SURGICAL MANAGEMENT OF OMPHALITIS IN CALVES

By

PRASANNA D.

THESIS

Submitted in partial fulfilment of the requirement for the degree of

Master of Veterinary Science

Faculty of Veterinary and Animal Sciences
Kerala Agricultural University

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MANNUTHY THRISSUR – 680651
KERALA, INDIA

2003

DECLARATION

I hereby declare that this thesis entitled **SURGICAL MANAGEMENT OF OMPHALITIS IN CALVES** is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award to me of any degree diploma associateship fellowship or other similar title of any other University or Society

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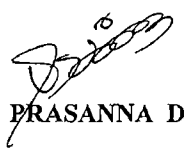

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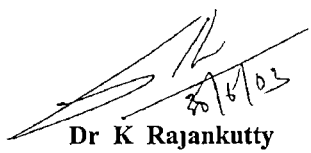

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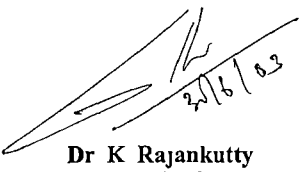

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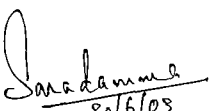

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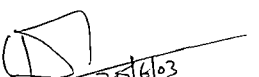

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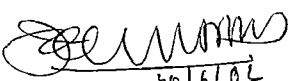

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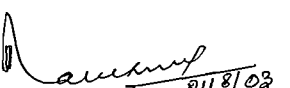

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It gives me immense pleasure to record my sincere and heartfelt thanks to my friends ***Yuvaraj Vimal Paul Rajendran Chintu Deepa Binduraj Babitha Sajitha and Bindu P*** *for their perennial support love and affection*

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PRASANNA D

Dedicated to My Beloved Parents,

Brother and Uncle

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Introduction

INTRODUCTION

In foetal life umbilicus serves as the portal of entry to the umbilical vein carrying oxygenated blood from placenta to the foetal liver the umbilical arteries carrying the deoxygenated blood from the foetus to the placenta and the urachus draining the excretory waste materials from foetus to the allantois The umbilicus consists of two umbilical arteries one umbilical vein and one urachus Following birth the umbilical arteries retract as far as to the bladder while umbilical vein and urachus are obliterated and remain connected with umbilicus as remnants In calves umb licus during the first few days of calf hood is raw and acts as favourable medium for the infectious organisms to grow Umbilical infections are frequently encountered in calves and often have an unfavourable influence on ts general condition and health (Bouckaert and DeMoor 1965)

Umbilical infections may be restricted to the localized area of the navel or may extend through the umbilical vein arteries or urachus and result in generalized sept caemia which may lead to polyarthritis panophthalm tis mening tis and endocard tis (Diefenderfer and Brighthng 1983) Pollakiuria due to urachal remnant infection and abscessation was also reported (Trent and Smith 1984a) Umbilical infection apart from causing generalized disturbances also causes diffuse gangrene of the hind limbs in calves (Mbassa 1985 and Hollands 1986)

Early diagnos s of the infection evaluation of its extension into the abdomen and adoption of appropriate treatment are essential If left undiagnosed or untreated it can cause managemental loss and also calf mortality Though death may ensue at a very later stage the calf will be unthrifty and ail from various health hazards which will lead to economic loss to the farmer Detailed evaluation procedures in clinical cases of omphalitis are lacking except a few clinical reports The status of the animal which is of paramount importance to the surgeon can be obtained from symptoms and evaluation of haematological and radiographical changes

Hence the present study was undertaken with the objective of assessing the severity of omphalitis by clinical haematological and rad olog cal evaluations and cultural examinations and to recommend a suitable approach for surg cal management of omphalitis in calves

Review of Literature

REVIEW OF LITERATURE

Bouckaert and De Moor (1965) reported that after birth the umbilicus consists of remnants of umbilical vein leading to the liver two umbilical arteries arising from internal iliac arteries and the urachus passing into the bladder Frequently the umbilicus gets infected and it may be subcutaneous (omphalitis) or it may affect the umbilical vein (omphalophlebitis) the umbilical arteries (omphaloarteritis) or the urachus (urachitis) On abdominal palpation thick cord could be felt craniodorsally in omphalophleblitis and caudodorsally in urachitis Contrast radiography using triopaque was found effective in identifying the structures affected

Diefenderfer and Brightling (1983) diagnosed urachal abscess in calves suffering from dysuria using intravenous contrast urography It was reported that in clinics most of the urachal abscesses could be diagnosed only at surgery during abdominal exploration in conjunction with resection of umbilical abscesses

Trent and Smith (1984a) reported dysuria and pollakiuria in heifers with urachal abscesses In affected calves normal complete blood count high PCV and haemoglobin leucocytosis neutrophilia with shift to left were observed and they isolated *Corynebacterium pyogenes* from the infected

mass The condition was treated by celiotomy and partial resection of apex of the bladder

Trent and Sm th (1984b) diagnosed intra abdominal umbilical cord remnant infection in calves by deep palpation and by introduction of a probe through the fistula at the umbilical region The micro organisms isolated from the infected structures were *Corynebacterium pyogenes Proteus* spp *Escherichia coli* and *Enterococcus* spp Surgical excision and marsupialisation of the umbilical vein were carried out to treat the condition

Radostits *et al* (1985) opined that navel ill especially extension of infection into the abdominal cavity if not diagnosed or treated properly would lead to complications like polyarthritis meningitis cataract and liver damage in calves

Dass *et al* (1985) successfully diagnosed intra abdominal abscess by palpation which felt like a thick cord like structure filled with pus which extended into the abdominal cavity

Hylton and Rousseaux (1985) reported intestinal strangulation as a complication of omphaloarteritis in a calf It was stated that following incomplete retraction of the umbilical arteries at birth formation of haematoma occurred inside the body wall which later got nfected by bacteriae through the umbilicus Haemogram revealed leukocytosis with severe shift to left

Mbassa (1985) reported diffuse gangrene of hind limb associated with umbilical infection in a calf Clinical signs like anorexia depression temperature of 38 4°C respiration rate of 20 per minute and pulse rate of 80 per minute were observed The micro organism isolated from the infected part was *Staphylococcus aureus*

Hollands (1986) reported gangrene of hind limbs in two calves associated with navel infection and isolated *Escherichia coli* Histopathological examination revealed presence of thrombi within the umbilical arteries

Shearer (1986) reported cases of internal navel abscess attached to the cranial end of the bladder and extending downward to the umbilicus in calves between the age group of three to twelve months Though the calves were unthrifty there were no visible external signs and the temperature respiration rate and pulse rate were normal Increased frequency of micturation in small quantit es was a later sign Examination of urine revealed an excess of cellular debris and protein Excision of the umbilical abscess along with the infected remnants including the cranial end of the bladder was performed through mid ventral laparotomy incision

