

Surgical Correction of Umbilical Disease in Calves: A Retrospective Study of 95 Cases

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SUMMARY

95 calves aged from two days to six months received surgical treatment for umbilical disease during a period of five years. Umbilical hernias affect females more often than males and 15 of 22 calves with umbilical hernia were Holstein Friesian. The most frequently encountered disorder (28,4% of cases) is infection of the urachus. Urachitis occurred in calves less than six months of age and was accompanied by other disease such as peritonitis, polyarthritis and pneumonia and exhibited only a moderate success rate to surgical treatment. Omphalophlebitis occurred most frequently in young calves and resultat in leucocytosis, and other condition such as liver abscesses, arthritis, and pneumonia. Surgical treatment had a moderate success rate. Other umbilical infections, omphaloarteritis and omphaloarteriourachitis, were rarely diagnosed.

Keywords: umbilical disease- calf- surgical treatment-outcome

Buzağularda Göbek Lezyonlarının Operatif Sağaltımı : 95 Vakalı Retrospektif Bir Çalışma

ÖZET

Bu çalışmada, beş yıllık periyotta kliniğimize gelen yaşları 2 gün ila 6 ay arasında değişen göbek lezyonlu toplam 95 buzağı şirurjikal olarak tedavi edilmiştir. Göbek fitkisi erkek buzağulara nazaran daha çok dişi buzağularda gözlenmiştir ve toplam 22 göbek fitikli hayvandan 15'inin ırkı Holstein-Fresian idi. Tüm hayvanlarda en fazla görülen göbek lezyonu urachus enfeksiyonu idi (%28,4). Urachitis daha çok 6 aydan küçük olan hayvanlarda ve peritonitis, arthritis ve pnömoni gibi hastalıklarla birlikte gözlendi. Yapılan cerrahi girişimlerde başarı memnuniyet verici idi. Omfaloflebitis daha çok genç hayvanlarda gözlendi ve bu hayvanlarda lökositoz, karaciğer apseleri, arthritis ve pnömöniye sebep olduğu gözlendi. Yapılan cerrahi işlemlerde başarı yine memnuniyet verici idi. Kliniğimize gelen buzağularda gözlenen diğer göbek lezyonları omphaloarteritis, omphaloarteriourachitis ise çok nadir olarak teşhis edildi.

Anahtar kelimeler: göbek lezyonları, buzağı, operatif sağaltım, sonuçlar

INTRODUCTION

The umbilicus is the remnant of the fetal-maternal connection. At birth, this structure consist of the paired umbilical arteries, a single umbilical vein, and the urachus. Prior to birth, the umbilical vein serves as the source of oxygenated blood to the fetus via the liver and the ductus venosus / portal vein. The paired umbilical arteries are branches of the internal iliac artery and carry waste materials and unoxygenated blood to the placenta. The urachus is the connection from the fetal bladder to the allantoic sac. Following a normal delivery, the smooth muscle that surrounds the umbilicus contracts in response to the stretching of the cord at parturition. Separation of the umbilical cord allows the umbilical arteries and urachus to retract into the abdomen, where they close by smooth muscle contraction(6,18).

A number of problematic variations in the umbilical structures can occur, most commonly umbilical hernias, umbilical abscesses, and urachal fistulas (1,5,20,25). The most common congenital defects in cattle are umbilical hernias, which are seen in all breeds and have been reported to be related to heritable factors (13,25) or in associaion with inflammation of the umbilicus (7,25). Depending on the size of the hernial ring, omentum, the abomasum, intestine, or in combination of these may be inside the sac. Longstanding

hernias are more likely to develop adhesions between these abdominal structures and the everted peritoneum(6,14). Umbilical abscesses can results from inflammation of any of the umbilical structures. The practice of dipping navels in strong iodine solutions may create such a degree of inflammation and necrosis that organisms may more easily penetrate the stalk, or the sealing of the umbilical vessels is so complete that minor infections may not be permitted to drain to the outside (2,8). Drainage from the umbilical stalk, although confirming abscess formation, does not identify which of the umbilical structures is involved. In addition to the precense of drainage from the umbilical stalk, calves affected with omphalitis often suffer from poor performance and recurring fevers, and are prone to develop bacterimias that may result in joint infections and meningitis(2,4,12). The purpose of this study reported hear was to describe the clinical history, treatment, and outcome in 95 calves evaluated at the University of Adnan Menderes for umbilical disease.

