

## Common Anatomical Evaluations of Herniation and Their Surgical Managements in Ovine and Caprine Libyan Native Breed

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### الملخص

الفتق هو حالة مرضية. تظهر في الكشف السريري غالباً على كونها كيس متحرك تحت سطح الجلد مليئ ببعض الأحشاء الهاربة من تجويف البطن. عبر فتحة طبيعية أو مكتسبة تكون نتيجة لعيب تشريحي في جدار البطن. تهدف هذه الدراسة الإكلينيكية إلى وصف التوظيف التشريحي للفتق الشائع في فصيلة المجترات المحلية مثل الخراف البربرية وكذلك الماعز المحلي. بالإضافة إلى تقييم التشخيص المبكر للفتق. والتحقق من نتيجة التدخل الجراحي وخصوصاً في الحالات الحرجة منه. لقد أجريت هذه الدراسة على إجمالي عدد 33 رأساً من المجترات الصغيرة. مقسمة إلى 25 رأساً من الغنم البربري وثمانية رؤوس من الماعز المحلي والتي تم تشخيصها حيوانات ذات فتق جراحي. أجريت هذه الدراسة في الفترة من فبراير 2009 حتى نوفمبر 2022 جميعها بكلية الطب البيطري بجامعة طرابلس حيث قسمت الحالات حسب الفتق الجراحي إلى 3 أقسام في كل من الاغنام والماعز وكانت على النحو التالي:-

الفتق البطني (14 خروف و3 ماعز). فتق كيس الصفن (4 خراف ورأس ماعز واحد)، أما في فتق السرة (7 رؤوس خراف و4 رؤوس ماعز . لقد خضعت جميع الحالات سواء الأغنام والماعز لدراسة كاملة تضمنت تاريخ الحالة وحجم حلقة الفتق ونوع الفتق وكذلك نتائج الإصلاح الجراحي. أظهرت نتائج هذه الدراسة إلى أنه من إجمالي الحالات التي كانت تعاني من الفتق (33 رأس ، كان أكبر عدد في استقبال الحالات من 2009 إلى 2022 في سنة 2014 بنسبة وصلت إلى 27.3% بينما كانت في فترتي عامي 2011 و2022 أقل عدد من الحيوانات بنسبة تراوحت 6.1 % ولقد تراوحت أعمار الحيوانات في هذه الدراسة من 5 إلى 48 شهرا حيث كانت أعلى الفئات العمرية المصابة 12 شهرا و24 شهرا بنسبة مئوية على التوالي 18.2% و 21.2% وتصدرت الغنم البربري نسبة الإصابة الأكبر 75.8% مقارنة بالماعز المحلي حيث كانت النسبة 24.2% . كما لوحظ في هذه الدراسة ان نسبة الإناث كانت الأكثر إصابة بنسبة 54.5% مقارنة بإصابة الذكور حيق سجلت 45%، كما اوضحت هذه الدراسة إلى أن الفتق البطني هو النوع الأكثر شيوعا في هذا القطيع بنسبة 51.5% ويليه الفتق السري بنسبة 33.3% ويتبعه فتاق كيس الصفن بنسبة 16.2%.

#### ABSTRACT:

**Background:** Hernia is a pathological condition, mostly presents as sac filled with some of escaped viscera which protruded through the natural or acquired opening; due to anatomical defect of the abdominal wall. **Aim of this study:** is to describe the Anatomical localization of the common hernias in ovine and caprine species, beside to evaluates the utility in diagnosis of different hernias of such swellings, and investigate the outcome of the surgical intervention of such a lesion with more concentration of the critical case of hernias. **Methods:** This study was carried out on a total number of 33 heads of animals, which were 25 heads of sheep and 8