Hylton and Trent (1987) had reported omphaloarteritis in a calf along with congenital urethral obstruction and uroperitoneum The affected calf had neutroph lia with shift to left high levels of serum fibrinogen

potassium phosphorus and creatinine Laparotomy revealed a mass attached to the cranial end of the bladder and extending down to the umbilicus

Taguchi *et al* (1990) resorted to positive contrast radiography and ultrasonography in addition to deep palpation for the diagnosis of infection involving intra abdominal umbilical cord remnants and abdominal organs in calves Surgical removal of the infected structures by ventral celiotomy was reported as an effective treatment except in umbilical abscesses which responded only to drainage

Edwards (1992) resorted to surgical drainage for treating subcutaneous abscess and surgical excision for the infected structures like umbilical vein arteries and urachus in calves The structures affected were identified by passing catheter or by deep abdominal palpation Ultrasonography was also suggested as an alternate technique

Hathaway *et al* (1993) isolated *Salmonella typhimurium* from the navel region liver hepatic lymph nodes of a calf suffering from navel infection

Lisher *et al* (1994) had reported dribbling of purulent discharge from the umbilicus as typical sign of urachal infections in calves Other symptoms like pollakiuria and stranguria with temperature of 39 2°C pulse rate 72 beats/min and respiratory rate of 36 breaths/min were also reported He also opined ultrasonography as an easy very reliable and informative aid for the

diagnosis of umbilical disease and helpful in determining the choice of therapy

Watson *et al* (1994) opined that omphalophlebitis can involve the full length of umbilical vein extend into the liver and result in liver abscessation and also reported that the urachus was the most commonly infected part among umbilical structures which was associated with cystitis pollakiuria and dysuria in calves Ultrasonography was recommended as the best method to evaluate the intra abdominal umbilical masses Fistulography of umbilical tract and excretory urography were recorded as the other diagnostic procedures The commonly isolated micro organisms from the umbilical infections were *Actinomyces pyogenes* and *Escherichia coli* Drainage and flushing for extra abdominal abscesses and surgical approach for intra abdominal masses were recommended as the treatment procedures

Edwards sand Fubini (1995) reported environmental management improper hygiene of the umbilicus and failure of passive immune transfer as the most likely factors responsible for the formation of umbilical remnant infect ons Omphalophlebitis in calves and foals were treated by marsupialisation of the umb lical vein since complete resection of the infected tract was not possible The organisms isolated from the purulent materials within the umbilical vein remnant of the calves included

Actinomyces pyogenes Escherichia coli and *Fusobacterium nucleatum* Physical and ultrasound examinations were employed to diagnose these conditions

Staller *et al* (1995) reported that the umbilical cord remnants infection was common in calves and associated with septicaemia septic arthritis dysuria incarceration of small intestine and chronic unthriftiness They also suggested abdominal radiography fistulography of umbilical tract and intravenous pyelography as adjunct to diagnostic techniques and recommended surgery as the treatment of choice

Lopez and Markel (1996) reported omphaloarteritis in a calf with clinical signs of depression enlarged and thick umbilicus and foul smelling material expressed from it The blood count revealed leucocytosis with neutrophilia Micro organisms like *Escherichia coli Proteus mirabilis Enterococcus spp Morganella mogami Fusobacterium necrophorum Bacteroides spp* were isolated from the resected portion of the artery Formation of adhesions involving reproductive tract periodic systemic showering and peritonitis from rupture of residual abscess were the long term complications The condition was treated by marsupialisation of the umbilical arteries

Nayak *et al* (1999) diagnosed intra abdominal and extra abdominal umbilical abscesses by palpation near the umbilical ring The calves affected with extra abdominal abscesses were subjected to lanching and conventional method of dressing while cases having combined extra and intra abdominal pockets were flushed with 10 to 15 ml of antiseptic or antibiotic solution with the help of a polythene catheter It was recommended that in the absence of ultrasonography external palpation of the umbilical area seems to be a suitable approach for the diagnosis of intra abdominal abscess

Starost (2001) isolated *Haemophilus somnus* from the urachal abscess of a calf and opined that the calf might have got infection from the infected birth canal of the dam or from the contaminated environment

Materials and Methods

MATERIALS AND METHODS

The study was carried out in twelve selected clinical cases of umbilical infections in calves of different breeds of either sex presented to the College Veterinary Hospitals at Mannuthy and Kokkalai All the calves were clinically examined before surgery and the observations were recorded Plain and contrast radiographs were taken to locate the extent of infected tract or abscessation Based on these observations the animals were divided into two groups viz Group I and Group II each consisting of six animals In Group I the calves with extra abdominal umbilical infections (Fig 1) and in Group II the calves with combined extra abdominal and intra abdommal umbilical infections were included (Fig 2) The following line of treatments were adopted

In Group I surgical drainage was carried out and the tract was treated by routine dressing

In Group II surgical excision of the infected tract(s) was carried out and the abdominal wound was treated by routine dressing

Patient Management

1 Preparation of the patient

1 Group I

In this group the umbilical abscesses were made to mature by applying iodine ointment for three consecutive days The umbilical swelling and area all around were shaved washed and cleaned followed by the application of tincture iodine solution for surgical dramage after restraining the animal on lateral recumbency (Fig 3)

ii Group II

The calves were treated with antibiotics and parentral fluids like 5% dextrose normal saline and vitamins prior to operation depending up on the severity of infection and the general condition The site of operation was shaved washed and cleaned followed by the application of tincture iodine solution (Fig 4) and controlled the animal on dorsal recumbency

2 Anaesthesia

For surgical excision local infiltration along the proposed site of incision was performed using 5 to 10 ml of two per cent solution of lignocaine hydrochloride[1] after sedating the animal with xylazine[2] at the rate of 0 1 mg / kg body weight administered intramuscularly twenty minutes prior to surgery

3 Technique

i Group I

The abscesses were surgically opened drained irrigated with potassium permanganate (1/1000) solution and the cavity was packed with tincture iodine gauze The abscesses that were found open at the time of presentation to the hospitals were drained irrigated with (1/1000) potassium permanganate solution and packed with tincture iodine gauze

[1]Xyloca ne 2% L gnoca ne hydrochlor de 21 3 mg/ml Astra IDL L m ted Bangalore

[2]Xylaz ne Xylaz ne hydrochlor de 23 32 mg (equ valent to 20 mg of xylaz ne) Ind an Immunolog ca s L m ted Gol apadu Gun ur D st A P

