**CHAPTER-I**

**INTRODUCTION**

Bangladesh is a densely populated country with an area 147570 square kilometers contains almost 14,97,72,364 peoples (5th Census2012). Its economy is basically depends on agriculture and livestock (BBS 2002). Livestock plays a vital role in nutrition - directly through the consumption of animal products by livestock owners and their families; and indirectly through the sale of animals and animal products as a source of income (FAO, 1999). It also plays an important role on GDP (5.3%) of Bangladesh. The incidences of diseases are very high although it varies with the species, age of animal season of year (Samad ,2001). Among them hernia is common in case of calves.

Hernia is defined as the protrusion of the contents of a body cavity through a normal or abnormal opening in the wall of that cavity either to lie beneath the intact skin or to occupy another adjacent body cavity. (Tyagei *et al., 2002*).it may be congenital or may be acquired within few weeks after birth (Fank,1970). A hernia may be classified according to location, functional alterations, contents and cause. According to location –external hernia.eg.-scrotal hernia, umbilical hernia and internal hernia, this lacks hernia sac. E.g.-diaphragmatic hernia.

According to functional alterations- Reducible hernia, where contents of hernial sac can be returned to the original position through hernial opening. Irreducible hernia, when the contents of the hernial sac cannot be returned to the original position through the hernial opening. (Tyagei *et al., 2002).*

According to causes -Traumatic hernia occurs due to trauma. E.g. - ventral hernia and Infectious hernia by destruction of abdominal wall due to infection.

A hernia is an abnormal protrusion, or bulging out, of part of an organ through the tissues that normally contain it. In this condition, a weak spot or opening in a body wall, often due to laxity of the muscles, allows part of the organ to protrude. A hernia happens when a weakened area of muscle, such as the abdominal muscles, allows tissue or an organ to bulge through. This commonly happens in the abdomen, where the weakness allows part of the intestine to bulge through. This can usually be seen as a bulge under the skin.

Hernia of the abdominal wall or external hernia is such surgical disease, which is characterized by outlet of the visceral organs from the place of their physiological placement through the natural channels or defects of the abdominal and pelvic wall. In such case all visceral organs covered by parietal peritoneum and skin are not damaged. Internal hernia is such disease; visceral organs hit the peritoneum pouch. It formed in the place of natural peritoneum fold or recess and generally kept in the abdominal cavity. A hernia may develop in almost any part of the body; however, the muscles of the abdominal wall are most commonly affected. Hernias cause pain and reduce general mobility. They never cure themselves, even though some can be cured (at least temporarily) by external manual manipulation. Depending on the nature of the protruding organ and the solidity of the structure through which it is protruding, a hernia may cause complications that are medically dangerous. One major danger of a hernia is that if bowel is contained within the protruding loop it may hinder or stop the flow through the intestine (occlusion). More serious still, if the loop itself becomes twisted outside its containing structure, or compressed at the point where it breaks through that structure (a strangulated hernia), the blood supply to the loop will also cease and the entire hernia will undergo tissue death (necrosis). This requires immediate emergency surgery.

A hernia is a protrusion of the contents of a body cavity through a weak point of the body wall. This may be from accidental or a normal anatomical opening, which does not completely fulfill its physiological function. It is a common defect in calves. Congenital umbilical hernias are of concern for heritability, although many umbilical hernias are secondary to umbilical sepsis. Multiple births and shortened gestation lengths are two important risk factors for congenital umbilical hernias in calves’ .these are probably the result of a polygenic threshold character, passively involving a major gene whose expression is mediated by the breed background. Sire and umbilical infections are associated with risk of an umbilical hernia in calves during the first 2 months of life. The frequency of umbilical hernia in the progeny of males ranging from 1-21% is consistent with the hypothesis that enhancer is the carrier of major dominant or co-dominant gene with partial penetrance for umbilical hernia. Hernias may be small at birth and gradually enlarge with age. The contents of an umbilical hernia are usually fat, omentum and, in some larger hernia, segments of small intestines. In cattle, large umbilical hernias are not uncommonly seen with an average frequency of 4-15% .they develop from improper closure of the umbilicus at birth due to the developmental anomaly or hypoplasia of the abdominal muscles or from manual breaking or resection of the cord close to the abdominal wall .

Several methods for hernial treatment have been described. Ligation of the hernial sac, use of clamps, suturing of the hernial sac and radical operation are normally performed to correct the umbilical hernia, although open herniorrhaphy is the most common method of veterinary treatment .despite its common use, open method of herniorrhaphy has many demerits especially bacterial infection that might cause recurrence of hernia. Whether closed herniorrhaphy can minimize these postoperative complications is unclear, although for an irreducible umbilical hernia there is no choice other than open herniorrhaphy. There is no data concerning comparison between the open and closed methods of herniorrhaphy in calves.

**Objectives of the work-**

To maintain the normal physiological condition of calves

To prevent secondary bacterial infections

To correct imperfect closure of umbilicus

To know the better methods of umbilical hernia managements

To know the different factors associated with the prevalence of hernia

**CHAPTER-II**

**REVIEW OF LITERATURE**

A hernia is the protrusion of an organ or tissue through an opening. The opening may be one caused by a tear in the abdominal wall or diaphragm or it may be a natural opening like the inguinal canal or femoral canal. A hernia is different from a prolapse. In a prolapsed, the protruded tissue is exposed outside whereas in a hernia it is covered by the skin (Venugopalan, 2000th).

**2. 1 Anatomy of umbilicus**

In the developing foetus the various component structures of the umbilical cord pass through the ventral abdominal wall. These comprise the umbilical vein that leads to the liver, two umbilical arteries, which arise from the iliac arteries and the urachus passing to the bladder.

At birth the amniotic membrane of the cord is torn and gradually the umbilical vein and the urachus close, although they temporarily remain outside the umbilicus. Both umbilical arteries retract as far back as the bladder but is some abnormally thick umbilical cords, this retraction is insufficient or completely absent, thus exposing the arteries to possible infection (Edwards, 1992). The risk of infection is greater when the cord is torn very short (Bouckaert and De Moor, 1965)

**2.1.1 Umbilical arteries**

The aorta carries blood caudally to the rear quarters and in the region of the last lumbar vertebrae the two large umbilical arteries that carry largely "venous" blood down on either side of the bladder through the umbilicus to the placenta where waste products and carbon dioxide can be exchanged for nutrients and oxygen (Roberts, 1999). More than 50% of the foetal cardiac output goes to the placenta (Dawes, 1961). Assali (1967) reported that in the foetal lamb at 130 days of gestation 48% of the blood volume was in the placenta and at term about 26% of the blood volume was in the placenta (Adams, 1969). The effects of allowing the cord to remain intact for a short time after birth to increase the blood volume in the newborn remains to be scientifically assessed. Hemoglobin values and red blood cell number in the foetus are muchhigher thanin the adult. These values rapidly drop to normal after birth. Foetal hemoglobin apparently has a greater affinity for oxygen and releases it more slowly than does hemoglobin in the adult. The foetus has a high heart rate, about twice thatof a young animal greatly promotiong a high cardiac out put per unit of body weight necessary to compensate for the low oxygen content of the foetal blood (Assali, 1967). The ductus arteriosus atrophies and eventually becomes the ligamentum arteriosum. The umbilical arteries are stretched at the time the cord is broken and they contract into the abdominal cavity and are closed by smooth muscle contraction. The umbilical arteris later become round or lateral ligament of the bladder Concomitant with theses changes after separation of the foetus from the placenta at birth is a marked rise of arterial blood pressure (Assali, 1968).

