wound, and the primary closure technique based on primary-intention healing of a scrotal wound has also been used (Abou-Ahmed *et al.*, 2012). Castrations are performed with the donkey either standing, sedated, or in a recumbent animal under general anesthesia. The two most common techniques are either a closed or an open technique performed through two scrotal incisions made on either side of the median raphe (Kilcoyne *et al.*, 2013). Once the testicles are removed; the incisions are manually enlarged to facilitate drainage and prevent seroma formation or excessive swelling (Hussen, 2018).

Postoperative complications may occur due to the malpractice of equine practitioners. The majority of complications encountered after castration tend to be mild and resolve with minimal treatment, but more serious complications could be life-threatening (Kilcoyne, 2013). Complications that can arise following surgical castration include scrotal swelling or edema, excessive postoperative hemorrhage, infection, hydrocele, schirrous cord, peritonitis, omental herniation, and eventration (Hodgson & Pinchbeck, 2019). The complications can be prevented by, appropriate general health evaluation of the animal and proper surgical techniques like, careful ligation of the spermatic cord, appropriate antibiotic therapy, and during the recovery period, by limiting exercise and avoiding keeping the animal with mare (Devine *et al.*, 2023). Ligation of the spermatic cord is recommended, to reduce the risk of postoperative complications (Koenig *et al.*, 2019). A thorough knowledge of male reproductive anatomy and physiology combined with a good surgical technique helps to reduce the rate of complications associated with the procedure. In this case report, a successful open castration in a donkey has been reported.

Patient history and physical examination

A five-year-old, male donkey weighing 200 kg estimated was presented to Jimma University Veterinary Open air Clinic with a history of bites on the scrotum by a hyena, and both testicles protruded from the scrotum (Figure 16A). Also, one of the testicles was already ruptured, and there is high bleeding (Figure 16B). Pre-surgery, various physiological parameters were evaluated, like heart rate (40 beats/minute), body temperature (37.5°C), and respiration rate (12

breaths/minute), which were found to be within the normal range. Finally, depending on the examinations and clinical findings, the donkey was found fit for the procedure, and the decision was made to perform an open castration to help manage the traumatized testicles of the donkey.

Preoperative preparation of patient

The donkey was checked for its vital health parameters. As the donkey was fit for the procedure, the decision was made to proceed with open castration. The scrotal area, which is bitten, was prepared by washing with tap water and savlon.

Anesthesia and animal control

The donkey was controlled physically with the aid of rope casting. The donkey was controlled in lateral recumbency with adequate visualization of both testicles by extending and tying the hind limb with the corresponding forelimb. Chemically restrained, with direct intratesticular injection of 2 ml of 2% lidocaine HCL (Lignocaine Injection Bp; Sakar Healthcare Ltd., India) into each testis was used to block the spermatic nerve and minimize pain during the surgical operation.

Surgical procedure

After the animal was properly restrained and anesthetized, the testicle was pushed to the tip by gently handling fingers. The parietal tunic of the cord was separated from the spermatic fascia (Figure 16C). The two artery forceps are applied to the spermatic cord. The spermatic cord was ligated using Vicryl no. 2-0 (Figure 16D), and below the ligature, the testicle was severed by a surgical blade, and the testis was removed. The second testis was removed through another similar procedure. Then cyclo spray was applied to the wound to prevent infection, and the surgical site was cleaned properly (Figure 16E). The donkey was stood up immediately after surgery and followed for a few hours to check for bleeding in the clinic, but there were no problems.



Figure 16: Open castration in donkey

(A) Both testicles protruded from the scrotum, (B) one of the testicles was already ruptured and there is high bleeding, (C) parietal tunic of the cord was separated from the spermatic fascia, (D) the spermatic cord ligation using Vicryl no. 2-0, (E) antibiotic applied to prevent infection, and the surgical site was cleaned properly and (F) on the 25th day of follow up the scrotal wound was completely closed

Postoperative care and complications

An ox tetracycline spray (manufactured by Provet Veterinary Products Industry and Tic. Inc., Ankara, Turkey) was applied to the wound to prevent secondary infection. An antibiotic (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (pro&strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) at 1 ml/25 kg were administered for three consecutive days intramuscularly. The wound was dressed daily using a 2% povidone-iodine solution and cleaned properly. The mild swelling of the scrotum and discomfort minor post-operative complications were observed until the third day after surgery and caused the donkey reluctant to move. After the third day, the swelling started decreasing and walked without

reluctance after 7th day of surgery. On the 25th day of follow up the scrotal wound was completely closed and there was a good prognosis (Figure 16F).

Discussion

The most common reason for equine castration is to prevent aggressive behavior and stop breeding animals with inferior pedigrees (Stout, 2005). The reason for the castration of the donkey in this case was due to the scrotum being bitten by a hyena. Equines are castrated in the field using either a closed or open castration technique that leaves the scrotal incisions open to heal by second intention (Owens, 2020). Irrespective of the chosen technique, the incidence of castration-related complications is generally regarded as low. In this case report, direct intratesticular injection of 2 ml of 2% lidocaine HCL (Lignocaine Injection Bp; Sakar Healthcare Ltd., India) into each testis was used to block the spermatic nerve and minimize pain during the surgical operation. After the testicle was pushed to the tip by gently handling fingers, the spermatic cords were ligated using Vicryl no. 2-0, and below the ligature, the testicle was severed by a surgical blade and removed. An antibiotic (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (pro&strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) at 1 ml/25 kg were administered for three consecutive days intramuscularly. Complications that result from castration, including scrotal swelling, edema, hemorrhage, omental herniation, eventration, penile trauma, bacterial infection of the spermatic cord, incisional infections, hydrocele formation, and peritonitis, have been reported (Kilcoyne & Spier, 2021).

Most postoperative complications are mild and not considered life-threatening, but eventration, hemorrhage, penile trauma, and peritonitis may be fatal. Postoperative swelling and edema of the prepuce and scrotal area are the most common complications of equine castration (Baldwin, 2024). Generally, in this case report, minor post-operative complications observed were mild swelling at the scrotum and discomfort that regressed by itself after the fourth day. The scrotal wound was healed on the 25th post-operative day. This finding was within estimate with May and Moll (2002), who reported scrotal swelling peaks 3–4 days after surgery and resolves completely in 10–12 days in horses. Castration sites need to heal from the inside out, and wound healing requires a second intention (Searle *et al.*, 1999). However, in the current case, complete scrotal

wound healing took 25 days. The prolonged wound healing in the present case might be attributed to the moderate degree of swelling observed in this donkey or species differences.

In conclusion, castration is an elective method that's regularly done to render the animal docile and easily controllable. In some cases, castration is done to avoid accidental mating when the animal isn't desirable for breeding purposes and in certain testicular abnormalities such as orchitis, irreparable traumatic wounds, and tumors. The standard surgical strategy involves open castration in which both scrotal sacs and the tunica vaginalis cavities are opened through two large incisions, the testicles removed, and the wounds left open for postoperative care until complete healing takes place. Based on the over conclusion, the following points were recommended: The procedure should be performed by observing the common surgical principles to minimize the complication of postoperative sepsis. The owner was advised to keep the donkey restricted from meeting female animals until the wound gets completely healed.