ıı Group II

In this group prior to surgical excision of the infected tract(s) a course of Streptopenicill n was administered intra muscularly for a period of five consecutive days An elliptical incision on the skin enclosing the swelling at the umbilical region was made The dissection was further continued deep into the abdominal cavity following the direction of the tract (Fig 5) The extra abdominal infected tract along with the intra abdominal abscess was excised after ligating the tracts by braided silk No 2 at its deepest possible level close to the liver or urinary bladder dependmg upon the tract(s) affected and then the stump was cauterized using tincture iodine solution The laparotomy wound was closed by simple contmuous suture pattern using braided silk No 2 and the skin by monofilament nylon

4 Post operative management

In Group I the abcess cavity was packed with tincture iodine gauze till there was no pus and thereafter the cavity was dressed with framycetin[2] ointment till it completely healed In Group II tincture benzoin seal was applied over the suture line From the next day onwards the surgical wound

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D cryst c n S® LDV Streptomyc n sulphate equ valent to 2 5 g of base Proca n pen c ll n G IP 15 00 000 un t Pen c l n G sod um IP 500 000 un ts Sarabha Zydus Sarabha Chem cals Vadodara

[2]Soframyc n® sk n cream Framycet n sulphate IP 1% W/W Avent s Pharma Ltd Industrial Estate Goa

was cleaned and dressed daily with framycetine ointment Fluids like Intalyte and polybion[2] were administered in cases based on the assessment of physiolog cal status of the animals Sutures were removed on the eighth post operative day

In all the calves streptopenicillin was administered intramuscularly for three consecutive days Thereafter it was either continued for two more days or changed to oxytetracycline[3] based on the results of antibiotic sensitivity test

Main items of observations

History

Anamnesis regarding the duration of illness whether the umbilical cord was torn naturally or ligated cut and disinfected at the time of birth along with other complaints by the owner were recorded

Clinical observations

Clinical symptoms such as swelling of the umbilicus drainage of pus from the umbilicus extent and direction of the infected tract(s) were recorded These observations were made before surgery post operatively on seventh day and fourteenth day The observations on wound healing complication and recurrence if any were recorded on seventh and fourteenth day postoperatively

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Intalyte Dextrose sod um chlor de Potass um chlor de and Calc um chlor de Wochkardt Bombay

[2]Polyb on Th am ne hydrochlor de R boflav n sodium Pyr doxine N ctot n am de Cynocobalam ne Merck Ltd Goa

[3]In amyc n[TA] (Veter nary) Oxytetracycl n d hydrate IP (equ valent to anhydrous oxytetracycl ne 50 mg) Intas Pharmaceut ca s Ltd Matoda Ahmedabad

Physiologic il observations

Respirat on rate pulse rate rectal temperature and colour of the conjunctival mucous membrane were recorded before surgery The animals were continuously mon tored for 7 days post operatively and on the 7 ^{h} and 14 ^{h} post operative days were recorded

Haematological evaluation

Blood samples were collected from the jugular vein before surgery and post operatively on the seventh and fourteenth day for est mation of packed cell volume total erythrocyte count total leukocyte count and differential leukocyte count

Radiological observations

Plain lateral radiograph and retrograde contrast radiograph of the umb hcal reg on were taken For contrast radiography 3 to 5 ml of meglumine salt of diatr zoic acid solut on was infused through the open nfected tract using a catheter to identify the direction and the extent of the infect on In case of closed abscess it was opened catheterized and the contrast mate ial was infused

Identification and sensitivity of organisms

Pus collected in ster le swabs were cultured for isolat on and identif cation of the micro organisms and were subjected to antibiotic sens tiv ty test

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Fig 1 Calf with large extra abdominal umbilical swelling (Group I)

Fig 2 Calf affected by intra abdominal umbilical infection with extra abdominal swelling (Group II)

Fig.3 Calf prepared aseptically for surgical drainage (Group I)

Fig.4 Calf prepared for surgical excision (Group II)

Fig.5 **The infected umbilical tract dissected out from its course (Group II)**

Results

RESULTS

GROUP I

HISTORY

In all the calves the umbilical cord was torn naturally and no treatment was given to the stump All the calves had the history of swelling at the umbilicus and were between the age group of one week to eight weeks The duration of illness varied from three days to two weeks There was no history of previous treatment in any of the calves in Group I except in one calf (1/3) which was already treated by surgical opening of the infected umbilical area and the infection recurred within few days All the calves were apparently healthy except one (I/2) which was unthrifty and in a debilitated condition

CLINICAL SIGNS (Table 1)

On palpation the umbilical swelling was hot soft and painful in three calves (I/1 I/2and I/5) while it was hot hard and painful in two calves (I/3and I/6) and it was cold hard and painless in one calf (I/4) The size of swelling varied from 5 cm to 10 5 cm in diameter In two animals (I/1 and I/6) the abscesses were communicating to the exterior The extent of tract was assessed by passing a probe after opening into the cavity which varied from 3 4 cms to 15 cms in length The pus was thick yellowish and foul

smelling in three calves (I/1 I/4 and I/6) watery sanguineous and foul smelling in two calves (I/2 and I/3) and creamy yellowish and without any smell in one calf (I/5)

Physiological observations (Table 2)

The mean respiration rate (per min) was 42 33 ± 2 53 before surgery 41 86 ± 3 20 at 7 ^{h} day and 42 66 ± 3 29 at 14th day of observation The mean pulse rate (per min) was 116 33 ± 8 72 before surgery 104 83 ± 4 24 at 7 day and 101 00 ± 3 21 at 14 ^{h} day of observation The mean rectal temperature (°C) was 39 20 ± 0 24 before surgery 38 73 ± 0 09 at 7 ^{h} day and 38 76 ± 0 17 at 14 ^{h} day of observation

Haematological evaluation (Table 3)

The mean packed cell volume (per cent) was 35 66 ± 1 60 before surgery 34 50 ± 2 21 at 7 ^{h} day and 33 83 ± 1 79 at 14th day of observation The mean total leukocyte count (10^3/mm^3) was 10 05 ± 1 12 before surgery 9 06 ± 0 58 at 7 ^{h} day and 8 90 ± 0 54 at 14th day of observation

The mean lymphocyte count (per cent) was 53 00 ± 4 42 before surgery 56 33 ± 2 55 at 7 ^{h} day and 60 66 ± 2 60 at 14th day of observation The mean neutrophil count (per cent) was 46 16 ± 4 16 42 66 ± 2 30 at 7 ^{h} day and 40 00 ± 2 32 at 14 ^{h} day of observation The mean monocyte count (per cent) was 0 16 ± 0 16 before surgery 0 66 ± 0 33 at 7th day and 0 66 ±