**2.1.2 Umbilical vein**

According to Dawes (1961) marked changes occur in the foetal circulatory system at the time of birth. The umbilical cord ruptures and the umbilical vein present in the umbilical stump apparently closes due to a smooth muscle effect. The remnant of this vessel from the umbilicus to the liver becomes in later life the round ligament of the liver. A smooth muscle sphincter apparently closes the ductus venosus within 5 to 30 minutes after separation of the umbilical cord. In later life it becomes the ligamentum venosus in the substance of the liver (Roberts, 1999)

**2.1.3 Urachus**

The urinary system is formed mainly from mesodermal tissue. The earlier or most primitive urinary or excretory organ in the embryo is the pronephros with two pronephric ducts, one on each side in the body wall dorsal to the peritoneum. The organ soon degenerates, to be succeeded by the mesonephros *or* wolffian body. This structure, using the earlier pronephric ducts now called mesonephric or wolffian ducts open into the common cloaca. Later in the development of domestic animals the mesonephrons, or wolffian body, degenerates and the metanephrons or true kidney develops more caudally as an outpocketing of the mesonephric ducts. These ducts become the ureters, which open, into the bladder. The latter structure opens caudally by the urethra into the amniotic cavity and cranially by the urachus into the allantoic cavity. During the development of the foetus, urinary wastes are discharged principally into the allantoic cavity and little passes through the urethra into the amniotic cavity (Roberts, 1999).

**2.1.4 Umbilical cord**

The umbilical cord connects the foetus and the placenta. In dogs and cats the umbilical stalk is attached to the zonary placenta on the opposite side of the uterus from the mesometrial attachment. It is composed of the allantoic and amniotic portions.

The length of the umbilical cord in the bovine foetus varies from 30-40 cm. In the dog and cat it is quite strong and short with a length of only 4 to 5 inches. In the dog, cat, and mare the cord usually rugptures by the actions of the dam after the foetus has been born or of the newborn itself. In domestic animals it is safer from the standpoint of possible hemorrhage or infection to allow the cord to break naturally by traction than to ligate and cut it as is done in humans. The point of rupture in the foal and calf is about 2.5 to 5 cm from the umbilicus. After rupture the arteries into the body, the vein collase, and urachus shrinks and ceases to function (Roberts, 1999). By the contraction of the arteries into the body tissues, provision is made for the prevention of bleeding from the navel. The umbilical vein collapses, the blood drains from it and the fluids in the umbilical cord drain out, often aided by the licking of the cord by the dam. The umbilical cord becomes necrotic, dries up and drops away in 7 to 21 days (Roberts, 1999). During the early stages of development the intestines of the foetus rest partly in the umbilical cord because of their early rapid growth. Later the body walls enclose this area and the umbilical ring contracts, forcing the intestines back into the abdominal cavity. If this does not occur, an umbilical hemi a results. A cross section to the umbilical cord in the amniotic portion travels the amnion as the investing membrane. Fine granular villous elevations of the amnion occur over the umbilical cord in cattle and to a lesser degree in horses, sheep, and goats (Roberts, 1999). Inside the investing amnion are two 'umbilical arteries and two umbilical veins which fuse in the amniotic portion of the cord near the foetus to form a single vein. The urachus expands just beyond the amniotic portion of the cord to open into the allantoiccavity (Roberts, 1999).

**2.2 Umbilical hernias**

The umbilical opening in the foetus allows the passage of the urachus and umbilical blood vessels. At birth, these structures are disrupted or severed and umbilical opening closed around the cord. The wound heals by cicatrisation and represents umbilicus in the later life due to improper closure of the umbilical opening at birth or from mal development of hypoplasia of abdominal muscles, a defect may remain in the mid-ventral line to form a congenital hernial ring. The acquired umbilical hernia occurs primarily due to manual breaking or resetioning of the cord too close to the abdominal wall. Excessive straining due to diarrhoea or constipation or infection of the cord prevention natural closure of the umbilical orifice may also result in umbilical hernia (Krishnamurthy, 2002).

Considerable variation is seen in the size and shape of the hernial sac and ring in calves. The great majority of umbilical hernias are reducible and in these cases diagnosis is straightforward. Pressure applied to the swelling will return the contents of the sac, usually greater omentum, to the peritoneal cavity. Small intestine, which is normally retained within the greater omental sac, is only rarely implicated in umbilical hernias in calves. Once the hernia has been reduced the effect in the abdominal wall can be clearly identified and its size, shape and the rigidity of its border assessed (Edwards, 1992)

**2.2.1 Constituents of hernia**

A hernia consists of the hernial ring, sac and contents. The ring may be formed due to a rupture in the abdominal wall (Ventral hernia), diaphramatic wall (Diaphragmatic hernia) or due to a persistent prenatal opening (umbilical hernia).

The hernial sac ismade of tissues that enclose the hernial contents. The wall of the sac usually contains the skin, muscularfibers, fibrous tissue and parietal peritoneum. The hernial sac is absent in case of diaphragmatic hernia. The contents of hernia include the organ (a loop of bowel) or tissue (omentum) or both (Krishnamurthy, 2002).

**2.3 Etiology**

Hernia occurring through a natural passage may be congenital, as is often the case with umbilical and inguinal hernia. The etiology of acquired hernia comprises predisposing and exciting causes.

**2. 3.1 Predisposing causes**

i. Umbilical hernia was described as being a probable sex-limited dominant character in male Holsteins but the mode of inheritance in females was uncertain. Gilman and Stringham (1953) reported that one or more pairs of autosomal recessive genes of low frequency caused umbilical hernia in Holstein calves. The condition was seen more often in females but was probably not sex-linked (Roberts, 1999).

ii. Weakness of the abdominal wall due to contusions, local inflammation, etc. also causes umbilical hernia (Venugopalan, 2000th).

**2.3.2 Exciting causes**

i. Increase in the infra-abdominal pressure due to straining from constipation, diarrhoea, during parturition, violent coughing, gastric or intestinal tympany, or from exertion of the abdominal muscles when playing or gamboling or some they efforts(O'Connor,1980).

ii. Direct violence due to falling on a blunt object (Venugopalan, 2000th).

**2.4 Risk factors for umbilical hernia**

Umbilical hernias, or omphaloceles are not uncommon in domesticanimals. Congenital umbilical hernia and inguinal hernia are common abnormalities in some animal species. Yet the epidemiological factors of the two conditions are not clearly understood (Priester *et al.,* 1970). An analysis of patient register of Bangladesh Agricultural University Veterinary Clininc depicts on incidence of umbilical hernia in calves to be 1.85% (Samad *et a1., 2002).* Herrmann *et al.,* (2001) and Botteon *et al., (*2003) reported 1.8% and 0.56% incidence of umbilical hernia in Germany and Brazil respectively.