MATERIAL and METHODS

Calves-The case records of 95 calves referred to the University of Adnan Menderes, Aydın between July 1999 and July 2004, with the final diagnosis of an umbilical disease, were rewieved. The signalement,

history, physical examination findings, surgical management, and outcome were obtained from the medical records for each calf with umbilical disease. Definitive diagnosis was determined by results of physical examination in calves with umbilical disease, or at exploratory celiotomy or necropsy in calves. Laboratory results were obtained when available. Blood samples for analysis were collected immediately before surgery. The owners were contacted by telephone after release of the calf to obtain follow-up information.

Treatment- Recommendations for treatment were based on size and physical appearance of the umbilical structures. Open herniorrhaphy was performed for hernias > 5 cm diameter. Surgery was performed in calves with umbilical infections, if medical treatment has not resolved within 5 days. The antibiotic of choice for umbilical infection is penicilline (Amoxycilline, 20 mg/kg).

RESULTS

The mean age of the calves with umbilical hernia (15 females, 7 males) at the time of initial corrective surgical procedure was 58 ± 22 days (range, 17 day to 6 months) and there was 20 ± 14 days (range, 1 day to 3 months) of the calves with umbilical infections. (Table 1). 15 calves with umbilical hernia were Holstein Friesian,

and 7 were other breeds. Abnormal findings of physical examination included fever (62/73 with umbilical infection), tachypnea (51/73 with umbilical infection), and hypotermie (8/ 73 with umbilical infection). Umbilical palpation revealed heat, pain, swelling, moistness, and purulent drainage in 67 calves. Twenty two (22%) animals had external evidence of infection associated with the umbilicus. Twenty of them had polyarthritis (20%) and 10 calves had enteritis (10%). On 5 calves were detected a pneumonia. White blood cell (WBC) counts were obtained on 35 calves with umbilical infection.. The WBC counts were typically high and neutrophilia was observed in many calves. Clinical signs of dehydration with corresponding hemocentration were observed in many calves. Serum biochemical analyses were performed on 12 calves. Plasma creatinine concentration ranged from normal to moderately high. Glucose concentration ranged from low to normal. Plasma electrolyte concentration did not differ significantly from normal value.

To reduce the risk of anesthetic death, treatment of dehydration and acid-base, elektrolyte, and serum glucose concentration imbalances by IV administration of fluids was begun before induction of general or epidural anesthesia. Broad-spectrum antibiotics (potassium penicililine and streptomisine, IV) were given.

Table 1- Signalment and surgical complication findings in 95 calves with umbilical disease

Disease	Number of case	%	Sex ratio		Age of admission	Death	Surgical complication		
			M	F			secondary hernia	abscess	monoarthritis septicemia
Hernia umbilicalis	22	23,1	5	17	58 ± 22	3	3	0	0
Umbilical abscess	17	17,8	12	5	18 ± 12	0	0	0	0
Omphalophlebitis	24	25,2	16	8	20 ± 17	6	2	0	0
Urachitis	27	28,4	17	10	17 ± 17	7	2	2	2
Omphaloarteritis	3	3,1	2	1	20 ± 6	1	0	0	0
Mix infection	2	2,1	2	0	25 ± 20	1	0	0	0
Total	95	100	54	41		15	7	2	2