head of goats, which were presented with different types of hernias needs to be a surgical repair, in the teaching clinical at college of veterinary medicine in the university of Tripoli Libya, and this study conducted in the period of February 2009 till November 2022. All patients were classified into groups according to species and, also to different anatomical sites of hernia into: sheep groups were divided to (abdominal hernia were 14 heads, scrotal hernia were 4 heads, and umbilical hernia were 7 heads), while in a goat groups (abdominal hernia were 3 heads, scrotal hernia was 1head, and umbilical hernia were 4 heads). All the cases of hernias in sheep and goats were subjected to full study included case history the size of the hernial ring, classification of hernias, and surgical repair, and outcome of the surgery. **Result:** Data analysis in this study has showed that from the total number of patients with Hernia were (33 heads). The numbers of cases were varies in number since 2009 till 2022. Hence the highest number of hernial cases were in 2014 were 27.3%, while period of 2011, and 2022 were 6.1%. And their age was range from 5 to 48 months, and the highest age groups were presented to the clinic most frequently was 12 months and 24 months with the percentile respectively 18.2%, 21.2%, hernia was higher incidence rate in barbarian sheep than Mahali goats with percentages of 75.8%, and 24.2% respectively. Female groups were more exposed to hernias than male groups with percentages of 54.5%, and 45.4% respectively. In addition our finding has showed that abdominal hernia most common type in small ruminates, followed by umbilical hernia, and scrotal hernia 51.5%, 33.3%, and 15.2% respectively. **Conclusion:** Hernias is a complicated lesion can affected domesticated small ruminants. This lesion needs an immediate surgical intervention to avoid worst prognosis. Hernias most commonly occurs within indoor rearing system, with unknown clear cause back to this lesion.

**Keywords:** Anatomy, Barbarian, Goat, Hernia, Herniorraphy, Mahali, Sheep

### **INTRODUCTIONS:**

A hernia is a protrusion of tissue through a defected surrounding wall of abdomen. This sudden lesion occurs most frequently in domesticated farm animals due to different causes mostly crowdedness. Anatomically hernias are divided into two groups, depending on whether they present in the cranial region of abdomen or caudally in the inguinal region, and each group anatomically it have multiple forms too (Catcott, *et al.*, 1972).

Indirect inguinal hernia which is usually surrounded by the inguinal region, and the viscera will escape through the internal inguinal ring (Al-Sobayil, Fahd A, *et al.*, 2007); it is the most common hernial type and is more commonly observed in farm animals (Greber, *et al.*, 2013). While direct inguinal hernia this type is similarly bounded by the inguinal triangle, but the viscera seems to be escapes directly through the muscular and fascial wall of the abdomen; it carries a minimal risk of blood vessels strangulation (Kitessa, *et al.*, 2022).

Whereas umbilical hernia commonly seen in newly born animals from few second of its life to days after parturition, it usually auto cure by the age (Al-Sobayil, F. A., *et al.*, 2007), on the other hand large or strangulated umbilical hernias will require a surgical intervention to correct it (Berge, *et al.*, 1966).

In regard to the abdominal hernias could be seen dorsally or ventrally on the lateral side of the animal body, mainly alongside to the costal arch or more caudally at the flank region of either side (Johnston, *et al.*, 2017). Mechanically by a violent force, or from the impact of blunt objects usually the justifying the cause of hernias in most reported Data, but they may result after overstretching also of the weakened abdominal muscles (Franz, 2008).

Hernias repair is the most common operation in general surgery, so many corrective procedures have been reported by (Fubini, *et al.*, 2016; McILwraith, *et al.*, 1984; Smythe, *et al.*, 1959). Fixation of a hernia, by manual reduction can return the tissue to its original compartment in order to reducing the mitigating associated symptoms, and avoiding adverse outcomes such as strangulation, and permitting elective surgical repair, which has lower morbidity than emergency repair (Nilsson, *et al.*, 2007). But manual reduction is contraindicated in case of strangulated hernias. In such cases, fluid replacement, and antibiotic therapy would be started for a better prognosis and to avoid necrosis septicemic shock (Frost, *et al.*, 2008).