0 33 at 14th day of observation The mean eosinophil count (per cent) was 0 66 ± 0 42 before surgery 0 33 ± 0 21 at 7 h day and 0 33 ± 0 21 at 14th day of observation

Radiographic observations

The observations of the lateral plain radiographs and retrograde contrast radiographs of abdomen and umbilical region were recorded and the details are given below

Animal 1

Plain Cavity seen was gas filled surrounded by soft tissue density

Contrast Probe in position with ill defined cavity

Animal 2

Plain Large swelling at the umbilicus with soft tissue density (Fig 6)

Contrast Corrugated tract with well defined cavity could be seen extending subcutaneously posterior to the umbilicus The cavity was filled with gas which was outlined by thin streaks of contrast material (Fig 7)

Animal 3

Plain Swelling at the umbilicus with soft tissue density

Contrast The plastic catheter with contrast material could be seen in position in the swelling

Animal 4

Plain Swelling at the umbilicus with well defined extra abdominal contents with soft tissue density

Contrast The contrast material outlining the cavity in the extra abdominal swelling

Animal 5

Plain The swelling of the umbilicus with well defined extra abdominal soft tissue density

Contrast The whole cavity of the swelling was filled by contrast material w th probe n position

Animal 6

Plain Swelling of umbilicus with fluid density

Contrast A small extra abdominal cavity of the swelling was filled with contrast with a faint streak of contrast lining the tract to the exterior

Culture and sensitivity test (Table 4)

Of the six samples taken four isolates of *Escherichia coli* and two isolates of *Staphylococcus spp* (I/4 and I/5) could be obtained The isolates from I/2 I/3 and I/6 were highly sensitive to oxytetracycline and I/1 to streptomycin while both I/4 and I/5 were sensitive to penicillin than other antibiotics tested

Post operative complications if any (Table 5)

By seventh post operative day the healing of abscess was complete in I/1 and I/4 while the healing was in progress in I/2 I/3 I/5 and I/6 By 14^{th} day complete healing was observed in all animals except in I/6 where there was recurrence of the pus formation on the twelfth day and hence again treated with oxytetracycline for five more days consecutively

Table 1 Observations on the Clinical Signs in Group I (n= 6)

Animal No	Type of abscess	Pain perception	Consistency	Diameter of the abscess cms	Tract	Extent of tract cms	Pus		Odour
							Colour	Consistency	
1	Hot	Painful	Soft	7	Present	4 5	Yellowish	Thick	Foul
2	Hot	Painful	Soft	10 5	Absent	15	Sanguineous	Watery	Foul
3	Hot	Painful	Hard	7	Absent	10	Sanguineous	Watery	Foul
4	Cold	Painless	Hard	8	Absent	3 4	Yellowish	Thick	Foul
5	Hot	Painful	Soft	5	Absent	4	Yellowish	Creamy	No smell
6	Hot	Painful	Hard	5	Present	5	Yellowish	Thick	Foul

Table 2 Observations on Physiological Parameters in Group I (n=6)

Parameters	Before Surgery	7th Post operative day	14th Post operative day
Mean Respiration rate (per min)	**42 33**± 2 53	**41 86** ± 3 20	**42 66** ± 3 29
Mean Pulse Rate (per min)	**116 33** ± 8 72	**104 83** ± 4 24	**101 00** ± 3 21
Mean Rectal Temperature (°C)	**39 20** ± 0 24	**38 73** ± 0 09	**38 76** ± 0 17

Table 3 Observation on Hematological Parameters in Group I (n=6)

Parameters	Before Surgery	7th Post operative day	14th Post operative day
PCV (%)	35 66 ± 1 60	34 5 ± 2 21	33 83 ± 1 79
TLC (10^3/mm ^{3})	10 05 ± 1 12	9 06 ± 0 58	8 90 ± 0 54
Lymphocyte (%)	53 00 ± 4 42	56 33 ± 2 55	60 66 ± 2 60
Neutrophil (%)	46 16 ± 4 16	42 66 ± 2 3	40 00 ±2 32
Monocyte (%)	0 16 ± 0 16	0 66 ± 0 33	0 66 ± 0 33
Eosinophil (%)	0 66 ±0 42	0 33 ± 0 21	0 33 ± 0 21

Table 4 Observations on Culture and Sensitivity Test of pus in Group I (n= 6)

Case No	Isolates	Sensitive To
1	*Escherichia coli*	Streptomyc n
2	*Escherichia coli*	Oxytetracyline
3	*Escherichia coli*	Oxytetracycline
4	Staphylococcus spp	Penicillin
5	Staphylococcus spp	Penicillin
6	*Escherichia coli*	Oxytetracycline

Table 5 Observations on Post Operative Healing in Group I (n=6)

Case No	7 h Day Healing			14 h Day Healing		
	Complete	In progress	Complication	Complete	In progress	Complication
1	+		Nil	+		N l
2		+	Nil	+		Nil
3		+	Nil	+		Nil
4	+		Nil	+		Nil
5		+	Nil	+		Nil
6		+	Nil			Recurrence

Fig 6 Skiagram showing the extra abdominal swelling (plain radiograph) (Group I)

Fig 7 Skiagram showing the extra abdominal tract lined by contrast material (contrast radiography) (Group I)

A 0 5 0

GROUP II

HISTORY

In all the calves the umbilical cord was torn naturally and the stump was left untreated All the calves had the history of umbilical swelling and were aged between four weeks to five months Three calves (II/1 II/3 and II/4) had history of purulent discharge from umbilicus The duration of the illness varied from one week to five months Two calves which were treated previously by surgical drainage local dressing and antibiotics (II/2and II/3) showed no improvement Calf II/2 had suppurative arthritis in both the knees and II/5 was lame due to the loss of hoof on its right fore limb following an accident Calf II/2 had the history of flakes in the urine All the calves were in healthy condition when presented except for the presence of swelling

CLINICAL SIGNS (Table 6)

On palpation the umbilical abscesses were hot hard and painful in two calves (II/3 and II/4) cold hard and painful in two calves (II/1 and II/5) hot soft and painful in one calf (II/2) and cold hard and painless in one calf (II/6) The size of the abscesses varied from 2cms to 12 5 cms in diameter In three animals (II/1 II/3 and II/4) the swelling was

communicating to the exterior by a tract with purulent discharge The tract on exploration varied from 4 5 cms to 20 cms in length

The pus obtained was yellowish watery and foul smelling in two calves (II/1 and II/2) sanguineous thick with no smell in two calves (II/5 and II/6) yellowish thick and foul smelling in one calf (II/3) and yellowish creamy and foul smelling in one calf (II/4)