**2.4.1 Effects of age**

Most acquired hernias develop about 3-4 weeks of age (Keown, 1976). Umbilical hernias mostly occurred between 1 and 3 months of age while calves below 1 month and those above 3 months are less commonly affected (Fretz *et al.,* 1989, Kahman *et al.,* 2001).

**2.4.2 Effects of sex**

The incidence of the disease in the female calves has been reported to be more frequent as compared to the male counterparts (Hayes, 1974, Brem *et al., 1985,* Singh *et al., 1989).* Females are at high risk for congenital umbilical hernia in cattle, horses and dogs but in horses and dogs but in horses and swine, males are at excess risk for congenital inguinal hernia (Howard and Hayes, 1974). Angus and young (I 972) reported that both male and female calves are apparently affected equally. Male calves were found to be mostly affected for umbilical hernia than female calves are apparently affected equally. Male calves were found to be mostly affected for umbilical hernia than female calves (Das and Hashim, 1996, Rahman *et al.,* 2001). Higher prevalence in males may be due to large swelling at umbilical region for preputial sheath, during development of such large preputial sheath, the ventral abdominal wall may not be properly developed and leads to the formation of hernial ring before birth. Moreover, navel infection after birth in male calves may be more frequent due to continuous moistening by urine (Rahman *et al., 2001)*

**2.4.3 Effects of breed**

Umbilical hernias are hereditary in cattle, horses and swine (Roberts, 1999). Most cases of umbilical hernia in horses are due to improper handling of the foal at birth. This includes manually breaking the cord instead of allowing itto break naturally and ligating the cord instead of leaving it untied.

Several breeds are at high risk for one or both types of hernias; these could be used as models for genetic research. The condition is comparatively more frequent in Holstein-Friesian (Zhigaehev, 1983). Rahman *et al.,* (2001) found that occurrence of the disease was highest cross-bred calves. Hayes (1974) and Kohli (1999) reported that pure Holstein cattle or the crossing of local cattle with this breed were more likely to suffer from congenital defects than local cartel.

**2.4.4 Effects of season**

Umbilical hernia predominantly occurs in the summer (March-June). Its occurrence, declines in the winter (Brem *et al.,* 1985 Dehoux, 1992, Rahman *el al.,* 2001, Samad *et al.,* 2002).

**2.5 Genetics of umbilical hernia**

One reason for varied inheritance in umbilical hernia is that' several genes controlling umbilical ring closure may mutate in different ways some due to dominant and some recessive gene in a Friesian outbreak a phenotypically normal sire, an affected son and a normal grandfather all left approximately half affected and half normal offspring. Environmental agencies prevent ring closure could also produce hernias indistinguishable from genetic hernias (Angus and Young, 1972.)

**2.6 Complications of umbilical hernia**

**2.6.1 Lesion**

Adhesion may take place between the sac and contents, making reduction difficult or impo. The fibrous tissue proliferation close to the hernial ring may cause constriction due to cicatrical contractions (Venugopalan, 2000th). Inflammatory adhesions have been found to unite the contents to the lining of the sac. When recent, the adhesions are fibrinous and easily ruptured, but in old cases, they are fibrous and resistant. They may be in the formof bands or plaques. They prevent complete reduction ofthe hernia, and may cause strangulation by constricting the bowel (O’Connor, 1980).

**2.6.2 Hydrocele of thesac**

Collection of fluid within the sac (hydrocele) may be due to exudations from the hernial contents. A constricted hernial ring favours such exudations (Venugopalan 2000th).

**2.6.3 Incarceration**

A hernia is said to be incarcerated when its contents very voluminous and cannot be reduced. This may be attributed to intestinal segments entering into the hernial sac or as a result of accumulation to intestinal contents (food materials) within the lumen of the herniated segment .The accumulated food materials reveal hard masses as water gets absorbed and these hard masses make reduction of hernia very difficult. They may also cause partial or complete obstruction of the bowel segment and thus favour further accumulation of food materials (Venugopalan 2000th).

**2.6.4 Torsion**

Torsion or twisting of the hernial -contents within the hernial sac interferes with the blood supply to the tissue and may lead to gangrene, toxaemia etc. (Venugopalan, 2000).

**2.6.5 Strangulation**

Compression caused by the hernial ring causing interference with the blood supply to the hernial contents is called strangulation of a hernia. When a hernia is strangulated soon after its occurrence it is spoken of as an acute hernia, e.g. Strangulated inguinal hernia in race horses (Venugopalan, 2000). Here the incarcerated contents are so compressed by the hernial ring or by the neek of the sac, or by both, that their circulation is arrested and the lumen of the bowel is obstructed causing them to undergo death or gangrene within 24 hours. In such situation, microorganisms pass from the interior of the viscus through its weakened wail and cause fatal peritoneal septicemia (O’Connor, 1980). A sudden increase of the hernial contents produces obliteration of its efferent end by compressing its walls against the border of the ring. Eventually the mutual pressure of the two parts ol'the loop completely closes its entrance and exit causing faecal stasis and arrest of the circulation in the part (O’Connor, 1980).

The double dovetailing of the mesentery, attached to the affected parts of the bowel, between the abdominal cavity and the hernial sac acts as a wedge in the opening, and helps in producting strangulation. The intestinal mucous membrane at the constricted part acts like a valve, gliding on the other coats of the organ, and tending to further occlude its passage and imprison its contents. Venous congestion of the hernial contents occurs, owing to the blood continuing to flow in through the arteries for some time after the veins have become occluded the constriction affects the veins first on account of their thin walls (O'Connor, 1980, Venugopalan, 2000th). there may be haemorrhage, due to the rupture of congested capillaries, and a variable amount of fluid collects in the hernial sac as a result of the venous engorgement. The bowel may be altered in colour, appearing blackish from ecchymosis and cyanosis, and yet retain sufficint vitality to regain its normal condition. However, the herniated pieceof bowel on being returned to the abdome may undergo necrosis and cause death from peritonitis (O'Connor, 1980).

**2.7 Umbilical infections**

Umbilical infections are frequent in calves and often have an unfavorable influence on the general condition and health-of the animal.

The amniotic memberane of the cord is torn at birth, gradually the umbilical vein and the urachus close, but they temporarily remain outside the umbilicus. Both arteries retract as far as the top of the bladder. In some abnormally thick umbilical cords this retraction is insufficient or competely absent, so that the arteries are exposed to infection. The risk of infection is greater when the umbilical cord is torn off too short. Umbilical infection can be complicated by umbilical hernia. (Edwards, 1992).

**2.7.1 Subcutaneous infection or abscess (Omphalitis)**

If an abscess has been formed a fluctuating and painful swelling may be recognized in the umbilical area. A small fistula, from which pus flows at pressure may exist, but generally this kind of omphalitis is closed. The treatment consists in opening the abscess and draining the pus out.