Since early diagnosis helps to suggest the right interventions, and then in reducible hernia usually the abdominal contents can easily be returned to their previous abdominal site. Reduction not only allows symptomatic relief for herniated animal, also can reduces the risk of future incarceration (Amare, *et al.*, 2020). In some cases, non-operative treatment may sufficient for those animals have reducible hernias (Slatter, 2003). A large prospective cases in this clinic showed that; animals with less symptomatic, non-operatively treated have outcomes similar to those experienced by minimally symptomatic cases whom undergo surgical intervention.

Restricted hernia cannot easily be returned to its normal anatomical position (Tóth, *et al.*, 2019). The covering skin appear to be normal, the contents should not be tense, and bowel sounds can sometimes be heard (Arévalo-Rodríguez, *et al.*, 2021). The incarcerated tissue usually are bowel, omentum, or any of other abdominal viscera (Pratschke, 2014). A smaller aperture of herniation and adhesions can precipitate incarceration (Wilson, 2012). An incarcerated

hernia can often be reduced manually, especially with sufficient anesthesia (Cooper, *et al.*, 2004).

Obstruction is a big concern to the veterinarian; because the hernia is one of the three most common causes of obstruction (Ihedioha, *et al.*, 2006). In addition to causing signs of obstruction, an obstructed hernia has a more tense appearance than a non-obstructed hernia, even with proper sedation and technique, not every hernia can be manually reduced. In such cases, surgical reduction is more urgent to prevent strangulation (McAuliffe, 2014).

A strangulated hernia is a surgical emergency in which the blood supply to the herniated tissue is compromised, strangulation stems from herniated bowel contents passing through a restrictive opening that eventually reduces venous return and leads to increased tissue edema, which further compromises circulation and stops the arterial blood flows (Edwards, 2012).

Hernias may be detected by a routine physical examination (Fesseha, 2020), Characteristics of asymptomatic hernias are as follows; (swelling sac looks like at the herniated site, sometimes pain on press, and abdominal distension (Cooper, *et al.*, 2004).

## **MATERIALS AND METHODS:**

### **Animals:**

The present study was carried out on Libyan native bread animals of clinical cases (Fig. 1). Patients were of 25 heads barbarian sheep and 8 heads Mahali goats with total number 33 heads of domesticated small ruminates. Most of them were presented to the Veterinary Teaching Hospital, at Faculty of Veterinary Medicine, Tripoli Libya. This study was conducted since beginning of 2009 till the end of 2022. All cases were presented to the clinic with the same clinical signs but different anatomical regions of bulging swelling known hernias (Fig. 1). All cases

were needed an urgent surgical interventions to fix the defect and avoid bad prognosis out com. According to our record referred that, most of the patients that went undergo a surgical intervention were 25heads of sheep subdivided them according to the hernial type into I. abdominal hernia included 14 heads of sheep which divided into: 6 males and 8 females, II. Scrotal hernia were 4 heads of rams, and III. Umbilical hernia were 7 heads which were 2 males and 5 females. While in case of goats our record was showed that; I. abdominal hernia were 3 females, II. Scrotal hernia was only 1 male, and III. umbilical hernia were 4 heads 2 in each gender category and we adopted this pattern of subdivision to subdivide the cases into groups and then facilitates and detect the bio-statistical differences analysis in each category by using SPSS software. (See the Tables 1,2,3,4, and 5).

#### **Clinical signs and physical examination:**

The protocol in these cases should be Palpation of the swelling to check the hernial content, and to measure hernial ring diameter. Also record all the vital parameters like heart rate, respiratory rate and rectal temperature to each case as a preoperative routine work.

#### **Preoperative preparations:**

Each cases deprived of food 24 hours and water for at least 10 -12 hours before being admitted to surgery. Procaine penicillin (24 mg/kg), and dihydrostreptomycin sulfate (30 mg/kg) (Pen & Strep Norbrook, UK) were given intramuscularly 12 hour before surgery as prophylaxis.