3.3.4 Wound management in jenny due to hyena bite

Abstract

Wounds of different forms are among the common health concerns that afflict working donkeys in many countries. A five-year-old local breed female donkey weighing 200 kg was brought to JUCAVM Veterinary Open air Clinic with a history of a hyena bite over the posterior body part six hours before. The donkey was controlled in dorsal recumbency and anesthetized with local anesthesia of 2% lidocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd., India) at a dose of 10 mg/kg body weight infiltrated circularly at the wound. After preparing the surgical site, the wound was thoroughly irrigated with normal saline to remove all loose and unviable skin. Since there was a loss of part of the tissue and there is sufficient skin available, there is less contamination or infection for closure. So, the wound was managed as delayed primary closure wound management by suturing the skin to prevent further contamination. The wound was regularly dressed with antiseptics until nearly healed. The donkey was administered antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) at 1 ml/25 kg I.M. for three consecutive days. The wound was treated with fly repellent by applying oxy tetracycline HCL spray (oxy viocid 3.58% w/w) to the wound. Hyena bites can be managed by different methods; either in open or closed methods of wound management. In the present

particular case, a hyena bite in the form of a laceration wound was managed in the form of delayed primary closure wound management. In this case report, there is surgical site inflammation, and irritations and postoperative complications are observed. The skin suture material was removed on the 14th day after a completely healed wound. Finally, depending on the phone communication, the donkey was successfully healed after one month.

Keywords: *Closure wound, Donkey, Hyena bite, Laceration wound*

Introduction

Donkeys are economically very important animals in Ethiopia (Wold *et al.*, 2004). The low-level development of the road transport network and the rough terrain of the country make the donkey the most valuable, appropriate, and affordable pack animal under the smallholder farming systems of Ethiopia (Dennis, 1999). There are an estimated 1.8 million horses, 377,000 mules, and 4.3 million donkeys working in Ethiopia harboring the largest population of donkeys in Africa and the second-largest donkey population in the world after china (Fasil & Yenewhunegnaw, 2017). Wounds of different forms are among the common health concerns to afflict working donkeys in many countries (Herago *et al.*, 2015). Due to the donkey's nature and the environment in which it lives, wounds frequently involve a significant amount of tissue trauma (Sánchez-Casanova *et al.*, 2014). In addition to mechanical injuries due to inanimate objects such as car accidents, kicks, and hyena bites are also common resulting from minor laceration to deep avulsion on exposed body parts especially in developing countries where management is poor, especially at night (Rahman *et al.*, 2020). The characteristics of the wound including the type, degree of contamination, location, size, and surrounding vascular supply can be readily evaluated upon presentation (Hendrickson, 2013). The type of wound e.g., laceration, abrasion, or puncture is a good indication of the wound's blood supply and contamination, as well as the viability of the surrounding tissue. Wounds can also be categorized by their degrees of contamination; clean, clean-contaminated, contaminated, or infected (Rosselli, 2024). Clean and clean-contaminated wounds are suitable for primary or delayed primary closure. Traumatic wounds are generally contaminated or infected wounds, which are not suitable for primary closure. Contaminated and infected wounds can be converted to clean wounds and closed primarily through debridement and lavage, or they can be healed via secondary or tertiary intention (Hendrickson, 2013). There are three main methods of wound management and

healing: primary closure, delayed primary closure, and second-intention healing (Schoonover, 2014).

Delayed primary closure is used for wounds that cannot be closed immediately due to excessive swelling or contamination (Elce, 2016). The wound is allowed to heal to a certain point by secondary intention. Excess granulation tissue may be allowed to form so that the skin expands over the defect. Following sharp excision of the granulation tissue, there is adequate skin to close the wound without excessive tension (Knottenbelt, 1997). Delayed primary closure entails a period of open wound management to establish a healthy wound bed until the wound edges can be approximated. Second-intention healing describes wounds that are left to heal without surgical correction via wound contraction and epithelialization. An understanding of the basic physiological processes involved in wound healing will aid the practitioner in developing the best treatment regimen for traumatic wounds (Pavletic, 2018). The initial assessment of a traumatic wound enables the practitioner to evaluate the blood supply to the wound, the viability of surrounding tissues, and any other factors that may inhibit or retard wound healing or increase the wound's susceptibility to infection (Grada *et al.*, 2018).

The location of the wound is important to take into account because certain areas have physiological advantages or disadvantages that affect wound healing as well as anatomical structures (Abdullahi *et al.*, 2014). Other anatomical considerations associated with the location of the wound include structure involvement, cosmetic importance, movement (wounds over joints vs. the trunk), and underlying bony prominences. All of these have implications for the wound's vascular supply; physiological factors associated with wound healing; and subsequently the best method of management for the wound. In the present particular case, hyena bite in the form of laceration wound was recommended to manage in the form of wound management with delayed primary closure.

Patient history and physical examination

A five years old female donkey weighing 200 kg estimated was presented to the Jimma University Veterinary Open air Clinic with a history of hyena bites over the posterior body part (Figure 17A) before six hours. The physical examination parameters were examined. Accordingly, the temperature, respiratory rate, heart rate, and pulse rate were 38.50°C, 72

breaths/min, 50 beats/min, and 52 beats/min, respectively. The mucous membrane was pink. All were within the physiological limit. The donkey was traumatized in the form of laceration wounds to the right part of the ventral abdomen, cranial to the hind leg, and a few contusions to the lateral thigh. Since there was a loss of part of the tissue and there is sufficient skin available, there is less contamination or infection for closure. Fortunately, the wound was unilateral, and the donkey was able to walk. Depending on the clinical examination, the case was diagnosed as a laceration type of open wound and was managed as delayed primary closure wound management as follows.

Preoperative preparation of patient

After physically restraining and stabilizing the animal, the hair surrounding the wound was shaved and washed with water and soap (Figure 17B). Thence, sterile drapes were put on and fixed to the donkey body by towel claps after positioning, stabilizing, and aseptically preparing the wound sites (Figure 17C).

Anesthesia and animal control

The donkey was physically restrained with the aid of rope casting. The donkey was controlled in left dorso-lateral recumbency and anesthetized with local anesthesia of 2% lidocaine HCL (Lignocaine Injection Bp; Sakar Healthcare Ltd., India) at a dose of 10 mg/kg body weight infiltrated circularly at the wound.

Surgical procedure

After preparing the surgical site, the wound was thoroughly irrigated with normal saline to remove all loose and unviable skin. Since there was a loss of part of the tissue and there is sufficient skin available, there is less contamination or infection for closure. Thus, the wound was managed as delayed primary closure wound management by suturing the skin with a simple horizontal interrupted suturing pattern with silk suture material to prevent further contamination (Figure 17D). Then, immediately after the skin was sutured, the donkey stood up and checked for bleeding (Figure 17E). After finishing the procedure, Jenny was sent home.



Figure 17: Wound management in jenny due to hyena bite

(A) Hyena bites over a posterior body part of the donkey, (B) the hair surrounding the wound was shaved and washed with water and soap, (C) sterile drapes were put on and fixed to the donkey body by towel claps, (D) suturing the skin to prevent further contamination, (E) immediate after the skin was sutured the donkey stood up and checking for bleeding, and (F) after 2 months the donkey was successfully healed

Postoperative care and complications

The wound was regularly dressed with antiseptics until nearly healed. The donkey was administered antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (pro&strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) at 1 ml/25 kg I.M. for three consecutive days. The wound was treated with fly repellent by using oxytetracycline HCL spray (oxy viocid 3.58%w/w) (manufactured by Provet Veterinary Products Industry and Tic.Inc., Ankara, Turkey) at the wound. The owner was also advised to maintain the cleanliness of the surgical site by preventing contamination. In addition, the owner was advised to inspect the overall discomfort and status of the wound in addition to providing a well-built shelter for his animal, which is wild animal-proof. In this case report, there is surgical site inflammation, and

irritations and postoperative complications are observed. The skin suture material was removed on the 14th day after a completely healed wound. Finally, depending on the phone communication, the donkey was successfully healed after one month (Figure 17F).