**2.7.2 Infection of the umbilical vein (Omphalophlebitis)**

Bouckaert and Moor (1965) treated eight cases of omphalophlebitis including five complicated by umbilical hernia. In some cases large abscesses were present extending from the navel to the liver. On clinical examination this large abscess was not always visible and a serious suppuration was found during an operation for umbilical hernia. Suppuration of the umbilical vein involves a danger of extending the infection into the liver and via the bloodstream into the articulations, lungs, kidneys and other organs (Edwards, 1992).

**2.7.3 Infection or abscess in the urachus**

This is a frequent occurrence which may affect the urachus over its whole length from the umbilicus to the bladder, or may be limited to one of more places along this course (Edwards, 1992). This may occur concurrently with an omphaloarteritis. The symptoms are a suppurating fistula and by palpation a thick cord or abscess is felt on the caudal side of the umbilicus, close to the abdominal wall.

Since a connection between the suppuration in the urachus and the bladder is possible pyouria may appear in these animals (Bouckaert and De Moor, 1965). An exact diagnosis may be established by means of radiography or radioscopy after injection of a contrast medium into the fistula.

Surgically the whole of the suppuration should be reseeted after ligating the canal in the healthy part. In serious cases the urachus has to be cut loose from the top of the bladder. By doing so, a small opening in the bladder will inevitably be made, which has to be sutured in two layers with catgut 2-0 (Bouckaert and De Moor, 1965)

**2.8 Symptoms**

**2.8.1 Physical symptoms**

The physical symptoms are due to the presence of the hernial swelling, which varies in shape and size, and presents features varying according to the nature of the hernia (O'Connor, 1980).In enterocele it is elastic, and in epiplocele doughy to the feel; manipulation of the former may produce a gurgling noise and detect the vermicular movement of the bowel (Venugopalan 2000th). If the herniated portion of intestine is distended with gas it will be tympanitic on percussion, and if it contains a quantity of fluid it will fluctuate on palpation. It may be tympanitic in its upper and contain fluid in its lower part (O'Connor, 1980). In reducible hernia the swelling can be obliterated by pushing the contents into the abdomen, and the edges of the ring can then be felt by two or three fingers inserted through the opening. If the patient males a sudden effort or is made to cough, the swelling can be seen and felt increasing in size.

When the hernia is incarcerated, the contents cannot be reduced and the ring cannot be easily felt. When a reducible hernia becomes strangulated, well-marked symptoms are observed. The swelling increases in size, becomes hard and tense, painful and irreducible, and fails to convey an impulse to the hand during coughing. The symptoms may coincide with the production of the hernia, and then the condition is spoken pf as acute hernia. When gangrene supervenes, the inflammatory phenomena disappear and the hernia becomes cold and insensitive (O'Connor, 1980).

**2.9 Diagnosis of umbilical hernia:-**

Animals with large umbilical hernias are usually identified by the owners at or soon after birth. A patient history and the location of the lesion usually leave little doubt about the diagnosis, although smaller hernias require careful inspection and palpation. Examination of the animal in dorsal recumbency facilitates reduction of hernial contents and hernial ring palpation. Once an umbilical hernia is diagnosed a careful search for other related congenital defects is undertaken.

Abdominal radiography generally is not indicated for patients with small uncomplicated reducible umbilical hernia. Animal with large umbilical or supra –umbilical wall defects especially when incomplete caudal sternal fusion is present are specifically examined for other congenital diaphragmatic or cardiac defects before correction (Slatter, 1946).

**Table2.1; Differential diagnosis among hernia, cyst, hematoma, tumour and abscess (Samad, 2000th )**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameters | Hernia | Cyst | Hematoma | Tumour | Acute |
| History of  development | Weeks | Months | Sudden | Months | 3-5 days |
|  |  |  |  | ± ve | +ve |
| Evidence of  pain | ± ve | -ve | ± ve |
| Inflammation | Usually –ve | -ve | ± ve | Usually | +ve |
|  |  | +ve | ±ve | -ve | +ve |
| Fluctuation | -ve |
| Exploration  with needle | Ingesta | Clear  fluid | Fresh/clotted  blood | Fresh blood | Pus |

+ve = Positive -ve=Negative ± ve=Positive/Negative

**2.10 General principles of treatment for umbilical hernia**

**2.10.1 Spontaneous recovery**

Some umbilical hernias may undergo spontaneous recovery. This may be due to deepening of the abdomen and shortening of the mesentery as the animal grows. The viscera are thus withdrawn within the abdominal cavity while the umbilical ring cicatrizes behind it. The above explanation of spontaneous recovery could only fit mesentery-supported structures, such as the small intestine and small colon (Keown, 1976). In very small hernias, where only the tip of a viuscus is in thehernial ring, it is conceivable that fibrosis of the ring will alone close the opening and reduce tile hernia. An important requirement for spontaneous recovery is that on adhesions are present. In most cases adhesions are absent in umbilical hernias of calves, and the hernias are reducible (Keown, 1976).

**2.10.2 Conservative methods**

**Reduction and retention by bandage**

The hernia is reduced by local manipulation and bandage is applied around the abdomen to prevent its return. An "elastoplast" bandage is better to avoid interference with breathing. The bandage is retained for two to three weeks. This method of treatment is effective in some cases of umbilical hernia (Venugopalan, 2000th ).

**Application of blisters or injection of irritant solutions**

Application of irritant substances close to the hernial ring causes inflammatory swelling. This is sometimes sufficient to prevent recurrence of a small hernia and to facilitate closure of the hernial orifice. The solutions commonly employed for the purpose are sodium chloride 5-15%, zinc chloride 5-10% Irritants such as hydrochloric or sulfuric acid may be applied over the hernial sac by glass rods dipped in the acid. A few longitudinal and transverse lines are drawn over the sac. The injection of irritants around the hernial ring is still done to stimulate fibrous tissue formation and closure of the ring (Venugopalan, 2000th ).

**A ligature or a set of through and through mattress sutures**

It may be applied at the base of the hernial sac after reducing the hernia to facilitate sloughing of the sac and simultaneous closure of the hernial ring. This method, however, may not be effective in some cases (Venugopalan, 2000th ).

**Belts**

To encircle the abdomen and cover the hernia have been used in treatment. The belt reduces the hernia, allowing fibrosis of the hernial ring to proceed and thus . close the opening (Keown, 1976).

**Hernial clamps**

Application of hernial clamps keep the hernia reduced and at the same time cut off blood supply to the sac and causes it to slough. The inflammation produced by this process stimulates fibrous tissue formation around the ring (Keown, 1976).

Skewers are steel rods 4-5 inches in length one end is bent at right angles to permit handling; the other end is sharpened and bent slightly outward in the same direction. The animal is sedated and cast in dorsal recumbency. The surgical site is prepared and desensitized with local infiltration of anesthetic. The hernia reduced, and while the thumb and fingers of one hand keep the hernia reduced one skewer isput through the sac transversely. The second skewer is then placed longitudinally, or at right angles, to the first. A heavy ligature is now placed between the skewers and the body. This is tied tightly enough to cause the sac to slough (Keown, 1976).