#### **Anesthesia and animal control:**

Field block anesthesia involving by circular infiltration with 2% lidocaine hydrochloride (20 mg/ml, Jeil Pharma Co., Korea) at 3.4 mg/kg body weight around the border of abdominal, umbilical and scrotal hernias was performed. Besides circular infiltration of stated local anesthetic, each case was intravenously

sedated with a dose of 0.1 mg/kg diazepam (Intas Pharmaceutical, India). The position of the animal supposed to be keep on the side that helps and allow the surgeon to relocate the hernial contents to the normal anatomical position (Fig. 1).

### **Surgical repair:**

In case of abdominal and umbilical hernias groups, each case of anesthetic animal was restrained in the dorsal or lateral recumbent position, according to the type and hernial position. Povidone-iodine and ethyl alcohol 70% was applied to scrubbing the surrounding areas of incision site after complete shaving the hernial area to be aseptically ready. The site of the incision was covered with a sterile disposable drapes and fixed well by specific clumps. A skin incision was performed and the adhesions between the parietal peritoneum and elliptical skin were freely detached by using both blunt and sharp dissection. The hernial ring was exposed examined well and freshened, repositioned all the herniated visceral organs to the abdominal cavity and, gently loosed any adhesion may appeared, and then herniorrhaphy was done through stitched by a simple interrupted or interrupted horizontal mattress suturing pattern via using No. 4 chromic catgut (Ethicon, Scotland), poly (p-Dioxanone) suture (PDS; Ethicon, South Africa) or silk (Soie/Silk 42, Rue BENOIT. FRACHON- FRANCE) sutures. The subcutaneous tissue was sutured also by catgut or PDS (Fig. 1 A, 1 B).

While In case of scrotal hernias group, anesthetic animal was received anesthetic dose at the site of the operation by insert a linear infiltration, which was lateral to the scrotum. Then a linear skin incision was made followed by sharp and blunt dissection in order to the expose the hernial contents and normal scrotal contents as well, all abdominal contents were gently retracted into the abdominal cavity through the inguinal canal, and the external inguinal ring was tightened by sutured interrupted stitches patterns by a chromic catgut. A gross examination and

dissection of the exterior-raised testicle was applied to evaluate how efficient the effected Testicles, if appeared atrophied testis, then supposed to be removed immediately and followed by complete closure of the external inguinal ring using catgut, PDS or silk sutures.

Notice: In goats the anesthesia; each animal was anaesthetized with Xylazine (Rompun® 2%, Bayer Turkey) and Ketamine hydrochloride 1000 (Virbac-France) given I/V dose 0.1 mg/kg bwt.

#### **OUTCOME AND FOLLOW-UP:**

Each animal was given postoperative therapy with Combikel (Kela) Belgium-penicillin-streptomycin at a dose rate of 20ml. for the penicillin and 10mg/kg streptomycin for 5-7 days (Procaine benzlpenicillin 200mg (200 000IUm Dihydrostreptomycin as Sulphate 200mg ) and a prophylactic dose of anti-tetanus serum 1,500 IU subcutaneously. The incision site was dressed with diluted chlorhexidine solution at 2-day intervals for 3 days. The healing process was clinically evaluated and the surgical wound was completely healed within 15-20 days. Most cases either sheep, or goats the outcome went so good and no complications were recorded during, and post-operative surgery too.

#### **RESULTS:**

##### **1. The relation between time period of diagnosis and the total number of patients:**

Data analysis in this study has showed that from the total number of patients with Hernia were (33) as presented in (Table. 1) and the number of cases whom suffering with different types of hernias were varies in number since 2009 till 2022. Hence the highest number of hernial cases were presented to the clinic was in the year of 2014 with total percent 27.3%, while period of 2011, and 2022 were

showed a fewest number of cases with total percent 6.1% as presented in (Table. 1).

## **2. The Relation of Hernias with Different Age Groups:**

Results obtained in this study also has showed that, from the total numbers of patients with different types of hernias were (33 heads of sheep and goats), hernial lesion was observed from 5months of age till 48 months, and the highest age groups were presented to the clinic most frequently were 12 months and 24 months with the percentile respectively (18.2%, 21.2%) as presented in (Table. 2).