Discussion

The current case at hand is characterized by a wide area and laceration type of wound in which there is sufficient skin available and less level of contamination or infection for closure. This agrees with wound management of the horse by Dernell (2006), Anderson & Langley-Hobbs (2013), and Scalise *et al.* (2016), in which delayed primary closure of the wound is the preferred treatment for wounds that involve detachment of skin with the maintenance of an intact blood supply rather than secondary healing. Because tissue integrity and perfusion, wound repair processes, bacterial challenge, and host responses heavily influence infection if left open, this does not support the current case management, in which the wound was left open without suturing. The current case report was a mechanical injury due to a hyena bite. So this is similar to the study conducted by Addis and Tesfaye (2017), which found that hyena bites on working donkeys were very common and severe in the same locality. A hyena bite may cause tissue loss or even the death of the donkey, depending on the severity of the wound (Demelash Biffa, 2006). However, the donkey that survived the hyena bite was extremely painful, stressful, and undoubtedly the most critical welfare issue facing donkeys with varying degrees of wounds encountered at different anatomical sites. To some extent, mechanical injury to the integumentary system of a donkey, particularly a hyena bite of skin and associated structure, is one of the clinical conditions encountered in veterinary practice (Tadesse *et al.*, 2019). However, a hyena bite can be managed by different methods, either in an open or closed method of wound management. In the present particular case, a hyena bite in the form of a laceration wound was brought to the clinic and managed in the form of delayed primary closure wound management.

The donkey was administered antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (pro&strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) at 1 ml/25 kg I.M. for three consecutive days. In this case report, there is surgical site inflammation and irritation post-operative complications are observed. The skin suture material was removed on the 14th day after a completely healed wound. Finally, depending on the phone communication,

the donkey was successfully healed after one month. In conclusion, care of donkey wounds in the field can be challenging endeavor. Owners should perform much of the daily care and monitoring of equine wounds and thus can greatly assist or impede the progress.

3.4 Case Reports on Small Animals

3.4.1 Ovariohysterectomy in dog

Abstract

Ovariohysterectomy is the removal of the ovaries and uterus from a female dog to prevent pregnancy and certain types of diseases. A two years old local breed female dog weighting 20 kg estimated was brought to the Veterinary Open air Clinic of Jimma University with a history of second-parity for a spay procedure. The owner was advised to withhold the dog from feed for 12 hours and from water for 6 hours before coming to the clinic for the next-day appointment. The dog was pre-medicated using 0.1% Atropine sulfate @ 0.04 mg/ kg through IM, and sedated using xylazine at a dose of 2 mg/kg, through IM as a pre-anesthetic drug, and an induction dose of 5% ketamine at 10 mg/kg was given through the IV route. An incision was made on the ventral midline approach through the three layers (skin, linea-alba, and peritoneum) to expose the abdominal contents. The uterus was cut off just cranial to the ligature. Linea-alba and peritoneum, together with subcutaneous tissue, were sutured separately by simple interrupted by using catgut 2-0 and skin by interrupted horizontal mattress sutures by using nylon. The owner was advised to monitor the dog and manage the Elizabethan collar to prevent it from dislodging. There was a satisfactory outcome while the dog was observed on visit days. The skin suture material was removed on the 10th day after a completely healed wound. Ovariohysterectomy was done to control zoonotic diseases, to control unwanted litter, and to minimize reproductive tract diseases.

Keywords: *Dog, Ovariohysterectomy, Postoperative, Spay, Ventral midline*

Introduction

Ovariohysterectomy is one of the most routinely performed major abdominal surgeries in the veterinary practice (Arnold *et al.*, 2014). It is an irreversible technique that is used for the sterilization of female animals where surgery is done under proper general anesthesia and sterile

operating technique. Ovariohysterectomy (OVH) is the removal of the ovaries and uterus from the female dog to prevent pregnancy and certain types of diseases (Sontas *et al.*, 2012). This procedure should only be done if the dog is in a fit state to withstand general anesthesia. However, the procedure is contraindicated if the dog presents a generalized condition with hypothermia and dehydration. Ovariohysterectomy of female dogs is one of the most common and routine procedures performed in veterinary surgical practice but requires skills, experience, and safe anesthetic drugs (Bowlt *et al.*, 2011). There were two approaches used for ovarian hysterectomy, including the flank and caudal midline incision approaches (McGrath *et al.*, 2004). Some authors chose the caudal midline approach over the flank approach for ovariohysterectomy, and it is supported and used as the best technique in certain surgical texts (Howe, 2006).

The flank approach is less preferred because of several challenges encountered, including the difficulty of exteriorizing the entire uterine body, a dropped ovarian pedicle that may pose difficulty in recovering, and that it may be difficult to expose the opposite ovary and uterine bifurcation (Buote & Fransson, 2022). For regular contraceptive neutering, the optimal age for dogs is pre-puberty (Moxon *et al.*, 2023). Dogs have their first heat at 5 to 12 months of age. The benefits of Ovariohysterectomy include a reduction in reproductive tract diseases in bitches such as Pyometra and mammary neoplasia, a reduction in pregnancy and parturition-related disorders such as metritis, mastitis, and dystocia, a reduction in hormone-associated disorders such as vaginal prolapse in bitches, and a reduction in undesirable sexual behaviors (Maya-Pulgarin *et al.*, 2017). The disadvantages of Ovariohysterectomy are surgical and anesthetic complications, increased risk of neoplasia of various organ systems, obesity, and urinary incontinence in bitches (Yates & Leedham, 2019). Furthermore, several surgical techniques for OVH and their benefits and complications have been widely discussed for decades. Ovariohysterectomy is generally performed via the linealba.

Hemorrhage, adherence, urinary incontinence, and return to oestrus, including repeat surgery, are all possible complications (Howe, 2006). The behaviors suffering from the spaying of female puppies are competitive dominance (getting closer to guardians) and indiscriminate eating. In this case, the aggressive behavior increased after spaying. The primary symptoms of Ovariohysterectomy are population control, prevention of reproductive tract illnesses, and

removal of unwanted hormonal cycling behaviors. These complications and difficulties, however, may be dependent on the surgeon's experience with the procedure. The patient of the present case report had no preoperative antibiotic administered before the surgery. Complications associated with Ovariohysterectomy include hemorrhage, ovarian remnant syndrome, stump pyometra, stump granuloma, vaginoperitoneal fistula formation, ureteral trauma, accidental ureteral ligation, and urinary incontinence. The main objectives of a female dog's ovariohysterectomy are to reduce the stray dog population, decrease reproductive tract diseases, and decrease undesirable sexual behaviors (Acar, 2020). In this case report, a successful Ovariohysterectomy in a dog to control birth has been described.

Patient history and physical examination

A two years old local breed female dog weighting 20 kg estimated was brought to the Veterinary Open air Clinic of Jimma University with a history of second-parity for a spay or neuter procedure. Since he has other dogs in his house, could not keep another dog in his compound and he also asked me to spay the dog. A physical examination was performed on the dog, and there was no sign. The dog had good body condition and had normal mucous membrane color. The vital parameters measured for the dog were: temperature was 39.7°C, heart rate was 120 beats per minute, and respiratory rate was 28 breaths per minute. Then the decision was made to perform an ovarian hysterectomy under general anesthesia. When the owner was interested, I was appointed the next day to withhold food for at least 12 hours and water for 6 hours before the operation.