**2.10.3 Surgical method**

Surgical procedures that bring the edges of the hernial ring together are frequently used to treat umbilical hernias. These methods are sometimes spoken of as ‘open reduction’. There are various suture materials and suture patterns for the repairing of umbilical hernia in calves.

**2.11 Suture materials**

Different types of suture materials 'are currently available to the veterinary surgeon. Suture selection should be based on knowledge of the physical and biological properties of suture materials, an assessment of local conditions in the particular wound, and knowledge of wounds of various tissues (Peacock and Van Winkle, 1976).

Ideally, a suture material should maintain adequate tensile strength until its purpose is served; be nonelectrolytic, noncapillary, nonallergenic, and noncarcinogenic; be confortable for the surgeon to use; have good knot security; stimulate minimal tissue reaction; be either absorbable at a dependable rate after healing is well advanced or encapsulated without postoperative complications; and be inexpensive, readily available, and easily sterilized without alteration. Also, the ideal suture material should not be corrosive or toxic or create a situation favorable to bacterial growth (Bellenger, 1982, Sharp *et al.,* 1982).

Sutures are generally classified as either absorbable or nonabsorbable. Absorbable sutures are defined as those that undergo degradation and rapid loss of tensile strength within 60 days (Edlich *et al.,* 1973, Bellanger, 1982). Nonabsorbable sutures are neither absorbed nor digested by the tissues. They are encysted if buried in the tissues. Nonabsorbable sutures generally have high tensile strength and produce minimal tissue reaction. Sutures may also be further classified as natural and synthetic.

**2.11 .1 Absorbable sutures of natural origin**

**i. Surgical gut (catgut)**

Surgical gut is the most widely used suture today (Holt and Holt, 1981). It is prepared from either the submucosa of sheep small intestine or the serosal layer of cattle small intestine. Surgical gut is composed essentially of formaldehyde-treated collagen. It is a capillary multifilament suture composed of several plies that are twisted slightly, machine ground, and polished to yield a relatively smooth surface and diameter that resembles a monofilament (Van Winkle and Hastings, 1972, Edlich *et al., 1973).* Surgical gut is sterilized by ionizing radiation. It is not autoclavable, since heat denatures the protein and causes a loss of strength (Postlethwait, 1977). The unopened inner aluminum foil package may be adequately disinfected in chemical solution (e.g., 2% activated glutaraldehyde solution) (Postlethwait, 1977). Ethylene oxide sterilization, however, prolongs the absorption time (Van Winkle and Hastings, 1972).

The absorption of surgical gut following implantation is a two-fold mechanism primarily involving the macrophage (Salthouse *et al.,* 1969). First, a loss of tensile strength results from the cleaving of molecular bonds by acid hydrolytic and collagenolytic activity. Second, digestion and absorption by proteolytic enzymes occur during the later stages of implantation. Because of its collagenous composition, surgical gut stimulates a significant foreign body reaction in the implanted tissue. Surgical gut exhibits a wide variation in the rate of absorption and loss of tensile strength. Premature absorption is observed when surgical gut is exposed to the acidic pepsin secretions of the stomach, infected environments, and highly vascularized tissue. Its absorption is also increased in protein-depleted patients. Increasing suture diameter has little influence on the time required for its absorption. Medium chromic gut loses about 33% of its original strength after 7 days of implantation and about 67% after 28 days (Postlethwait, 1977).

Surgical gut is available in plain and chromic forms. Treatment with chromium salts results in an increase in intermolecular bonding. This crosslinking action of chromium increase tensile strength and resistance to digestion and decrease tissue reactivity (Bellenger, 1982).Medium chromic gut is currently the type most commonlyused. Plain gut produces such a severe tissue reaction and exhibits such a rapid loss of tensile strength that it has little use in surgery (Bellenger, 1982). The absortion time of different types of catgut are given in the Table 2.2.

**Table 2.2 Absorption times of different types of catgut according to the degree of chromicisation (Venugopalan, 2000th ).**

|  |  |  |
| --- | --- | --- |
| Types of catgut | Degree of chromicising | Absorption time (days) |
| Type-A | Plain | 10 |
| Type-B | Mild chromic | 15 |
| Type-C | Medium chromic | 20 |
| Type-D | Extra chromic | 40 |

Surgical gut generally exhibits good handling characteristics. However, when wet, surgical gut swells, weakens, and exhibits poor knot security (Herrmann, 1971). Disadvantages of surgical gut include the inflammatory reaction it includes the variability in rate of loss of tensile strength, its capillarity, and the occasional sensitivity reactions (Bellenger, 1982). The absorption of catgut in tissues can be delayed by treating it with chromic acid. The chromicised catgut is less irritating to tissue than plain catgut and also in more slowly absorbed. In large animal surgery size no. 1 and 2 are used for ligaturing larger vessels; no. 3 for fascia and muscles; no.5 for rumen, uterus and abdomen (Venugopalan, 2000th ).

**ii. Collagen**

Collagen is a multifilament suture material that was introduced in 1964 (Stashak and Yturraspe, 1978). It is processed from bovine flexor tendon and treated with formaldehyde or chromium salts or both. Its aseptic source and simplicity of processing are advantageous compared with surgical gut. Although collagen contains less onocollagenous protein than surgical gut the rate and method of absorption of these sutures do not appear to differ (Bellenger, 1982). Collagen sutures are currently made only in tine sizes and are used almost exclusively in ophthalmic surgery.

**2.11.2 Absorbable sutures of synthetic origin**

**i. Polyglycolic acid**

Polyglycolic acid (PGA) is a noncollagenous synthetic absorbable suture (Postlethwait, 1970). It is a braided multifilament polymer of glycolic acid (Bellenger, 1982). Unlike other polyester sutures, PGA is relatively limp and pliable (Stashak and Yturraspe, 1978). The method of absorption of PGA differs from that of surgical gut. PGA is absorbed by hydrolysis-not phagocytosis- presumably through esterase activity (Stashak and Yturraspe, 1978, Bellenger, 1982). Absorption is associated with a markedly reduced inflammatory process compared with surgical guf (Stashak and Yturraspe, 1978). Complete absorption of PGA sutures usually occurs in 100 to 120 days (Bellenger, 1982).

PGA has greater tensile strength than surgical gut, silk, and cotton (Stashak and Yturraspe, 1978). Loss of its tensile strength has been shown to be 33% during the first seven days after implantation and approximately 80% within two weeks (Postlethwait, 1970). PGA has superior tensile strength compared with surgical gut during the most critical phases of wound repair (Stashak and Yturraspe, 1978). It is suitable for use in a wide variety of surgical procedures. A marked reaction to PGA sutures has been observed in the acute stages of infection, although little tissue reaction is demonstrated in later stages (Varma *et al.,* 1981). Disadvantages of PGA sutures include their tendency to drag through the tissues, to cut friable tissue, and possibly to have poorer knot security than surgical gut (Stashak and Yturraspe, 1978).