Abdominal palpation near the umbilicus revealed the presence of intra abdominal masses approximately ranging from 3cms to 15 cms in diameter The intra abdominal masses were extending anterior to umbilicus in the animals II/3 II/4 and II/5 and posterior to umbilicus in II/1 II/2 and II/6

After surgical exploration it was confirmed that animals II/3 II/4 and II/5 were having infected umbilical vein in which the abscess had extended upto the liver (Fig 8) In II/1 the infection of urachus extended upto the bladder (Fig 9) while in II/2 only half of the urachal tract was infected (Fig 10) In II/6 the urachal tract was seen infected only upto 2 cms in length

Physiological observations (Table 7)

The mean respiration rate (per min) was 42 50 ± 2 18 before surgery 38 33 ± 1 28 at 7 ^{h} day and 35 00 ± 0 81 at 14th day after surgery The mean

pulse rate (per min) was 86 66 ± 4 31 before surgery 85 33 ± 6 96 at 7th day and 87 50 ± 6 16 at 14th day after surgery The mean rectal temperature (°C) was 39 03 ± 0 25 before surgery 38 71 ± 0 15 at 7 h day and 38 86 ± 0 17 at 14th day after surgery

Haematological evaluation (Table 8)

The mean packed cell volume (per cent) was 35 66 ± 1 97 before surgery 34 50 ± 1 50 at 7 h day and 33 13 ± 0 90 at 14th day after surgery The mean total leucocyte count ($10^3/mm^3$) was 13 36 ± 1 38 before surgery 9 63 ± 0 60 at 7 h day and 9 86 ± 0 74 at 14 h day after surgery

The mean lymphocyte count (per cent) was 45 00 ± 4 92 before surgery 56 00 ± 2 09 at 7th day and 57 33 ± 1 78 at 14th day after surgery The mean neutrophil count (per cent) was 53 00 ± 5 94 before surgery 42 66 ± 1 80 at 7th day and 42 00 ± 1 48 at 14th day after surgery The mean monocyte count (per cent) was 0 33 ± 0 33 before surgery 0 50 ± 0 22 at 7th day and 0 33 ± 0 21 at 14th day after surgery The mean eosinophil count (per cent) was 0 00 ± 0 00 before surgery 0 83 ± 0 31 at 7th day and 0 33 ± 0 21 at 14 h day after surgery

Radiographic observations

The observations of the lateral plain radiographs and retrograde contrast radiographs of abdomen and umbilical region were recorded and the details are given below

Animal I

Plain No appreciable lesion could be seen in the abdomen except swelling at the umbilicus (Fig 11)

Contrast – A pear shaped mass extending from the umbilical region towards the bladder could be seen inside the abdomen It showed connection to the external umbilical fistula which was lined by the contrast material (Fig 12)

Animal 2

Plain No mass or abscess could be seen in the abdomen except swelling at the umbilicus

Contrast A line of contrast material could be seen extending inside the abdomen from the umbilicus

Animal 4

Plain No intra abdominal mass could be seen

Contrast A line of contrast material could be seen extending anterior to the umb l cus inside the abdomen

Culture and sensitivity test (Table 9)

Isolates of *Escherichia coli* were obtained from the pus collected from animals II/2 II/3 II/4 and II/6 while pus from animals II/1 and II/5 yielded *Staphylococcus spp*

The isolates of animals II/1 and II/5 were sensitive to Penicillin while that of animals II/3 II/4 and II/6 were sensitive to streptomycin and the isolate from animal II/2 was sensitive to oxytetracycline

Post operative complications if any (Table 10)

At seventh day the healing of the surgical wound in all the animals were good (Fig 13 & 14) In animal II/2 there was open joint of the right knee while in II/5 the wound was present in the hoof

At 14 day the surgical wound in all the animal healed completely without any complication The wound on knee and hoof in animals II/2 and II/5 respectively was persisting

Table 6 Observations on the Clinical Signs in Group II (n= 6)

Animal No	Type of abscess	Pain perception	Consistency	Diameter of the abscess cms	Tract	Extent of tract cms	Pus		Odour
							Colour	Consistency	
1	Cold	Painful	Hard	2	Present	20	Yellowish	Watery	Foul
2	Hot	Painful	Soft	12 5	Absent	20	Yellowish	Watery	Foul
3	Hot	Painful	Hard	2 5	Present	10	Yellowish	Thick	Foul
4	Hot	Painful	Hard	5	Present	15 5	Yellowish	Creamy	Foul
5	Cold	Painful	Hard	3	Absent	6 5	Sanguineous	Thick	No smell
6	Cold	Painless	Hard	2	Absent	4 5	Sanguineous	Thick	No smell

Table 7 Observations on Physiological Parameters in Group II (n=6)

Parameters	Before Surgery	7th Post operative day	14th Post operative day
Mean Respiration rate (per min)	42 50 ± 2 18	38 33 ±1 28	35 00 ± 0 81
Mean Pulse Rate (per min)	86 66 ± 4 31	85 33 ± 6 96	87 50 ±6 16
Mean Rectal Temperature (°C)	39 03 ± 0 25	38 71 ± 0 15	38 86 ± 0 17

Table 8 Observation on Hematological Parameters in Group I (n=6)

Parameters	O Day	7th Post operative day	14th Post operative day
PCV (%)	**35 66** ± 1 97	**34 50** ± 1 50	**33 13** ± 0 90
TLC (10^3/mm ^{3})	**13 36** ± 1 38	**9 63** ± 0 60	**9 86** ± 0 74
Lymphocyte (%)	**45 00** ± 4 92	**56 00** ± 2 09	**57 33** ± 1 78
Neutrophil (%)	**53 00** ± 5 94	**42 66** ± 1 80	**42 00** ± 1 48
Monocyte (%)	**0 33** ± 0 33	**0 50** ± 0 22	**0 33** ± 0 21
Eosinophil (%)	0 00	**0 83** ± 0 31	**0 33** ± 0 21

Fig.8 Dissected portion of the umbilical vein extended to liver (Group II)

Fig.9 Dissected portion of the urachus extended to the urinary bladder (Group II)