Umbilical hernia- Surgery (open herniorrhaphie) was attempted 21 calves with umbilical hernia. General anesthesia was induced with xylazine and maintained with slow IV ketamin administration. The ventral abdomen was clipped generously and scrubbed from sternum to pubis. An elliptical incision was made through the skin equal to twice the length of the base of the hernia. Hemorrhage was controlled and the connective tissue around the base of the hernial ring was freed from the sac using blunt dissection. The umbilical area was explored digitally from the peritoneal side to determine involvement of additional structures. If it was determined that no abscesses were present, the incision was carried around the base of the hernia sac. Any hemorrhage around the incision was controlled. Vertical mattress or simple interrupted pattern were used to close the hernia opening. Penicilline-streptomycine was applied for 3 days after discharge. Of the 22 calves that recovered from anesthesia were discharged from the hospital. 3 calves were readmitted to the hospital approximately 3 weeks after

discharge, with a dehiscence of sutured wound. Because of the animal's poor response to treatment and the owner financial constraints, the calves were euthanized.

Umbilical vein abscesses (Omphalophlebitis)- The surgical approach for umbilical vein abscesses was similar to that for an umbilical hernia. The elliptical incision around the umbilical stalk was made and the dissection carried down to the linea. The peritoneum was punctured (lateral to the mass), the digital exploration was identified the enlarged vein coursing cranially towards the liver. In 22 cases the abscess of the vein ends prior to entering of the liver. In these cases, the vein is freed from the surrounding tissue by a combination of blunt and sharp dissection and transfixion sutures were placed through the vein anteriorly to any enlargement. The vein than severed between the sutures and the end of the stump to be left in the abdomen was examined for evidence of exudate. The incision were closed as if a simple hernia. In 2 cases, a single abscesses in liver parenchyma was detected. Partial hepatic resection was performed in these

cases. Of the 24 calves that recovered from anesthesia, 18 were discharged from the hospital. Six calves died within 8 hours after surgery. Of 24 calves treated surgically for umbilical vein abscesses, 2 calves were readmitted to the hospital approximately 3 weeks after discharge, with a clinical signs of abdominal pain. A second laparotomy revealed extensive adhesions in the abdominal cavity of both calves. Surgical correction was attempted, but the calves were euthanized.

Umbilical artery abscesses(omphaloarteritis) and urachal abscesses (urachitis) - A normal elliptical incision was made around the umbilical stalk and the tissues are dissected down to the abdominal wall. As with a hernia, the abdomen is entered lateral to the stalk, a finger is inserted through this opening, and the posterior aspect of the abdomen is explored digitally. Abscesses umbilical arteries were followed until the enlarged portion decreases to a fibrous stalk. The stalk then were double ligated and transected between the ligatures. Twenty nine calves were treated surgically by excision of affected structures. On 1 calves, the capsula of urachal abscess involved the wall of the apex of the bladder. Partial resection of the bladder apex was performed on this calves. Eight calves died after surgery. 2 calves were readmitted to the hospital approximately 2 weeks after discharge were euthanized as a result of complication after urachus and umbilical arteries resection.

DISCUSSION

The history and physical examination findings in calves with umbilical infection frequently are similar. The principal clinical signs of disease are heat, pain, swelling, moistness, and purulent drainage in the umbilical region. The extent of the umbilical cord infection was determined by palpation, at surgical resection, or at postmortem examination.

Congenital umbilical hernias are common defects in calves, particularly in Holstein Friesian cattle where frequencies 4 and 15 % have been performed (32). Our study support this finding, because 15 of our calves with umbilical hernia were Holstein Friesian. It is generally accepted that a genetic component is involved in congenital umbilical hernias. Large hernias, although more susceptible to external trauma and resulting skin abrasion and superficial infection, seldom cause strangulation (9,13,18). Non of these were present in our cases. Simple umbilical hernias are nonpainful to the affected animal. Several approaches were used to close the hernia opening, including the vest-over-pants method, vertical mattress, and simple apposition (18,24). In this study, vertical mattress or simple interrupted pattern were used to close the hernia opening. When prior hernia surgery fails to hold or the defects is to large to allow proper apposition, the use of prosthetic meshes to bridge the defect were considered (9,18,24). A number of materials, both natural and mammade, have been investigated, including pericardial sac, nylon mosquito

screen, polypropylen mesh, teflon, polyglactin and preserved human dura (3,4,15,19). No single mesh totally fulfills the ideal. Because the owner financial constraints, prosthetic meshes were not used in our cases.