**ii. Polyglactin 910**

Polyglactin 910 is a braided synthetic fiber composed of glycolic and lactic acid in a ratio of 9:1 (Craig et *al.,* 1975). This suture is braided, because monofilament constructions were found to be too stiff for proper surgical handling (Bellenger, 1982). Polyglactin 910 sutures are both hydrophilic and more resistant to hydrolysis than PGA sutures (Craig el *al.,* 1975). The suture is sterilized by ethylene oxide and is available as a coated and uncoated suture. The absorbable coating compound is composed of a mixture of calcium stearate and a copolymer of lactide and glycolidein a ratio of 65:95 (Blaydes and Berry, 1980).

Polyglactin 910 is absorbed by the same mechanism as PGA, i.e., hydrolysis. Absorption occurs within 40 to 90 days after implantation (Craig *et al.,* 1975, Bellenger, 1982). "this suture loses 50% of its strength after 14 days and 80% after 21 days (Bellenger, 1982). Both polyglactin 910 and PGA suture have on detectable strength by 21 days (Rodeheaver *et al.,* 1981). Like PGA, polyglactin 910 is sttonger than surgical gut, and its rate of loss of strength was greater than that of surgical gut in all tissues except stomach (Postlethwait, 1977. Bellenger, 1982). Polyglactin 910 sutures were found to have an excellent size-to-strenght ratio,were relatively easy to handle, were stable in contaminated wounds, and elicited minimal tissue reaction (Conn and Beal, 1980). Polyglactin 910 elicited almost no acute vascular reaction after implantation.

**iii. Polydioxanone**

This recently available synthetic monofilament suture is a polymer of paradioxanone (Ray *et al.,* 1981). Polydioxanone (PDA) is melt-extruded into monofilaments of variable size and is sterilized by ethylene oxide. It has a greater flexibility than PGA, Polygactin 910, or polypropylene. The strength of PDS suture prior to implantation was greater than that of monofilament nylon and polypropylene (Ray *et al.,* 1981).

PDS like PGA and polyglactin 910, is degraded by hydrolysis. Hydrolysis occurs at a regular rate and predictable manner in tissue (Ray *et al.,* 1981). Loss of tensile strength of PDS suture is slower than that of PGA or Polyglactin 910 suture. PDS suture losses 26% of its tensile strength after two weeks, 42% after four weeks, and 86% after eight weeks (Ray *el al.,* 1981). Absorption of PDS suture also occurs more slowly than with PGA or polyglactin 910 sutures. Evidence of absorption of 1-IDS was present at 91 days, and absorption was essentially complete at 182 days after implantation. Degradation products of PDS suture were excreted primarily in the Urine (Ray *et al.,* 1981).

**2.11.3 Non absorbable sutures of natural origin**

**i. Silk**

Silk is obtained from the cocoon of the silk worm and is available as a twisted or braided multifilament (Stashak and Yturraspe, 1978). It is processed to remove the natural waxes and gums and dyed with a vegetable dye to aid in its identification in tissue (Bellenger, 1982). It may be treated by immersion in oil, wax, or silicone to decrease the natural capillarity. Although classified as a nonabsorbable suture, silk slowly loses tensile strength and is absorbed after tissue implantation (Holt and Holt, 1981). Silk loses 30% of its tensile strength by two weeks, 50% at one year, and essentially all of its tensile strength two years after implantation (Van Winkle and Hastings, 1972, Stashak and Yturraspe, 1978). Silk is inexpensive and has excellent handling characteristics (Stashak and Yturraspe, 1978, Bellenger, 1982).

One of the disadvantages of silk is the tissue reaction that it incites (Peacock and Van Winkle, 1976, Swaim, 1980). Silk has a great ability than nylon to bind gamma globulin. This binding ability eventually leads to an acute inflammatory reaction (Bellenger, 1982). Silk may serve as a nidus for calculi formation in the lumen of the urinary bladder or gallbladder. Silk should also be avoided in wounds having known or suspected bacterial contamination (Edlich *el al.,* 1973). Silk has been shown to potentiate infection, probably related to its tissue reactivity (Swaim, 1980). The introduction of staphylococci on a silk suture can enhance the; development of infection by as much as ten-thousand fold (Edlich *et al.,* 1973).

**ii. Cotton**

Cotton was introduced as a suture material in 1939 (Van Winkle and Hastings, 1972). Its use became popular during World War 11 when silk was relatively scarce (Bellengre, 1982). It is an inexpensive multifilament suture with capillary. Cotton has naturally twisted fibers that tend to unravel soon after implantation in tissues (Bellenger, 1982). It can be autoclaved however; prolonged autoclaving results in a decrease in tensile strength (Bellenger, 1982). Cotton loses 50% of its strength in six months and about 70% at the end of two years (Van Winkle and Hastings, 1972).

Disadvantage of cotton includes its ability to potentiate infection, its capillarity, tissue reactivity, and its inferior handling ability (Sharp *et al.,* 1982).

**2.11.4 Nonabsorbable sutures of synthetic origin**

**i. Nylon**

Nylon is an amine-containing thermoplastic suture material (Bellenger, 1982). Derived from hexamethylenediamine and adipic acid (Stashak and Yturraspe, 1978). Nylon available as monofilament and multifilament suture materials. It is biologically inert and noncapillary in the monofilanient form. Nylon is intermediate in tensile strength, similar polypropylene (Herrmann, 1971, Tera and Aberg, 1976).

Nylon causes minimal tissue reaction (Bellenger, 1982). After implantation, monofilament nylon loses about 30% of its original tensile strength over two years. Multifilament nylon retains almost on tensile strength after six months in tissue. This loss of tensile strength is thought to be associated with chemical degradation of the nylon. In vitrostudies indicate that the suspected degradation products of nylon are potent antibacterial agents (Sharp *et a l., 1982).* Nylonhas wide application as a suture material. Monofilament nylon used effectively as a skin suture. Nylon is not recommended for use within a serous or synovial cavity, because buried sharp ends cause frictional irritation (Bellenger, 1982).

The main disadvantages of nylon are its poor handling characteristics and knot security (Bellenger, 1982). Knot security can be improved by careful placements of knots with four or five loops. The resultant knots tend to be bulky and are time consuming.

**ii. Polypropylene**

Polypropylene retains its strength upon implantation tissues (Bellenger, 1982). Tissue enzymes do not weaken it and it is the least thrombogenic suture (Holt and Holt, 1981). For these reasons, polypropylene is frequently used in vascular surgery. It is a potent secured knotable, flexible, synthetic nonabsorbable suture material. Monofilament polypropylene maintains its strength in infected wounds even upto 90 days (Sharma *et al.,* 1990). The lubricating coating of prolene protects it against the effect of proteolytic enzyme. The inflammatory reaction subsided and shrunken fibroblasts were seen at 90 days around polypropylene suture (Sharma *et al., 1990).* The polypropylene suture evoked mild inflammatory reaction and induced proliferative changes as early as on the third day. At 30 day, a good approximation of wound edges was achieved in polypropylene sutured wounds. Rahman *et al.,* (2001) found polypropylene as a suitable suture material for closing the umbilical hernia in calves. The only disadvantage of this suture is its slippery handling and tying characteristics (Bellenger, 1982).