Fig.10 **Portion of the infected urachus after surgical excision (Group II)**

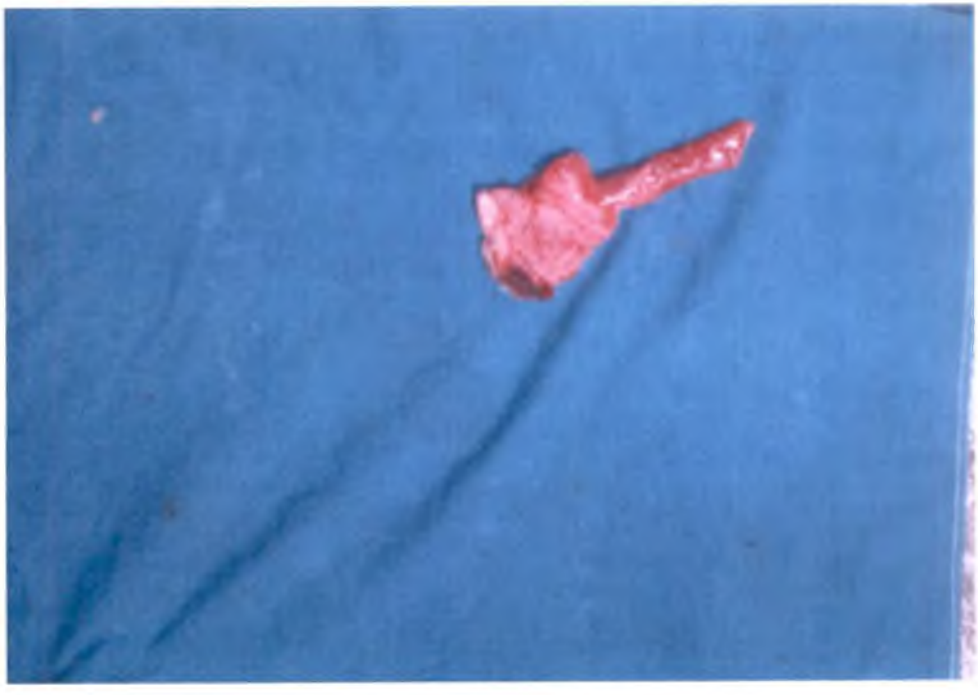
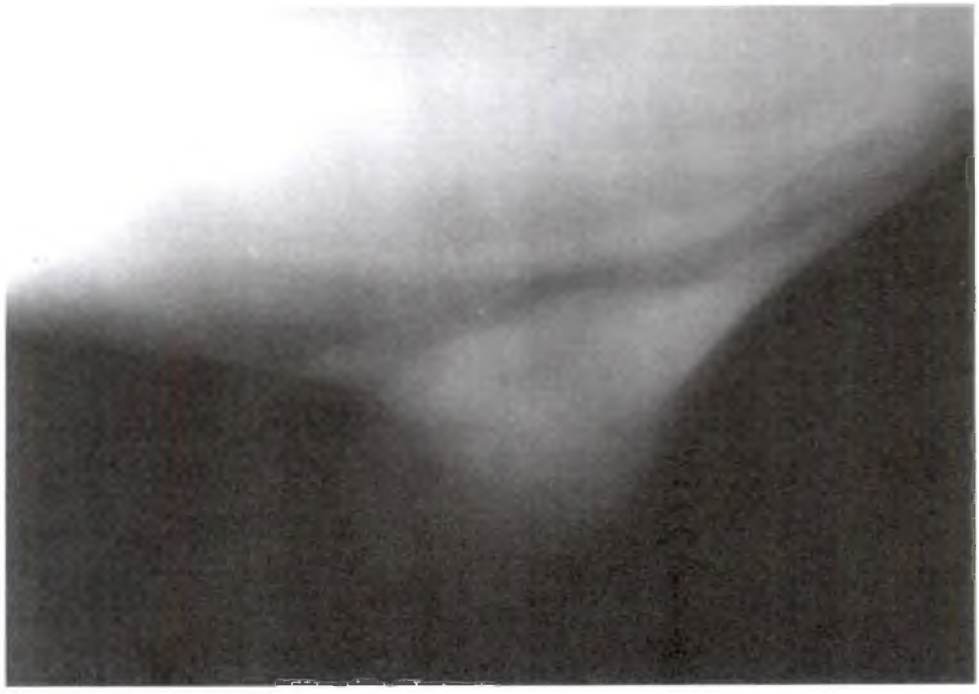


Fig.11 **Skiagram showing extra abdominal swelling (plain radiograph) (Group II)**

Fig.12 **Skiagram showing pear shaped intra abdominal mass extending posteriorly lined by contrast material (contrast radiography) (Group II)**



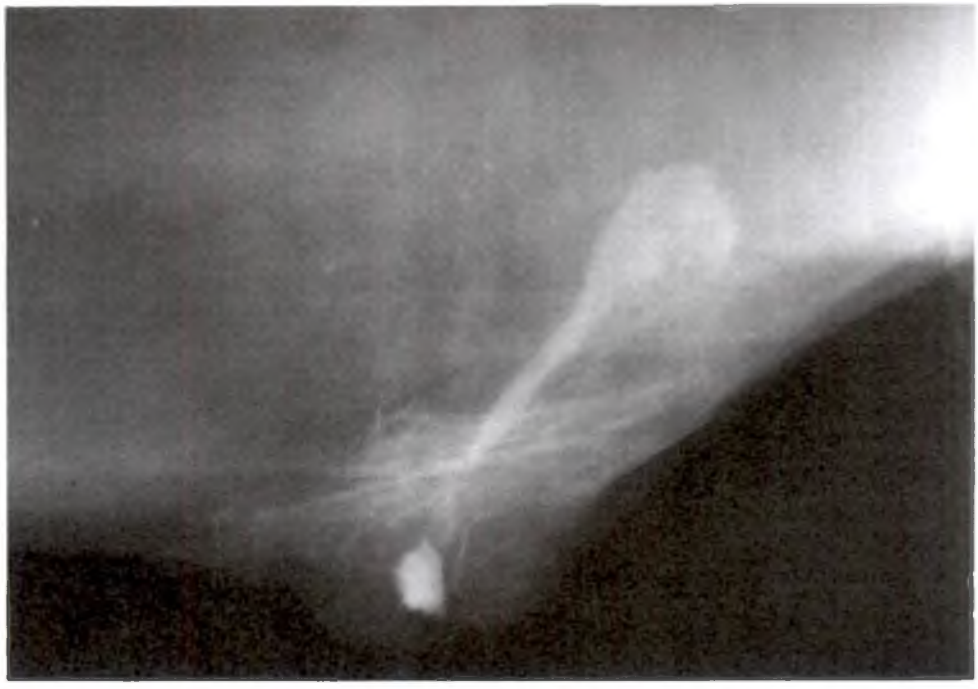


Fig.13 Calf treated for extra-abdominal abscess on fourteenth day after surgical drainage (Group I)

Fig.14 Calf treated for intra-abdominal abscess on fourteenth day after surgical excision (Group II)

Discussion

DISCUSSION

The study was carr ed out ın twelve selected clınıcal cases of umbılıcal ınfectıons ın calves of dıfferent breeds of eıther sex presented at the Veterınary College Hosp tals at Mannuthy and Kokkalaı These anımals were dıvıded ınto two groups vız Group I and Group II each consıstıng of sıx anımals based on the clınıcal and radıologıcal ınvestıgatıons