Most calves with omphalophlebitis, omphaloarteritis, or urachitis are 1 to 6 weeks old (4,5,10,12,16). In our calves, 90 % were < 6 weeks old. However, the potential for umbilical remnant infections to develop in neonatal calves is great.

Umbilical infection are common in newborn calves (4,12,26) . It has been reported that infection of the urachus is the most common infection related to the umbilicus in cattle (4,12,21,22). In this study, 28,4% of our calves had an infected urachus. Clinical entities associated with urachal abscesses include umbilical hernia, infected umbilical stalk, cystitis and septicemia (1,10,22). The incidence of omphaloarteritis in calves is open to discussion. Some author (24,26)reported it to be among the last commonly infected structures whereas another (14) believes it to be frequently involved in navel infections. In this study, 3,1 % of our calves had an omphaloarteritis. The distinction between umbilical artery and urachal abscesses often is difficult and is of little consequence, owing to the similar course these structures take toward the bladder. Ascending infections of the arteries often incorporate omentum, and the adjacent inflammation may lead to adhesion of the bladder wall to the arteries (14,18).

Any calves with umbilical infection admitted were in critical condition. Survival was largely dependent on the calfs condition at referral. Preoperative assesment and correction of dehydration, acid-base, and serum electrolyte and glucose concentration imbalances is essential, particularly if general anesthesia necessary.

The umbilical vein infection can extending into the liver or sufficiently close to the liver's parenchyma that total resection is not achievable(11,17,18). Marsupialization of the vein was a accomplished technique to achieve proper drainage of the abscess (3,4,11,15,19). Two (20,23) methods have been described: The first involves translocation of the infected, but resected, umbilical vein to a new incision site created lateral of the original incision. A scin incision is made in the right paramedian area, adjacent to the site where the vein enters the liver. At least 1 cm of vein was extend beyond the skin margin so, as the vein dries and retracts, the infected stump is not pulled back into the abdomen. The transfixion ligature then is removed to allow drainage. The second method described involves carrying the entire infected stalk as far cranially as possible and suturing the vein into the primary incision. In this study, on two calves, a single abscesses in liver parenchyma was detected. Partial hepatic resection was performed in these cases.

Calves with umbilical infection should be examined closely for other disease, including some involving the urinary tract (cystitis), gastrointestinal tract (peritonitis, enteritis, hepatitis), and musceloskeletal

system (arthritis). In our study, twenty two (22%) animals had external evidence of infection associated with the umbilicus. Twenty of them had polyarthritis (20%) and 10 calves had enteritis (10%). On 5 calves were detected a pneumonia. GEISHAUSER et al. (12) reported in 104 calves that umbilical infection was accompanied by other disease such as enteritis (21,1%), peritonitis (15,3,1%), polyarthritis (15,3%), pneumonia (14,4) and liver abscesses (9,6%).

In this study, omphalophlebitis and urachitis have a moderate success rate. Six calves with umbilical vein abscesses and eight calves with urachitis died within 8 hours after surgery. The majority of this calves had other condition (enteritis, polyarthritis and pneumonia). Of 24 calves with omphalophlebitis treated surgically, 2 calves were readmitted to the hospital approximately 3 weeks after discharge, with a clinical signs of abdominal pain. A second laparotomy revealed extensive adhesions in the abdominal cavity of both calves. Surgical correction was attempted, but the calves were euthanatized. died after surgery. 2 calves urachitis were readmitted to the hospital approximately 2 weeks after discharge were euthanatized as a result of complication after urachus and umbilical arteries resection. In a retrospective study (12) in calves with umbilical infection, omphalophlebitis and urachitis have a low to moderate success rate (54% and 75%). In the other study (4), omphalophlebitis caused 56% of deaths that occurred during six-month observation period.

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