## **3. The Frequencies of Hernias in Barbarian Sheep V.S Mahali Goats:**

Moreover results has showed that from the total number of patients with hernia lesion were (33 heads of sheep and goats) as presented in (Table. 3) and illustrated in (Fig. 3) the barbarian sheep were more frequently presented to the clinic with compliance of different types of hernia compared with Mahali goats with percentages of (75.8%, and 24.2% respectively) as it appear in (Table. 3) and illustrated in (Fig. 3)

## **4. The Most Susceptible Gender to Different Hernias:**

This study has showed that from the total number of patients with hernia lesion were (33 heads of sheep and goats) as presented in (Table. 4) and illustrated in (Fig. 4) the highest frequent number of cases have presented to the clinic with different types of hernia were highly observed in female groups in both species compared male groups with percentages of (54.5%, and 45.4%) respectively as it presented in (Table. 4) and illustrated in (Fig. 4)

## **5. The Most Frequent Hernia in Small Ruminant Species:**

Current result of carried study presented that from the total number of patients with hernia lesion were (33 heads of sheep and goats) as presented in (Table. 5) and illustrated in (Fig. 5) the abdominal hernia was highly incident rate than

umbilical, and scrotal hernia as well with the percentile (51.5%, 33.3%, and 15.2%) respectively as it presented in (Table. 5) and illustrated in (Fig. 5).

#### **DISCUSSION AND CONCLUSION:**

Multifactorial conditions tend to run around occurrences of Hernias in small ruminants, and which have different congenital and acquired etiology that leads to several harmful effects, such as lowering the productivity and reproductively of the suffered either sheep and goat as well (Underwood, *et al.*, 2015). Different forms of the abdominal hernias are commonly seen with different anatomical location all over the abdominal wall of the affected animals, these site includes the ventral aspect of the abdominal wall, and/or ventrolateral aspect of abdominal wall also could be seen near to the midline (de la Garza, *et al.*, 2022). The size of these hernial opening varies in diameter and the nature of hernial contents depends on the site of the herniation. However it is a common condition, and some animal breeders try to overlook it to the point of neglect unless it results in some serious symptoms (Abu-Seida, 2021; Greca, *et al.*, 2001; Grenager, *et al.*, 2022; Hjort, *et al.*, 2012). In the carried study, the exact cause of the hernia could not be traced, but it might be justify to the weakness of the abdominal muscles beside a direct heavy mechanical trauma could the animal exposed to, and that lead to rupture of the surrounding tissues of the abdominal wall.

In terms of the incidence rate of abdominal hernia small ruminants such as *barbarian sheep* and *Mahali goats* the native breads of libya were the most common species suffering from these problems and that mainly due to indoor breeding system in the country and that system characterized by overcrowded and that agree with (Al-Sobayil, Fahd A., *et al.*, 2007). One published report has been done in Pakistan on goats was concludes that, female goats were the most affected animal with 53.8 %, than male goats with 20.5% respectively, also the same study

was reported that, the most affected age were a goats above 12 months old, these reported results were completely agreed with the result of the carried study (Das, *et al.*, 2012).

Moreover a report has been done in Nigeria by (Tanko, *et al.*, 2015), on small ruminates either, were conclude that; ovine species had the highest percentage of hernias followed by caprine and bovine species, and the different abdominal hernias were the most common type observed, and these conclusions have ensured of what been conducted in this study.

On other hands in Egypt was a study has been published by (Misk, *et al.*, 2001) and they revealed that; higher incidence rate of hernias were observed in buffaloes species, and mainly diaphragmatic hernia type followed by cattle umbilical hernia, and then sheep and goats with different type of abdominal hernias. These conflict finding from our point of view is due to the kind of animals that are reprehensible in that city and quantity of animals as well as the followed breeding system adopted in those African country.

In regard to the hernia contents usually in each sac of hernia will be present part of omentum, part of small and large intestine, unusually abomasum, gravid uterus and rumen with their blood supply (Gelberg, 2017).