**2.11.5 Selection of suture materials**

Suture materials should be chosen on the basis of known biological properties of the suture and the particular clinical situation (Van Winkle and Hastings, 1972). Although there is generally not ideal suture for every possible indication, certain suture materials are superior to others in different wound environments. Certain principles should be considered when choosing a suture material.

Sutures should be at least as strong as the normal tissue through which they are placed (Van Winkle and Hastings, 1972). Skin and fascia are the strongest tissues whereas stomach and small intestine are much weaker (Van Wink and Hastings, 1972). A suture is not needed after a wound has healed (Peacock and Van Winkle, 1976). The relative rate at which the suture loses strength and the wound gains strength is important. Visceral wounds heal rapidly, attaining strength within 14 t o 21 days (Peacock and Van Winkle, 1976). Absorbable sutures are generally adequate for these tissues. Fascia and skin heal very slowly, and non absorbable sutures are more suited for its closure and a non absorbable suture is usually indicated liar its closer (Peacockand Van Winkle, 1976).

**2.12 Suture technique for hernias**

The closure of hernial openings in large domestic animals causes considerable difficulty. Without discussing the different hernia operations, some of the sutures for umbilical and abdominal hernias are described.

**2.12.1 Mattress suture**

The U-suture may be used for ventral and umbilical hernias. The stitches should be taken 1.5 cm from the hernial edge and passed out of the exposed hernial opening. On the opposite side the stitch is made at the hernial edge and exited from the edge. The stitches are led back in reverse order. When tying, the hernial edges are strongly approximated against each other, forming a ridge 1cm high.

**2.12.2 Hernial suture**

After freshening the hernial edges, the first line of everting sutures is placed by puncturing one hernial edge from outside to inside, and deep enough to avoid tearing. On the opposite edge the stitch runs from inside to outside and then back; it is placed far enough from the hernial edge so that a flap-like protrusion is formed. A second row of mattress sutures anchors the protruding flap to the abdominal wall and produces solid closure of the hernia.

**2.12.3 Myomattress suture**

The modified suture pattern (myomattress) is an overlapping suturing technique that provides adequate support to the suture line. Mayo (1907) introduced this approach to the umbilical herniorrhaphy. The Mayomattress suture is an overlapping interrupted mattress pattern. It is useful in midline abdominal closures in large animals and in repair of abdominal hernial defects. The suture is begun by passing the needle from the outside to the inside of the incision onone side. The needle is then similarly inserted on the opposite side on the same transverse plane in the same inward direction. It is advanced 0.7 to 1.5 cm and is passed from within to Ole outside on the second sutured side. Finally, it is returned to the original side and is passed from within to the exterior in the same transverse plane. As the knot is tied, the first area of tissue sutured will overlap the second. A surgeon's knot may be required to overcome distracting forces. Sufficient sutures are placed to close the incision or defect (Knecht *et al.,* 1987).

**2.12.4 Purse string suture**

The suture is used to narrow down and invert the lumen of hollow organs and also constrict the anal opening after reducing rectal prolapsed. It can also be used to secure catheters (Kumar and Kumar, 2002). Horizontal mattress and purse string suture pattern with catgut and silk are widely hernia in Bangladesh (Rahman *et al.,* 2001).

**2.13 Prognosis of umbilical hernia**

Incarceration or strangulation seldom occurs, probably on account ofthe nature of the contents. It may disappear spontaneously within 6-12 months of age, as the result of the bowel becoming filled with solid food and the abdominal muscles developing and filling up the opening in the abdomen as the animal grows. Adhesion between the sac and contents is rare (O'Connor, 1980).

**2.14 Control of umbilical hernia**

In apparently normal A.I. bull used extensively may, therefore, leave manyaffected calves and carrier females if his relationship to umbilical hernia is remained unsuspected. Once, however, the genetic etiology is recognized, the high penetrance and detection of transmitting bulls. Breeder should notify their A.I. centers if they have a number of herniated calves. Inspection of bulls at AI center should include umbilical palpation. The herniated bull should not be used for breeding purpose (Angus and Young, 1972).

**CHAPTER-III**

**MATERIALS AND METHODS**

The present study was carried out on 4 clinical cases presenting to the SAQTVH and UVH, Pabna Sadar, Pabna. The ages of the calves ranged from 14 days to 3 months. The histories of the cases indicated that the hernias were noticed at different ages before presentation to the hospital and were almost always observed at 1-2 month of age. Palpable opening in the umbilical region that was > 2 cm was defined as umbilical hernias. Recording included history of the cases, size of the hernial rings, and type of surgical repair of the hernias, presence of adhesions, postoperative care and follow-up of the cases which were simply achieved by mobile contact.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No. of**  **Cases** | **Treatment method** | **Age** | **Sex** | **Result** |
| 02 | Open method | 40  days | Male | Healing within  15 days |
| 01 | Conservative  Method | 14 days | Female | Healing within  25 days |
| 01 | Conservative  Method | 18 days | Male | Healing within  21 days |

**3.1 Clinical examination of calves**

**3.1.1 Diagnosis of hernia**

A preliminary diagnosis was made from the history and by palpation of the umbilical region. Diagnosis of the cases, however, was confirmed by exploratory puncture of the navel swelling and demonstration of intestinal contents. Detection of hernia ring with the index finger also aided diagnosis.

**3.1.2 Reducibility**

The affected animal was placed in dorsal recumbence and the contents were pushed back into the abdomen. In case of reducible hernia, the contents went back to, the abdominal cavity and the hernial ring became evident.

**3.1.3 Measurement of hernial swelling**

i. The protrusion of hernial swelling was the length from its neck to the fundus and was measured in cm with a measuring scale.

ii. Circumference of the swelling was taken at the level of its body and was measured in cm with a measuring tape.

iii. The diameter of the hernial ring was measured after blunt dissection of the abdominal muscle during operation.

**3.2 Monitoring of clinical parameters**

Respiratory rate, heart rate and rectal temperature were recorded prior to surgery and thereafter.

**3.3 Radical operation for hernia**

**3.3.1 Preparationof the Patient**

The animal was placed on the operation table in dorsal recumbency and was restrained physically by the help of assistants. The operation site was clipped, shaved and drapped using sterile surgical towel. The site was finally painted with tincture of iodine.