In Group I the calves wıth extra abdomınal umbılıcal ınfectıons and ın Group II the calves wıth combıned extra abdomınal and ıntra abdomınal umbılıcal ınfectıons were ıncluded Anımals m Group I were treated by surgıcal draınage and ın Group II by surgıcal excısıon of the ınfected tract(s)

HISTORY

From the hıstory ıt was revealed that the umbılıcal cord ın all calves of both the groups was torn naturally and the stump was not treated The calves ın the Group I were aged between one to eıght weeks and those ın Group II between one to fıve months Accordıng to Radostıts *et al* (1985) Omphalıtıs ıs commonly seen ın calves wıthın two to fıve days of bırth and often persısts for several weeks whereas ıntra abdomınal umbılıcal ınfectıons were commonly encountered ın calves of one to three months of age There was no hıstory of previous treatment ın any of the calves ın

Group I except in one calf which was subjected to surgical drainage of the umbilical abscess The infection recurred within few days after the treatment In Group II two calves had a history of being treated previously by surgical drainage of umbilical swelling local dressing and antibiotic therapy with no improvement

All the calves were in healthy condition except one calf in Group I which was debilitated and unthrifty and two animals in Group II of which one had suppurative arthritis in both knees whereas the other was lame due to the loss of hoof on its right fore limb following an accident Radostits *et al* (1985) opined that navel ill especially extension of infection into the abdominal cavity if not diagnosed or treated promptly may lead to complications like polyarthritis meningitis cataract and liver damage in calves One calf in Group II had shown flakes of pus in the urine and was later confirmed as a case of urachal abscess Post operatively the urine appeared normal Diefenderfer and Brightling (1983) observed cloudy appearance and flakes of pus in the urine of a calf and a heifer affected with urachal abscess Bouckaert and De Moor (1965) reported pyuria in calves affected with urachal abscess as it had the chance of connection to the bladder

CLINICAL SIGNS

On palpation the umbilical swelling was hot and painful in all calves of Group I except in one calf in which it was a cold and painless The swellings at the umbilicus were hard in consistency in three calves and soft in the remaining three calves in Group I In animals of Group I painful swelling of the umbilical area was found as a prominent clinical signs Bouckaert and De Moor (1965) reported fluctuating painful swelling at the umbilical area in extra abdominal umbilical infection In Group II animals umbilical abscesses were hot and painful in three calves cold and painful in two calves and cold and painless in one calf The consistency of the swelling was hard in all the calves of this group except for one which was soft Reef and Collatos (1988) observed warmth swelling pain and/or purulent discharge as classical signs in omphalitis in foals

The diameter of the extra abdominal mass varied from 5 cms to 10 5 cms in Group I and from 2 cms to 12 5 cm in Group II In two calves of Group I the infected tract was fistulous and closed In Group II three animals had f'stulous tract while other three had closed cavities Bouckaert and De Moor (1965) reported that though fistulation exists in omphalitis generally the tract would be closed Edwards (1992) reported closed fluctuating non reduc ble swelling or less frequently as a discharging sinus

in omphalitis and as closed fluctuating swelling or as a chronically discharging sinus intra abdominal abscess

The length of the infected tract when measured using a probe varied from 3 4 cms to 15 cms in animals of Group I and from 4 5 cms to 20 cms in Group II Bouckaert and De Moor (1965) and Edwards (1992) used probes to find out the direction and to confirm the extension of umbilical infection into the abdominal cavity

In Group I the pus in four calves was yellowish and in two calves it was sanguineous and foul smelling in all except one It varied in consistency from watery to creamy and thick In Group II the colour and consistency of the pus varied from yellowish watery to thick creamy with or without foul smelling in all cases but one which had a sanguineous and thick consistency These observations were consistent with the reports of Edwards (1992) who aspirated thick creamy purulent material from the umbilical swelling in calves

Abdominal palpation near the umbilicus revealed no intra abdominal mass in Group I calves In Group II the extension of the indurated umbilical structures into the abdomen could be felt extending either craniodorsally or caudodorsally from the umbilicus for about 3 cms to 15 cms These structures were later confirmed as the infected umbilical vein and urachus by contrast radiography and by the surgical exploration Three calves

suffered from infected umbilical vein and the other three had urachal abscess This is consistent w th the report of Edwards (1992) who detected a f rm thickened structure extending cranially or caudally in the abdomen on deep palpation Nayak *et al* (1999) had recommended external palpation of the umb lical cord near the umbilical ring as an alternative approach for the diagnosis of intra abdominal umbilical infection in the absence of ultrasonography Bouckaert and De Moor (1965) had diagnosed the intra abdom nal infection of umbilical vein and urachus by palpation and then confirmed it w th retrograde contrast radiography The symptoms in those calves were suppurating umbilical fistula and palpable intra abdominal thick cord or abscess either extending cranio dorsally towards the liver in umbilical ve n infect on or caudo dorsally towards the bladder in urachal infection In this present study also the intra abdominal masses could be palpated easily and hence it is advisable that all the calves affected with umb lical infections should be checked for its extension into the abdominal cavity

PHYSIOLOGICAL OBSERVATIONS

The respiratory rate pulse rate and rectal temperature were found within normal range in animals of both the groups throughout the period of study The observations were in accordance with the study of Shearer (1986) who encountered calves affected with intra abdominal urachal

abscess which were although unthrifty had the respiratory rate pulse rate and temperature within the normal range

Haemtological evaluation

The packed cell volume in both the groups were within normal range Diefenderfer and Brightling (1983) reported normal complete blood count in calves affected with urachal abscess

The total leucocyte count was found to be within normal range in Group I throughout the period of study The total leucocyte count in Group II animals was higher than the normal before surgery and it returned to normal physiological range by seventh post operative day Lopez and Markel (1996) reported leucocytosis characterized by neutrophilia in calves affected with umbilical infection

The neutrophil count in both groups were increased before the surgical intervention The observations were similar to that of Trent and Smith (1984b) who reported that normal complete blood count leucocytosis neutrophilia with shift to left in calves affected with urachal abscess Edwards and Fubini (1995) reported neutrophilic leucocytosis in three calves and foals affected w th umbil cal vein infection The neutrophil count in both the Groups I and II decreased to normal range by seventh post operative day of study This may be due to the removal of the source of infection wh ch caused neutrophil a

The lymphocyte eosinophil and basophil counts in both groups were within normal physiological range throughout the period of study Lischer *et al* (1994) observed similar findings in calves affected with umbilical infection