Anesthesia and animal control

The animal was pre-medicated using 0.1% Atropine sulfate @ 0.04 mg/ kg, IM and sedated using xylazine at dose of 2 mg/kg through IM, as a pre-anesthetic drug. Then induction dose of 5% ketamine HCL (manufactured by Neon Laboratories Ltd., India) at 10 mg/kg was given through the IV route. After aseptic preparation was completed, the dog was maintained using the same anesthetic agent, ketamine at 5 mg/kg, given through IV as needed throughout the surgical procedure.

Preoperative preparation of patient

The owner was advised to withhold the dog from feeding for 12 hours and from water for 6 hours before coming to the clinic for the next-day appointment. Upon arrival on the day of the appointment, the dog was rechecked for its vital health parameters. As the dog was found healthy and fit for the procedure, a decision was made to proceed and spay the dog. After proper premedication, the dog was positioned in dorsal recumbency on the operation table, and the mouth was tied with gauze to prevent biting during restraining. The area starting from the umbilicus to the pubis (surgical field) was washed with tap water and soap, shaved and washed again, scrubbed with savlon five times, and then painted with a 2% povidone iodine solution (Figure 18A). Thence, sterile drapes were put on and fixed to the dog body by towel claps after positioning, stabilizing, and aseptically preparing the incision sites, and surgical instruments were used during surgery.

Surgical procedures

After preoperative preparation of the dog, a ventral midline incision was made along the linea-alba, beginning about 3 cm caudal to the umbilicus and extending caudally for 6–8 cm. After the skin incision, the sheath of the rectus abdominus starts from the umbilicus and ends a few centimeters in front of the pubis incised. Using a pair of scissors, the subcutaneous connective tissue was bluntly dissected to visualize the linea-alba. Using toothed tissue forceps, the linea-alba was grasped in the middle, tented up, incised with a scalpel blade, and extended with a scissor. The peritoneum was also incised along the skin incision (Figure 18B). This means an incision was made through the three layers (skin, linea-alba, and peritoneum) to expose the abdominal contents. An index finger was used to locate the uterine horn by using the urinary bladder as a landmark. The uterus was withdrawn, and the ovary followed. The ovarian bursa was clamped across by artery forceps. The ovary was grasped between the thumb and index finger and withdrawn for ligation. The suspensory ligament of the ovary was ruptured by traction, and the ovary was withdrawn from the abdomen. Three artery forceps were applied for ligation of ovarian pedicle. Transfixation and double ligation were done with chromic catgut size 2-0 to legate the ovarian pedicle. The attachment between the ligature and the ovary was then severed. The severed stump was checked carefully for hemorrhage before returning to the abdomen. After removing one ovary, the other ovary was located and removed in a similar manner. The body of the uterus was withdrawn from the abdomen (Figure 18C). The uterine body, including the uterine artery, was ligated by transfixation and double ligation. The uterus was cut off just

cranial to the ligature. The uterine stump was checked for hemorrhage and returned to the abdomen. Linea-alba and peritoneum, subcutaneous tissue, were sutured separately by simple interrupted by using catgut no. 2-0 (Figure 18D) and also, the skin was sutured by interrupted horizontal mattress sutures with non-absorbable synthetic (nylon) suture materials (Figure 18E).



Figure 18: Ovariohysterectomy in dog.

(A) The Surgical site was shaved and washed with water and soap, (B) the peritoneum was incised along the skin incision, (C) the uterus was cut off just cranial to the ligature, (D) linea-alba, peritoneum, and subcutaneous tissue were sutured by simple interrupted, (E) Skin was closed by interrupted horizontal mattress sutures and (F) skin suture material was removed on the 10th day after a completely healed wound.

Postoperative care and complications

The wound was observed for hemorrhage and swelling. An antibiotic (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (pro&strep; Hebei Yuanzheng Pharmaceutical Co.,

Ltd., China) at 1 ml/25 kg was administered intramuscularly for five consecutive days. A tramadol hydrochloride (manufactured by: Human Well Pharmaceutical Plc., Ethiopia) at 2 ml/kg was injected as pain management for two consecutive days. The wound was sprayed with oxytetracycline HCL (oxy viocid 3.58% (w/w) (manufactured by: Provet Veterinary Products industry, and Tic. Inc. Ankara, Turkey). An Elizabeth collar made from locally available plastic material was placed on the dog neck to avoid self-inflicting trauma (self-mutilation). The owner was advised to restrict exercise. In this case report, there was a hypothermia complication that was observed during and after the surgical operation but resolved by placing the animals on a padded surface and supplied with extra bedding. The skin suture material was removed on the 10th day after a completely healed wound (Figure 18F). There was also a satisfactory outcome while the dogs were observed on all visit days and there is a good prognosis.

Discussion

Every year millions of unwanted puppies are born. About 75% of worldwide dogs, often referred to as stray, are free to roam and reproduce (Smith *et al.*, 2019). Every year between 8 and 10 million dogs enter shelters and 4 to 5 million of these animals are euthanized due to only lack of homes. Esch & Petersen (2013) identified free-roaming dogs as a source of transmitting diseases to livestock and humans. Free-roaming dogs are mostly responsible for bites. Among the zoonosis, rabies is of particular concern for humans and livestock where dogs are responsible for more than 90% of the estimated 55,000 human deaths and for the millions of people that every year take post-exposure vaccines following bite (Esch & Petersen, 2013). Large scale culling has now been shown to be ineffective because immigration and increased birth rates quickly compensate for the losses. Additionally, culling dogs is not an effective approach to reduce the impact of zoonotic diseases such as rabies (Taylor *et al.*, 2017). Surgical sterilization is currently the main control method advocated to control free-roaming dog populations (Dugassa *et al.*, 2020). Many surgical sterilization techniques have been described for female dogs, including midline Ovariohysterectomy, early-age gonadectomy, laparoscopic OVH, and ovariectomy. OVH is considered to be the most reliable method in the control of dog population control as a part of rabies control programs in rabies endemic areas (Benavides Melo *et al.*, 2018). Similarly, in the present case ovariohysterectomy was conducted to control unwanted puppies. In the present case, an ovariohysterectomy was done through the ventral midline. This work was supported by Murugesan *et al.* (2020), who reported a ventral midline approach as the standard

technique for canine ovariohysterectomy. A plastic material was placed on the necks of the dogs to control self-inflicting trauma as it was recommended by Coutinho & Madureira (2021). There was also a satisfactory outcome while the dogs were observed on all visit days and the owners were asked by phone after a long time of surgical procedure. This result agreed with studies by Kyles *et al.* (2012), who performed ovariohysterectomy in dog even though there was no complication. In this case report, there was no complication, except hypothermia that was observed during and after the surgical operation. The hypothermia was managed by applying drapes and placing a charcoal fire in the room. However, in this case report, the dog recovered uneventfully without any noticeable complication. This finding was also reported by Azizunnesa *et al.* (2017). Absence of complication might be due to appropriate provision feed, water and dry kennel and good postoperative care (Dhaliwal *et al.*, 2023).

In conclusion, this surgical case report strongly recommends the caudal midline incision under general anesthesia and aseptic procedure for a positive outcome of the surgical activity. Ovariohysterectomy was done to control zoonotic diseases, to control unwanted litter, and to minimize reproductive tract diseases. Ovariohysterectomy can be considered a 100% safe birth control measure and humane rather than euthanizing homeless dogs. Furthermore, because of a lack of knowledge, veterinary hospitals or clinics, additional anesthetic agents' availability, and cost, these surgical techniques were more popular in urban society than in rural society. It is recommended for our rural society. They should neuter (spay) their female dogs to control the stray dog population and to prevent the spread of zoonotic infectious diseases, which are transmitted from dogs to humans. Furthermore, to have a healthy protected dog, rural society must adapt to spaying their female dogs. Furthermore, the government should import sufficient quantities of anesthetic agents to address the market availability and price issues.