No treatments of choice or specific medication to cure a different types of hernias. Veterinary surgeons usually classified the hernia into reducible with palpable rings hernias and that no surgical intervention is needed, and/or irreducible with impalpable rings which were due to severe adhesions of the contents with the hernial rings and hernial sacs, and that it most need to instantly a surgical intervention (Abdel-Misih, *et al.*, 2010; Abu-Seida, 2021; Bojrab, 2011; Greca, *et al.*, 2001; Grenager, *et al.*, 2022; Hjort, *et al.*, 2012).

**CONCLUSIONS:**

The diagnosis of different abdominal hernias is easy as the hernial ring can be felt in most cases and prognosis is guarded. There are a lots of protocols and treatment options to repair different types of abdominal hernias, and that depends on time of diagnosis and the size of the hernial opening, the choose of right application like bandages, clamps or ligatures which may be helpful in a few cases where the hernial ring is small and adhesion less. Surgical intervention (herrnioplasty), (herniorrhaphy) are the final optional surgery in case of the large opening of hernial abdominal wall.

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**Table 1.**

*The Most Frequency Cases Per Year.*

Admission Year	Frequency	Percent
2009	3	9.1
2010	4	12.1
2011	2	6.1
2012	4	12.1
2014	9	27.3
2015	3	9.1
2020	2	6.1
2021	4	12.1
2022	2	6.1

**Table 2.**

*The Relation of Hernias with Different Age Groups*

Susceptible Ages	Frequency	Percent
5 Months	1	3.0
6 Months	2	6.1
7 Months	2	6.1
8 Months	2	6.1
9 Months	1	3.0
10 Months	2	6.1
12 Months	6	18.2
13 Months	2	6.1
14 Months	2	6.1
16 Months	2	6.1
24 Months	7	21.2
36 Months	3	9.1
48 Months	1	3.0

**Table 3.**

*The Frequencies of Hernias In Barbarian Sheep VS Mahali Goats*

Small Ruminant Species	Frequency	Percent
Barbarian Sheep	25	75.8
Mahali Goat	8	24.2

**Table 4.**

*The Most Susceptible Gender to Different Hernias*

Animal Gender	Frequency	Percent
Male	15	45.5
Female	18	54.5

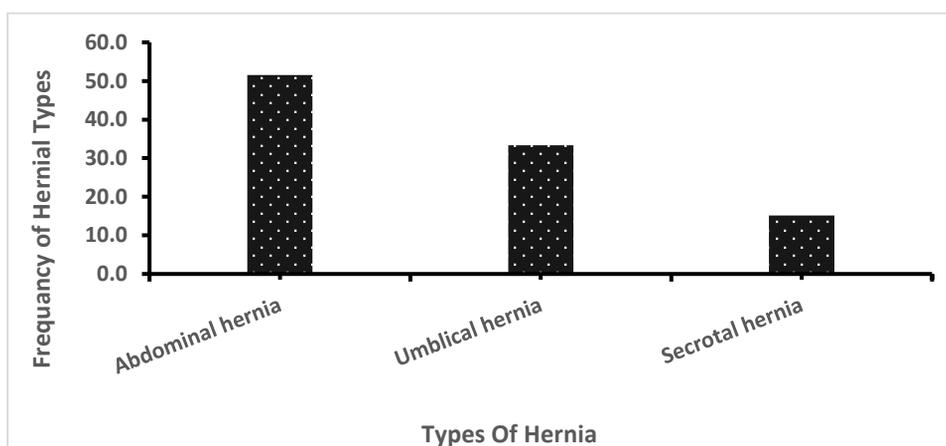
**Table 5.**

*The Most Frequent Hernia In Small Ruminant Species*

Types of Hernia	Frequency	Percent
Abdominal Hernia	17	51.5
Umbilical Hernia	11	33.3
Secrotal Hernia	5	15.2