**3.3.2 Anesthesia**

Xylazine hydrochloride (Romapm®, Bayer Korea, Ltd.) was administered at a dose rate of 0.01 mg/kg body weight through intramuscular route to calm down the calf. Later, 7 ml of 2% lignocaine hydrochloride (Jasocaine®, Jason Pharmaceuticals Ltd., Dhaka, Bangladesh) was infiltrated in an inverted `V' shaped manner from cranial to caudal aspect of hernial ring (Klein aid Firth, 1988)

**3.3.3 Operative procedure**

Two elliptical incisions were made on either side of the ring. In case of a male calf, the incisions were 2-3 cm apart to prevent possible contamination of wound with urine. Following blunt dissection of the abdominal muscles, diameter of the hernia ring was measured. Then loose connective tissue and fascia were removed to create a room for incision on hernial sacs. Hernial sac was grasped and the content was pushed back to the abdominal cavity. Some portion of the sac was removed and the edges of the ring were scratched and taken into apposition using the myomattress technique. Either catgut or polypropylene was used to close hernial ring. After closing the ring, skin edges were closed by horizontal mattress suture with nylon thread.

**3.3.4 Postoperative management**

This consisted of a course of antibiotic for 5 days. The skin stitches were removed within 10-12 days after operation. The animals were kept under supervision for a month to observe any complication if there was any.







**Fig: Pictorial presentation of umbilical hernia and operational procedures in open method.**

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**Fig: Reducible umbilical hernia containing only a small part of the omentum or a small loop of the intestine may respond favorably to belly bandages or clamps.**

**3.4 Conservative treatment:-**

Reducible umbilical hernia containing only a small part of the omentum or a small loop of the intestine may respond favorably to belly bandages or clamps. Belly bandages reduce the hernia and allow the hernial ring to close by cicatrization. To use metal or wooden clamps the animal is controlled in dorsal recumbency and the hernial contents are reduced normally. The clamp with its jaw open is placed longitudinally and directly the abdominal wall. The main objective of clamp application is to obliterate the hernial sac and to stimulate healing of the ring. The sac undergoes necrosis and sloughs down within 10 to 12 days. The skin wound heals by second intension (Tyagei *et al.,* 2002). Injection or application of irritants like hydrochloric or sulphuric acid around the hernial ring is done to stimulate fibrous tissue formation which will push the contents into the abdomen and close the hernial opening. Area all around the swelling should be prepared by clipping the hair, cleaning and drying before application of irritants. (Tyagei *et al.,* 2002).

**CHAPTER-IV**

**RESULTS AND DISCUSSION**

The present study was carried out on 4 clinical cases presenting to the SAQTVH and UVH, Pabna Sadar, Pabna. The ages of the calves ranged from 7 days to 3 months. The histories of the cases indicated that the hernias were noticed at different ages before presentation to the hospital and were almost always observed at 1-2 month of age. The causes of the disease was not investigated but may be accounted for genetic defect on reported in lamb by Dennis and Leipold (1968). It has been observed that the earliest onset of hernia was within one week after birth.

In the study, 4 cases of umbilical hernia were recorded and two of them were treated by conservative method because the hernial ring and sac was small and age of calves were less. Healing is without complication in case of conservative method. Conservative treatments are suitable only for a small reducible hernia. (Tyagei *et al.,* 2002).

Without doubt the pressure of bandage on inflammed hernial sac assists its contraction and the return of the contents but necrosis of the sac is apt. to occur and the truss must, therefore be frequently examined ( Dollar, 1895).

Treatment by conservative method (smearing with acid, sulfur) is only suitable to small hernia in young animals; in larger hernia it is of no value and restricts its use to cases where not more than two fingers can be introduced into the hernial opening, and where the sac is not greater than a hen's egg (Dollar,1895).

So majority of cases are treated by surgical method. But complication is recorded in surgical method. The most common complication of surgery are hernia recurrence and wound infection. (Theresa Welch Fossum, 1997).

**5.1 Effects of age, sex, breed acid season on the occurrence of umbilical hernia in calves**

**5.1.1 Effects of age and sex**

Calves between 1 and 3 months were most frequently affected with umbilical hernia. This observation is agreeable to earlier reports (Field, 1988, Gadre *et al.,*1989, Rahman *et al.,* 2001). However, Chuang *et al., (2000)* reported that the diseases more prevalent in calves of below 1 month. In Bangladesh diagnosis of the affection may be delayed because animals are reared in backward system and owners are either ignorant or have less interest for their management.

Umbilical hernia occurred predominantly in male calves (59.09%) as compared to their female counterparts (40.91%). This finding is agreeable with those of Das and Hashim (1996) and Rahman *et al.,* (2001) but contradictory to Brem *et al.,*(1985) and Singh et al.,(1989) who indicated females to be more susceptible to umbilical hernia than males. Higher prevalence in males may be due to large swelling at umbilical region for perputial sheath. During development of such large perputial sheath, the ventral abdominal wall may not be properly developed and leads to the formation of hernia ring before birth (Rahman *et al.,* 2001).navel infection in the male is also more frequent due to continuous moistening by urine.

**5.1.2 Effects of breed**

The hernia has been reported to be hereditary in origin and occur due to one or more pair of autosomal recessive genes found in cross bred animals (Angus and Young , 1972,Hayes,1974,Baired ,1993). In the present study, the incidence of umbilical hernia was significantly higher in the crossbred calves than that in the indigenous breed. The higher incidence may be due to preference of owners to inseminate their cows with these breeds. Pure Holstein cattle as well as the offspring’s of Holstein **×**indigenous cross are more likely to suffer from this congenital defect than the indigenous breed (Hayes, 1974, Kohli, 1999).

**5.1.3 Effects of season**

Incidence of umbilical hernia was significantly higher (59.09%) in the summer (February-May) whereas the lowest incidence (18.18%) was recorded in the winter (October-January). This observation was agreeable with earlier reports (Dehoux, 1992, Samad *et al.,* 2002).Various indigenous grasses amply grow in the summer season and the cattle widely graze or are led these fodder. Deeding of these grasses might explain the increased nutrition level, resulting increased conception rate. As a result, the calving rate is increased at the end of winter. This might contribute to the increased incidence of umbilical hernia in the summer season.

**5.2 Physical measurements of umbilical hernia in calves**

The degree of protrusion, body circumference and ring diameter of umbilical swelling were significantly higher in indigenous calves than those of cross bred calves. The increased degree of protrusion, body circumference and ring diameter of umbilical swelling in indigenous calves are not available in literature. However, this may be due to ignorance of farmers who tend to bring their patients to the hospital at the advanced stage of the disease.

Fretz *et al.,* (1988) found that most patients affected with umbilical hernia were less than 6 months old. The degree of protrusion in these cases was less than 10cm.this is similar to the present findings. The diameter of hernia ring in the present study ranged from 3 to 8cm. this finding is also agreeable with the previous reports (Muller *et al.,* 1988, Chaung *et al*.,2000).

**CHAPTER-V**

**CONCLUSIONS**

**The following conclusions may be drawn from the studies on umbilical hernia in calves:**

1. Umbilical hernia in calves is fairly prevalent and common at field conditions.
2. Umbilical hernia occurred mostly in calves of 1-3 month age group.
3. The prevalence of umbilical hernia is more common in male calves than that in female calves.
4. The higher incidence of umbilical hernia was encountered in the cross bred calves in contrast to indigenous calves.

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