3.4.2 Pre-scrotal castration in dog

Abstract

Surgical castration involves the removal of the testes and is commonly practiced on household pets to avoid unwanted animals. The approach for surgical castration is pre-scrotal in large dogs and scrotal technique in young canine and feline castrations. A three-year-old healthy local breed male dog weighing 10 kg was brought to Jimma university Veterinary Open air Clinic with a

history of inter-male aggression and mounting behavior. The owner was advised to withhold the dog from feeding for 12 hours and from water for six hours before coming to the clinic for the next-day appointment. The dog was pre-medicated using 0.1% Atropine sulfate @ 0.04 mg/ kg through IM, and sedated using xylazine at a dose of 2 mg/kg, IM as a pre-anesthetic drug, and the animal was transferred to a table for aseptic preparation. Then an induction dose of 5% ketamine at 10 mg/kg was given through the IV route. An incision was made on the midline in front of the scrotum. The cord was then clamped using three hemostats and double-ligated by transfixation ligation using a chromic catgut of 2-0 size after detaching a less vascular part, then severed to remove the testis. The skin wound was closed by three simple, interrupted sutures using silk. An antibiotic (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) at 1 ml/25 kg IM was administered for three consecutive days. In this case report, surgical management of castration in stray dog has been described to control the overpopulation of dogs and suppress the aggressive and mounting behavior of the dogs. A skin suture was removed on the tenth day of the surgical operation. On the 25th day of the visit, the wound was completely healed, with a small scar on the site of the incision.

Keywords: *Complication, Dog, Surgical castration, Surgical management*

Introduction

Castration is one of the most common surgical procedures performed in veterinary practice by small animal practitioners (Woodruff *et al.*, 2015). Castration is an essential management procedure that is often performed for behavior modification, ease of handling, and treatment of diseases associated with sex hormones (Palmer *et al.*, 2018). It is also an effective treatment and prevention of androgen-induced diseases, such as benign prostatic hyperplasia, perineal hernia, prostatitis, testicular tumors, and alopecia. In addition, castration reduces the risk of infectious diseases, trauma, and vascular diseases. Generally, castration can be done through surgical, chemical, or immuno castration methods. Surgical castration involves the removal of the testes (testicles) and is commonly practiced on household pets to avoid unwanted animals (Urfer & Kaeberlein, 2019, Kristoffersson, 2022). Surgical sterilization possesses certain social and physical values that make it advantageous for pets, owners, and society (de Lima *et al.*, Lima *et al.*, 2016). It is done as a method of contraception to aid in the pet overpopulation problem and to modify undesirable behavior, such as urine marking, inters male aggression, and mounting of other dogs (Palestrini *et al.*, 2021). It is almost the sole method for control of pet overpopulation globally.

A castrated stray dog takes up space in the dog population, preventing new dogs from appearing by using up resources, while still not being able to breed itself and give birth to new puppies (Bogel *et al.*, 1990). A population with a high percentage of castrated dogs contributes to a lower turnover rate in the population, which can help maintain vaccination coverage. Castration campaigns, conducted over long periods, may achieve complete effectiveness when used in isolation (Lima *et al.*, 2016). Even a small change in birth rates can make a dramatic difference in euthanasia rates over time through the impact on population dynamics. There are risks associated with castration of male dogs. For instance, it increases the risk of prostate carcinoma, hemangiosarcoma, mast cell tumors, lymphosarcoma, and lymphoma, as well as other kinds of cancer (Makchit, Bain, 2020). There are different methods of castration including the pre-scrotal mid-line approach, post-scrotal approach, and scrotal approach. The approach for surgical castration is pre-scrotal in large dogs and scrotal technique in young canine and feline castrations (Woodruff, 2013). The pre-scrotal technique has been taught as the only acceptable method of canine castration. However, scrotal castration has gained popularity in recent years as a safe

alternative to the pre-scrotal technique (Eze *et al.*, 2017). This technique may offer the advantage of reducing surgical time while not increasing complication rates over the traditional pre-scrotal approach. The scrotal approach advantages are it decreases incision length and subsequent surgical trauma, postoperative discomfort, self-trauma, and scrotal hematoma formation (Yiapanis *et al.*, 2021). Procedures that reduce anesthetic time and expedite the surgical procedure by even a few minutes can be of tremendous benefit. Despite, being a common surgical procedure in small animals, it has potential postoperative complications such as wound dehiscence, scrotal swelling, hemorrhage, subcutaneous bruising, scrotal hematoma, and self-trauma at the surgical site (Makchit). In this case report, surgical management of castration in stray dog has been described to control the over population of dog, to suppress the aggressive and mounting behavior of the dog.

Patient history and physical examination

A three-years-old, healthy local breed male dog weighing 10 kg estimated was brought to Jimma university Veterinary Open air Clinic with a history of inter-male aggression and mounting behavior. The owner requested us to castrate his dog to reduce its aggression. The dog was vaccinated two months before it was brought to the clinic. The owner did not observe any abnormality in the dog. The dog had good body condition. The body parameters of the dog were: body temperature 38.3⁰C, respiratory rate 27 breaths/minute, and pulse rate 82 beats/minute. On clinical examination, all parameters were within the normal range, and the color of the mucous membrane and hydration status revealed normal. Surgical castration was decided on the dog under general anesthesia.

Anesthesia and animal control

The dog was pre-medicated using 0.1% Atropine sulfate @ 0.04 mg/ kg through IM, and sedated using xylazine at the dose of 2 mg/kg, IM as a pre-anesthetic drug. Then induction dose of 5% Ketamine HCL (manufactured by: Neon Laboratories Ltd. India) @ 10 mg/kg was given through the IV route. After aseptic preparation was completed the dog was maintained using the same anesthetic agent, 5% Ketamine HCL (manufactured by: Neon Laboratories Ltd., India) @ 5 mg/kg given through IV as needed throughout the surgical procedure.

Preoperative preparation of patient

The owner was advised to withhold the dog from feed for 12 hours and from water for 6 hours before coming to the clinic for the next day's appointment. Upon arrival on the day of the appointment, the dog was rechecked for its vital health parameters. As the dog was found healthy and fit for the procedure, the decision was made to proceed and castrate the dog. Then the dog was sedated and put on a surgical table in dorsal recumbence and the mouth was tied with gauze to prevent it from biting during restraining. The incision site cranial to the scrotum at the level of ventral midline was washed with tap water and soap, shaved and washed again scrubbed with savlon five times, and then painted with 2% povidone iodine solution. Thence, sterile drapes were put on and fixed to the dog body by towel claps after positioning, stabilizing, and aseptically preparing the incision sites, and surgical instruments were used during surgery.

Surgical procedure

The surgical procedure was performed at the pre-scrotal site. After preoperative preparation, a sterile drape was placed to cover the other part of the body. After being covered with a sterilized draper keeping the open proposed area for the incision (midline in front of the scrotum), one testis was pushed forward with a forefinger to bring into the midline in front of the scrotum under the skin. An incision was made on the midline in front of the scrotum (Figure 19A) and the testis was removed by pressing between thumb and forefinger. The cord was then clamped using three hemostats and double ligated by transfixation ligation using chromic catgut of 2-0 size after detaching a less vascular part (Figure 19B), then severed to remove the testis. The second testis was removed through the same incision, a similar procedure was followed and the skin wound was closed by three simple interrupted suture patterns using silk (Figure 19C).