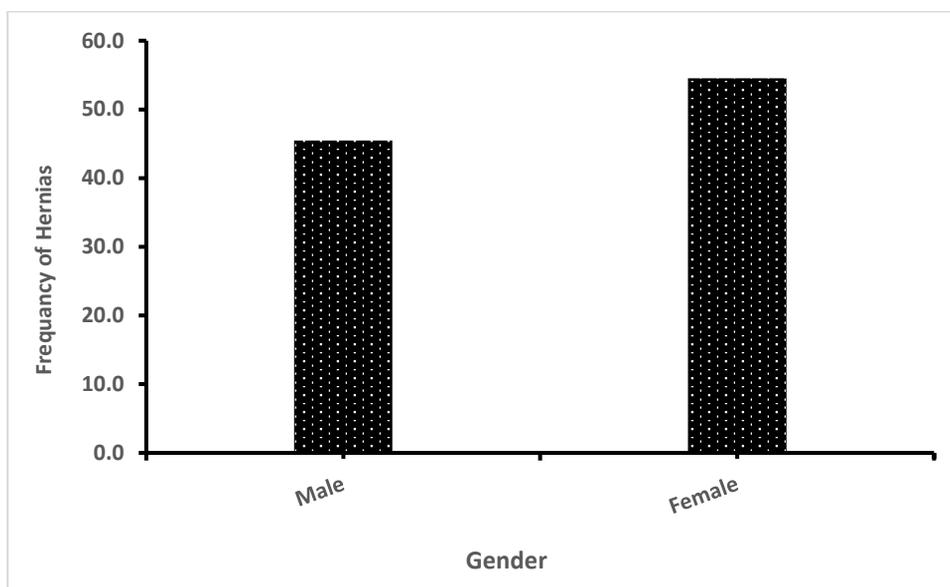
**Figure 5.**

*The Most Frequent Hernia in Small Ruminant Species*



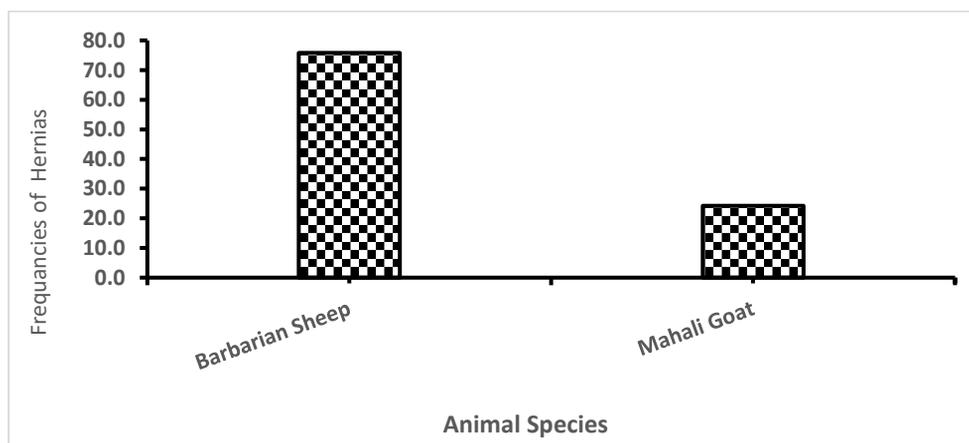
**Figure 4.**

*The Most Susceptible Gender to Different Hernias*



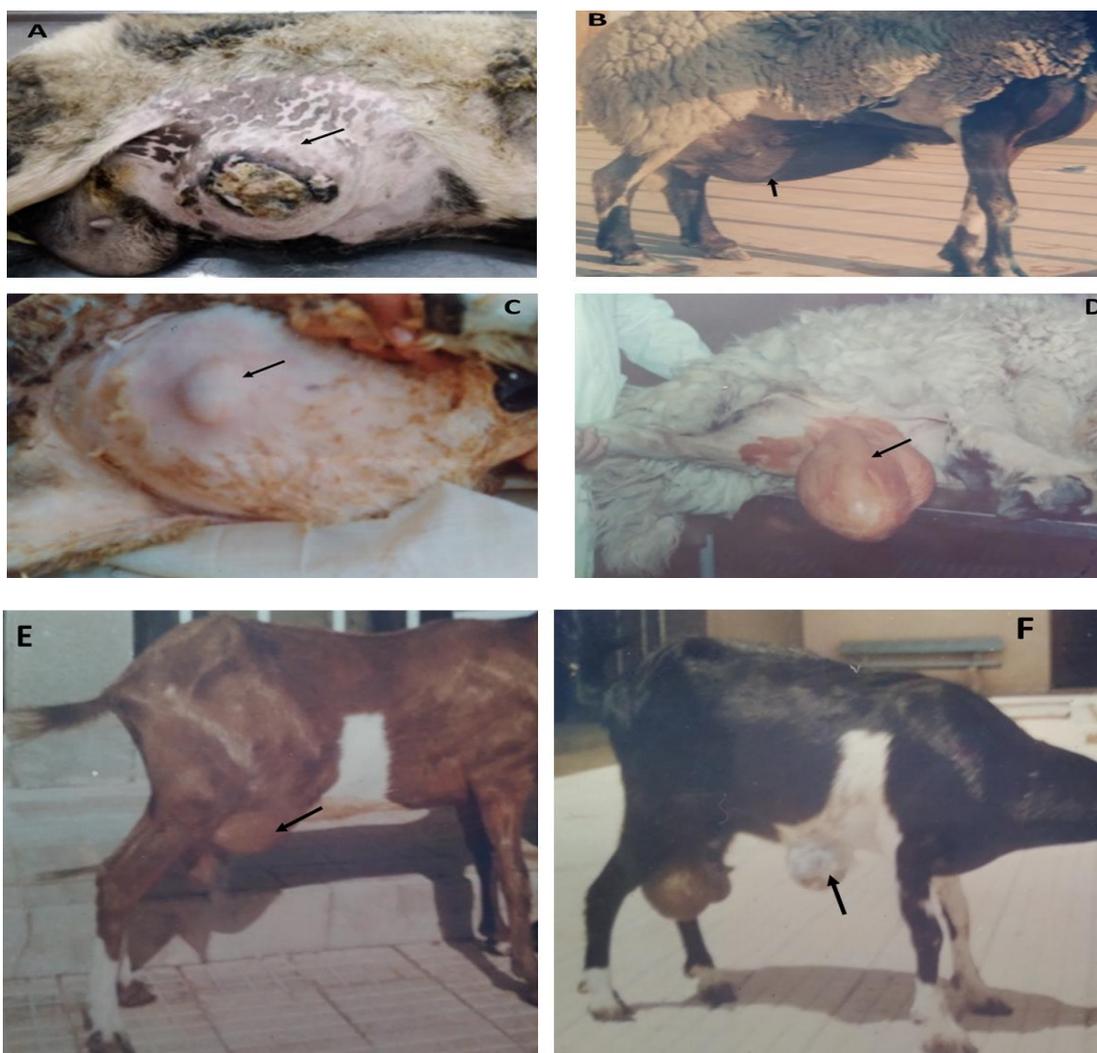
**Figure 3.**

*The Frequencies of Hernias In Barbarian Sheep VS Mahali Goats*



**Figure 1.**

Illustrate the different forms of hernias in small ruminants. A, B shows the abdominal hernia in 24months of barbarian ewes, while C illustrates the umbilical *hernia in 6months ewe*, and D appears the scrotal herma in 36months barbarian ram, whereas E shows the inguinal hernia in Mahali male Goat, and F elucidates the umbilical hernia in 6months Mahali female goat.



**Figure 2.**

*Illustrate the procedures of surgical intervention to different a hernias (herniorrhaphy). A presents the procedures of surgical intervention to fix abdominal hernia in 24months old barbarian ewe, while B shows the surgical intervention of umbilical hernia in 12months Mahali male goat.*