Figure 19: Pre-scrotal castration in dog

(A) Incision midline in front of the scrotum, (B) the spermatic cord was ligated by catgut, (C) suturing the skin, (D) wound was observed for hemorrhage, (E) Elizabethan collar was used to prevent self-mutilation and (F) on the 25th day visit, the wound was completely healed

Postoperative care and complications

The wound was observed for hemorrhage and edema formation (Figure 19D). Daily dressing of the wound using 2% povidone-iodine was applied to the surgical wound. Postoperative pain was managed using tramadol hydrochloride (manufactured by: Human Well Pharmaceutical plc. Ethiopia) at 2 mg/kg IM for two consecutive days. An antibiotic (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (pro&strep; Hebei Yuanzheng Pharmaceutical Co., Ltd., China) @ 1 ml/25 kg IM was administered for three consecutive days. Then wound was sprayed with oxytetracycline HCL spray (oxy viocid 3.58% (w/w) (manufactured by: Provet Veterinary Products Industry, and Tic. Inc. Ankara, Turkey). The most common complication is self-inflicted trauma to the surgical site but this was prevented using a locally made Elisabeth collar (Figure 19E). The skin suture was removed on the 10th day of the surgical operation. On

the 25th day visit, the wound was completely healed (Figure 19F) with a small scar on the site of the incision.

Discussion

Canine castration is one of the most common procedures performed in veterinary medicine (Hunt *et al.*, 2020). Therefore, castration is a good measure of population control (Raheem, 2017). In the present case report, castration was done to control the dog population since the dog was strayed. This work agreed with Adedeji *et al.* (2010) who suggested castration of stray dogs as one of the strategies for reducing dogs' population and indirectly by controlling roaming, may also contribute to reduce the incidence of dog bites and hence rabies transmission to humans usually associated with such bites (Raheem, 2017). In addition, this method was reported to have been used successfully to control rabies transmission from dog to human. There are different methods of castration including the pre-scrotal mid-line approach, post-scrotal approach, and scrotal approach. According to Booth (2003), and Hedlund (2007) a pre-scrotal technique was simpler to perform, the most common, not time-consuming, not requiring a lot of experience, the parietal vaginal tunic had not been opened thereby minimizing the risk of peritoneal contamination via the communication between the abdomens and only faint scar is the remnant of operation (Valdez, 2021).

In this case report, a pre-scrotal technique was employed, easily performed, and with good outcome which was agreed with the findings of these authors. On the contrary, Okwee-Acai *et al.* (2012) stated that the standard pre-scrotal surgical castration procedure is tedious, requires a lot of experience, and is time-consuming. In the pre-scrotal castration case, the results of post-operative wound healing were almost closed, dry, and clean and take a short time to heal. These results were quite similar to Gizawiny *et al.* (2004) and Okwee -Acai *at al.* (2012). Potential postoperative complications associated with castration includes: wound dehiscence, scrotal swelling, hemorrhage, subcutaneous bruising, scrotal hematoma, and self-trauma at the surgical site (Woodruff *et al.*, 2015). On the 25th day visit, the wound was completely healed with a small scar on the site of the incision. Hence, castration is recommended for the dog's overpopulation problem. In conclusion, castration is an optional procedure that usually aims to make the animal docile and easy to control. The standard surgical procedure involves open castration in which a

single, small pre-scrotal midline incision was made to exteriorize both the testicles through it, and the incision was closed with three simple interrupted suture patterns. The procedure should be performed by observing the general surgical principles to minimize the complications of postoperative sepsis.

3.5 Case Reports on Swine

3.5.1 Open castration in piglets

Abstract

Castration of male piglets is a common management practice carried out on commercial swine farms to prevent aggressive behavior and the occurrence of boar taint. The swine farm owner from Jimma town requested the Jimma University Veterinary Open air Clinic for the castration of his 3-week-old piglets estimated 8 kg, to prevent aggressive behavior of the piglets and boar taint to satisfy his customer's meat quality needs. Before the surgical procedure, a general physical examination was conducted to assess the piglet's health status, and all piglets were found to be healthy. Castration was performed on 10 male piglets. After aseptically preparing the surgical site, the piglets were restrained using both physical and chemical methods. Piglets were chemically restrained with an injection of 0.5 ml of 2% lidocaine hydrochloride subcutaneously along the length of both testicles to minimize pain during the surgical operation. The piglets were then physically restrained to prevent movement, and in each case, two sharp vertical incisions were made parallel to the medial raphe to externalize the testicles. Then, both testes were excised after two transfixation ligatures in the spermatic cord. The castrated piglets were administered antibiotics (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) at 1 ml/25 kg intramuscularly for three consecutive days to reduce the incidence of postoperative infection. Finally, the incision site was managed as open wound management, and an oxytetracycline HCL spray was applied to the incision site. The wound completely healed after 15 days.

Keywords: *Boar taint, Castration, Piglets, Testes*

Introduction

Castration refers to the removal of the testicles or the destruction of testicular function. Castration of meat-producing male animals has been widely used for a very long time (Needham *et al.*, 2017). There are several different techniques of castration including physical, chemical, and hormonal methods. Overall, surgical castration is the most common method performed by one in five veterinarians using an analgesic or local anesthetic at the time of castration (Prunier *et al.*, 2006). Surgical castration of male piglets is a common management practice carried out on commercial swine farms (Morales *et al.*, 2017). The indications for castration include reduction of aggressive male behavior, ease of management, and prevention of the occurrence of boar taint (Neary, 2023). Boar taint is the unpleasant odor produced by the skatole and androsterone in the fat when the meat is prepared. It is preferable to castrate piglets within the first 3 weeks of life (Jensen *et al.*, 2014). Although generally regarded as poor management, castration of larger pigs is occasionally indicated. The litter of piglets scheduled to be castrated should be clean and in good physical condition (von Borell *et al.*, 2020). If piglets in a litter are scouring, castration should be postponed. The area in which the castration is to be performed should be relatively clean and free of dust. If castration is to be performed in hot weather, it should be done early in the morning. The piglet is usually held by the hind limbs with the head down for the procedure (Holtz, 2010).

This type of restraint, however, carries a higher risk for complications. Lidocaine administered subcutaneously (0.5ml per site), over each testicle, and on each spermatic cord (0.5ml per site) is used to successfully reduce pain-related behavioral responses. However, piglet castration may also be performed without any form of anesthesia or analgesia within the first seven days of life (von Borell *et al.*, 2009). In piglets, older than a week, castration must be performed under anesthetic by a veterinarian with additional prolonged analgesia (Prunier *et al.*, 2006). Potential complications associated with surgical castration of piglets include hemorrhage, excessive swelling or edema, and infection (Morales *et al.*, 2017). These can reduce performance, compromise health, and in some cases, increase mortality (Schmid, 2021, Morales *et al.*, 2017). In this case report, open castration in piglets done at the farm level has been described.

Patient history and physical examination

The owner of a swine farm in Jimma town was visited by Jimma University Veterinary Open air Clinic staff. The swine farm owner wanted to castrate his 3-week-old piglet, estimated 8 kg body weight to prevent aggressive behavior and boar taint and satisfy his customer's meat quality needs. Before undergoing the procedure, the piglets underwent a general physical examination. Accordingly, all vital physiological parameters were found within the physiological limit. In addition, the nature and status of both testicles were also examined and found to be normal. Finally, the piglets were admitted for open castration through the opening of the scrotum by surgical incision. The castration procedure was performed to solve the farmer's problem.

Preoperative preparation of patient

The owner was advised not to feed the piglets for overnight fasting to avoid contamination of the operation site by defecation. Then a castration appointment was given for the next morning after overnight fasting. The long hairs were clipped from around the perineal area and scrotum and wiped with an antiseptic solution using a povidone-iodine solution. The piglets were cleaned after restraining by physical methods by assisting personnel.

Anesthesia and animal control

After the area of the incision was washed with water and scrubbed with a 2% povidone-iodine solution, each piglet was chemically restrained with an injection of 0.5 ml of 2% lidocaine hydrochloride (Lignocaine Injection Bp; Sakar Healthcare Ltd., India) subcutaneously along the length of both testicles to minimize pain during the surgical operation. Then the piglet was left waiting approximately 10–15 minutes for the anesthetic to take effect. The animal was then kept in dorsal recumbence, with animal attendants holding its hind and forelimbs in both conditions.

Surgical procedure

After preparing the testicle aseptically and well restraining, an adequate vertical skin incision of about 1cm length was done parallel to the median raphe onto each testicle by using a sterile scalpel blade after pushing the testicles forward through the scrotum and extending them depending on the size of the testicle (Figure 20A). After incising through the skin, fascial layer, and tunica vaginalis, the testicles were gently pulled out (Figure 20B). The spermatic chord was sutured by the two transfixation ligatures method with no. 1-0 chromic catgut (Figure 20C). The

spermatic chord was severed below the ligation, the testicle was removed (Figure 20D), and the severed end of the spermatic chord retracted into the inguinal region. A similar procedure was followed to remove another testicle. The incision site was checked for active bleeding before replacing the severed spermatic cord (Figure 20E), cleaned, and left open without suturing to allow discharges. Finally, the incision site was scrubbed with povidone-iodine solution, and an oxytetracycline HCL spray (oxy viocid 3.58% (w/w)) (manufactured by Provet Veterinary Products Industry and Tic. Inc., Ankara, Turkey) was sprayed on the incision area.



Figure 20: Open castration in piglet

(A) Fixing of the testicle and vertical incision on the scrotum, (B) tearing of the tunica vaginalis and pulling the testicle outside, (C) the spermatic chord was sutured by two transfixation ligatures method, (D) spermatic chord was severed below the ligation, (E) the incision site was checked for active bleeding before replacing spermatic chord and (F) there was no significant complication except little swelling at incision site in the first few days.

Postoperative care and complications

Postoperatively the castrated piglets were administered an antibiotic (penicillin G (24 mg/kg) and dihydrostreptomycin sulfate (30 mg/kg)) (pro&strep; Hebei Yuanzheng Pharmaceutical Co.,

Ltd., China) at 1 ml/25 kg intramuscularly for three consecutive days to reduce the incidence of postoperative infection. The wound was dressed with a 2% povidone-iodine solution and sprayed with oxytetracycline HCL spray (oxy viocid 3.58% (w/w)) (manufactured by Provet Veterinary Products Industry and Tic. Inc., Ankara, Turkey) for three consecutive days. There was no significant complication except a little swelling at the incision site in the first few days, which completely regressed after three days post-operation (Figure 20F), and according to the report of the owners, the piglets minimized their aggressive behaviors. The wound healed completely after 15 days. So, the prognosis for this procedure is very good.

Discussion

In veterinary practice, surgical castration of production animals is one of the most commonly demanded clinical services by farmers engaged in food animal production (Hernandez *et al.*, 2022). In general castration of piglets can be conducted in the open castration method (Rault *et al.*, 2011). In this case report, the use of surgical castration to solve pig farmers problems was demonstrated. The primary reason for castrating male piglets is to reduce boar taint, although important secondary benefits include reduced aggression and sexual behaviors such as mounting, that increase with the onset of puberty in entire males (Squires *et al.*, 2020). Castration of commercial pigs is routinely performed to decrease the incidence of boar taint and produce a more consistent taste and quality of meat (Hötzel *et al.*, 2020). The incidence of boar taint ranges from 10% to 75% after puberty and generally results in an unsuitable product for consumers.

Other advantages of castration include decreased aggressive behavior toward humans and other pigs and decreased sexual activity modifying behaviors results in less skin and carcass damage (Larzul, 2021). It is opined that the preferred time to castrate piglets is within one week of life (Hansson *et al.*, 2011). If castration is practiced after the seventh day of life, the authors recommended using a combination of local anesthesia and analgesia must be used with surgical castration to alleviate the pain and stress caused by this procedure. In this case report, a similar approach piglets were chemically restrained with an injection of 0.5ml of 2% lidocaine hydrochloride subcutaneously along the length of both testicles to minimize pain during surgical operation. A procedure of making two vertical incisions on each side of the scrotum to remove the testes was demonstrated in previous work (Pérez-Pedraza *et al.*, 2018, Anderson & Mulon,

2019). A similar procedure was used in the present surgical castration of piglets. The regular monitoring of the piglets was advised to the owner for any complications, such as active and prolonged hemorrhage. In the present case, all castrated piglets were recovered without significant complication except little swelling at the incision site in the first few days which was completely regressed after three days post-operation. The wound healed completely after 15 days.

4. SUMMARY OF COMPILED CASE REPORTS

In this case report, surgical operations were performed on a total of nineteen different species of animals presented to the Jimma University Veterinary Open air Clinic, and different surgical cases were performed in bovine, caprine, canine, equine, and swine species of animals. Out of the compiled cases, 17/19 (89.47%) were large animals, and 2/19 (10.53%) were small animals. Cesarean section, open castration, and prolapse were the most commonly performed surgical procedures during the case period of 12/19 (63.16%) patients, followed by hernia 2/19 (10.53%), ovariohysterectomy 1/19 (5.26%), rumenotomy 1/19 (5.26%), horn amputation 1/19 (5.26%), and wound and abscess management 2/19 (10.53%) patients. Post-operative complications were developed on 7/19 (36.74%) patients. The most common complication observed was inflammation in 4 (21.05%) patients, followed by postoperative surgical site local swelling in 3/19 (15.79%). During the case report period, 18/19 (94.74%) patients successfully recovered, whereas 1/19 (5.26%) died after 12 hours of surgical intervention, due to the absence of rumen motility and not presenting the animal earlier for surgical intervention (Table 1). Out of nineteen patients presented during the case report period, only one animal died due to the absence of rumen motility and not presenting the animal earlier for surgical intervention. Postoperative care, including pain relief, the administration of antibiotics, and dressing the incision site with antiseptics, were given to reduce postoperative complications. Moreover, each farmer was advised to take the necessary care after and before surgery. The rest of the 18 animals had satisfactory outcomes in the cases that were presented for surgical treatment.

Table 1: Surgical cases performed on different species, breeds, sexes, and ages of patients

Species	Total	Breed		Sexes		Ages	
	Number of patients	Cross breed	Local	M	F	≥ 2yrs.	≤2 yrs.
						(Adult)	(Young)
Bovine	11	-	11	5	6	10	1
	(57.9%)		(57.9%)	(26.32%)	(31.6%)	(52.6%)	(5.25%)
Caprine	1	-	1	-	1	1	-
	(5.25%)		(5.25%)		(5.25%)	(5.25%)	
Equine	4	-	4	2	2	4	-
	(21.1%)		(21.1%)	(10.5%)	(10.5%)	(21.1%)	
Canine	2	-	2	1	1	2	-
	(10.5%)		(10.5%)	(5.25%)	(5.25%)	(10.5%)	
Swine	1	1	-	1	-	-	1
	(5.25%)	(5.25%)		(5.25%)			(5.25%)
Total	19	1	18	9	10	17	2
	(100%)	(5.25%)	(94.75%)	(47.3%)	(52.7%)	(89.5%)	(10.5%)

Table 2: Type of operation performed, complication, and surgical outcomes

Species	Type of cases	Number of cases	Complications	Number of cases	%
Cattle	C- section	1	Local swelling & inflammation	1	5.26%
	Rumenotomy	1	surgical site inflammation, rumen motility absence & bloating	1(died)	5.26%
	Ventral abdominal Hernia	1	Local swelling & formation of seroma	1	5.26%
	Amputation of horn	1	-----	-----	
	Uterine prolapse		-----	-----	
	Cervico-vaginal prolapse	1	-----	-----	
	Rectal prolapse		-----	-----	
	Orchitis	1	inflammation & discomfort	1	5.26%
	Umbilical hernia	1	-----	-----	
	Paraphimosis	1	-----	-----	
Caprine	Abscess management	1	-----	-----	
	C-section	1	-----	-----	
Canine	Ovariohysterectomy	1	-----	-----	
	Open castration	1	-----	-----	
Equines	C-section	1	-----	-----	
	Open castration	2	Swelling of scrotum & discomfort	1	5.26%
Swine	Wound management	1	inflammation & irritation	1	5.26%
	Open castration	1	Swelling of scrotum	1	5.26%
Total cases		19	-----	7	36.8%

5. CONCLUSION AND RECOMMENDATIONS

Livestock is an important subsistence resource in improving the way of life of communities, especially in developing countries. However, these animals can be prone to various diseases and abnormalities which can be managed and treated by different veterinary services. One of the veterinary services is surgical treatment and management since the failure of surgical intervention provides no alternatives except for culling or the eventual loss of a productive or valuable animal through death. In this compiled case reports, horn amputation, herniorrhaphy, cesarean sections, ovariohysterectomy, rumenotomy due to ruminal impaction, paraphimosis, wound management, drainage of abscess, rectal prolapse, uterine prolapse, cervicovaginal prolapse, and open castrations were successfully conducted with different surgical treatment procedures and techniques at Jimma University College of Agriculture and Veterinary Medicine and premises of farm owners. Although there was no conducive place especially with regards to basic surgical equipment, instruments, and accessibility of anesthetic drugs, except the death of one patient following rumenotomy almost all performed surgical procedures were successfully recovered and cured in the study area.

Therefore, based on the above conclusions, the following recommendations were forwarded:

- ❖ Aseptic pre-, intra, and post-operative patient preparation and management should be needed to reduce or obtain free of intra and post-operative complications.
- ❖ Awareness should be created among local communities that surgery is important in some cases and that they should encourage early intervention for surgical cases.
- ❖ The veterinary clinics should be provide the necessary facilities for handling surgical cases.
- ❖ Further research is needed to better understand the prevalence of surgical conditions in different animal species in the region and to identify effective treatment strategies and should document more case reports of surgically treated cases.

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7. ANNEXES

Annex 1: Case history recording sheet

Date. _____

Case No. _____

Name of the clinic: VTC

Animal Detail

Species: Bovine ☐ Ovine ☐ Caprine ☐ Feline ☐ Canine ☐ Swine ☐ Avian ☐ Equine ☐

Breed ☐ Sex Male ☐ Female ☐ Age _____

Animal identification ☐ Name /if any/ _____

Owner detail

Owners' Name _____ Address Town _____ Kebele _____ House No _____
Occupation _____ Phone No _____

Case history

Clinical findings

Body Temp _____ °C Respiration rate _____ Breaths/min Heart rate _____ Beat/min
Ruminal Motility _____ /min Gut sound _____ VMM: Normal _____
pale _____ Congested _____ Jaundice _____ Cyanotic CRT: _____ Body Condition: _____ Superficial
Ln: PF _____ PS _____ MND _____ RPH _____ OTHER _____

Description of Case

Organ or system affected: Nervous ☐ Muscular skeletal ☐ Respirator ☐ Circulatory ☐
Digestive ☐ Urogenital ☐ Integument ☐ Other (specify) _____

SAMPLE TAKEN

Faeces ☐ Blood ☐ skin scraping ☐ Nasal swab ☐ Vaginal swab ☐ Ruminal Content ☐
urine ☐ Other ☐ _____

Tentative Diagnosis: _____

Differential Diagnosis List: _____

Laboratory Result: _____

Definitive Diagnosis: _____

Prognosis: _____

Observation and treatment

CLINICAL WORK TO BE PERFORMED: Surgical ☐ Medical ☐ Gynecology/Obstetric ☐

Follow-up/Quarantine

Medical treatment administered

Student in Charge: _____ Signature_____

Name of Staff in Charge: _____ Signature_____

Annex 2: Clinical parameters of some domestic animals

Animal	Temperature(^oC)	HR(Beats/Min)	RR(Breaths/Min)	CRT/ skin tenting
Cattle	37.5-38.5	60-70	30	Less than 2 sec
Sheep	39.1	60-70	19	Less than 2 sec
Dog	38.9	80-90	14-22	Less than 2 sec
Cat	38.5	100-130	20-30	Less than 2 sec
Donkey	36.7-38.3	28-44	8-16	Less than 2 sec
Pig	39	60-70	10-12	Less than 2 sec

Source: (Muir *et al.*, 2000)

Annex 3: Some useful anesthetic combinations

Animal	Drug Combination	Dose
Dog	Diazepam	0.5 to 1mg/kg IV
	Ketamine	5 to 10mg/kg IV
	Xylazine Ketamine	2mg/kg IM 5.5mg/kg IV
Cat	Xylazine	0.3 to 1mg/kg IM
	Atropine	0.3mg/kg IM
	Ketamine	5mg/kg IV

Source: (Yohannes *et al.*, 2018)

Annex 4: Recommended dosage for analgesics

Species	Analgesics	Dose	Route
Dog	Meloxicam	0.1 - 0.2 mg/kg	IV/IM
Food animals and equines		0.5 - 2 mg/kg	IV/IM
Cat		0.05 - 0.1 mg/kg	IV/IM
Small animals and small ruminants	Tramadol	2 – 5 mg/kg	IM
ruminants, small animals, Equines and swine	Lidocaine	0.5 - 5mg/kg	IM

Source: (Muir *et al.*, 2000)

Annex 5: Owner's Consent Form for Anesthetic and Operation

Owners name: -----, contact number: -----, address/kebele-----

Species: ----- Breed: ----- Age: ----- Colour: ----- Sex: -----

Weight: -----, Vaccination status: -----, patients local name-----

Operation/procedure: -----, Pre-anesthetic: Yes/no, -----

Pre-anesthetic blood sample: Yes /no, IV fluids: Yes/no (-----)

current medication: -----:

I hereby give permission for the above animal to be admitted for inpatient tests, treatment, observation, and any other procedures that may prove necessary. I understand that while every care and attention will be given to -----, the Practice cannot be held responsible for any untoward events that may occur.

I also understand that while every effort will be made to contact me in the event of unplanned procedures being necessary, the Practice must be permitted to perform any procedures they feel necessary to maintain the well-being of ----- . In extreme cases, this may include euthanasia if undue suffering is occurring and the chances of recovery are thought to be poor.

I understand that the full fee will be payable on the release of the animal.

Signature :----- (Owner/authorized agent)

Date: -----

Veterinarian -----, signature----- assistant name-----