RADIOGRAPHIC OBSERVATIONS

Plain radiographs of the infected umbilicus and the abdomen in both the groups generally produced a soft tissue density and did not help in specifically d fferentiating between extra abdominal and intra abdominal masses While retrograde contrast fistulography using Trazograf contributed much in differentiating between extra abdominal and intra abdominal umbilical affections and also in identifying the direction and the extent of the intra abdominal tract Bouckaert and De Moor (1965) recommended injection of iodine containing contrast liquid via the fistulae before radiography or radioscopy for identifying the extent of tract in umbilical infection Staller *et al* (1995) suggested abdominal radiography and fistulography of umbilical tract as adjunct to diagnostic techniques and recommended surgery as the treatment of choice The study revealed the use of retrograde contrast radiography in diagnosing the extent and direction of lesion at the umbilical region

CULTURE AND SENSITIVITY TEST

Cultural examination of the pus collected from the umbilical abscess yielded isolates of *E coli* from four calves each from both Group I and Group II and *Staphylococcus spp* from two calves each from both the groups Radostits *et al* (1985) had isolated *E coli Proteus spp Staphylococcus spp* and *Actinomyces pyogenes* from infections involving umbilicus in calves Edwards and Fubim (1995) isolated *E coli* from two calves affected with umbilical vein infection Mbassa (1985) isolated *Staphylococcus aureus* from a calf suffering from omphalophlebitis

Isolates of *Staphylococcus spp* from both the groups were sensitive to penicillins while three isolates of *E coli* from Group I were sensitive to oxytetracycline and one to streptomycin Three isolates of *E coli* from Group II were sensitive to streptomycin and one was sensitive to oxytetracycline The culture and sensitivity tests helped in selecting the suitable ant biotics to control infection of the umbilicus and also helped in the healing process

POST OPERATIVE COMPLICATIONS

In Group I two calves with opened abscess healed uneventfully by seventh post operative day and the other calves recovered completely by fourteenth post operat ve day except one One calf had the recurrence of infection on the twelfth post operative day and was treated with

oxytetracycline consecutively for five more days to avoid further complication The surgical s te in all the calves of Group II healed without any complication by fourteenth post operative day This is in accordance with Shearer (1986) who opined that umbilical infection responded well to the surgical correction and the prognosis was good

CONCLUSION

Umbilical infections in calves especially intra abdominal if neglected may lead to unthriftyness stunted growth and septicaemia leading to polyarthritis cystitis endocarditis and even death It causes considerable managemental and economic loss to the farmer Detailed anamnesis clinical and haematological investigations were found useful in assessmg the severity of the condition

Negligence in caring the umbilical cord at the time of birth often forms the main cause for umbilical infections Hot soft/hard and painful swelling with or without sinus dischargmg pus were generally observed as the main clinical feature in both extra abdommal and intra abdominal umbilical nfection Leucocytosis with neutrophilia was evident in intra abdominal umbilical affections

From this study it is concluded that all the calves affected by umbilical infection should be examined for intra abdominal affections also

Abdom nal palpation near the umbilicus is highly helpful for the diagnos s where n the extension of infection can be easily palpated as an indurated cord continuing either towards liver or bladder Retrograde contrast fistulography using iodine containing solution was found useful in different ating extra abdominal and intra abdominal infection and in assessing the extent and direct on of the intra abdommal infected tract and thus dent fy ng the structures affected

Culture and sensitivity test is essential for the appropriate selection of the antibiotic for the effective control of the infection

Surgical drainage along with the suitable antibiotic was found to be effective for the extra abdominal umbilical infection whereas surgical excision was found to be an appropriate treatment for the intra abdommal umbil cal abscess with suitable antibiot cs

Hence t is necessary to have a careful and systematic examination of the calves presented with umbilical infection to rule out any intra abdommal affections

Summary

SUMMARY

The study of omphalitis was carried out in twelve selected clinical cases of umbilical infections in calves of different breeds of either sex presented to the Veterinary College Hospitals at Mannuthy and Kokkalai These animals were divided into two groups viz Group I and Group II each consisting of six animals based on the clinical and radiological observations

In Group I the calves with extra abdominal umbilical infection and in Group II the calves with combined extra abdominal and intra abdominal umbilical infections were included

In Group I the calves were aged below eight weeks and had history of swelling at the umbilicus for minimum duration of three days The swelling varied in their size from 5cms to a maximum of 10 5 cms in diameter which were either draining to the exterior through a fistula or were closed The pus was either watery or creamy to thick in their consistency and was either yellow or sanguineous in colour On examining the cavity through the opening of the umbilicus the size varied from 2 5 cms to 15 cms in length The physiological parameters like respiration rate pulse rate and rectal temperature was found to be within normal range The haematological values such as packed cell volume total leucocyte count lymphocyte count monocyte count eosinophil count were also within normal physiological

range whereas there was increase in the neutrophil count Retrograde contrast radiography was employed to confirm the swelling as extra abdominal umbilical infection *Escherichia coli* and *Staphylococcus spp* were identified from the culture obtained from the pus and were found to be sensitive to penicillin streptomycin and oxytetracycline The calves were successfully treated by routine drainage and dressing All the calves recovered without any complication post operatively except one

In Group II one calf of 5 months had a longer duration of affection All calves in this group had the history of persistent swelling or recurrence of the swelling at the umbilicus even after routine treatment The calves evinced pain on palpation of the swelling The swelling was either hot or cold to touch and was mostly hard The swelling was either fistulated or closed Pus could be drained through the opening or after opening the swelling The pus in some calves were foul smelling while odourless in other cases and also varied in its consistency from watery creamy to thick and either yellow or sanguineous in colour On probing through the fistula an extension of the umbilicus could be appreciated extending into the abdominal cavity measuring to a maximum of 20 cm in length The intra abdominal abscess could be felt on palpation of the abdomen near the umbilicus as a continuation from the umbilicus towards liver or bladder The respiration rate pulse rate and the rectal temperature were well within their normal range Haematological parameters packed cell volume lymphocyte

count monocyte count eosinophil count were also within the normal range with leucocytosis and an increase in the neutrophil count Retrograde contrast radiography was of paramount importance to locate the extent of the tract and to diagnose the structure affected The diagnosis was confirmed on surgery as the umbilical vein that extended towards liver and as urachus that extended towards the bladder The causative organisms were found to be *E coli* and *Staphylococcus spp* All the calves were treated successfully by surgical excision of the intra abdominal and extra abdominal abscess All the calves had an uneventful recovery by the end of the observation period

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SURGICAL MANAGEMENT OF OMPHALITIS IN CALVES

By

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ABSTRACT OF THE THESIS

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ABSTRACT

The study was carried out in twelve selected clinical cases of umbilical infections in calves of different breeds of either sex presented to the Veterinary College Hospitals at Mannuthy and Kokkalai These animals were div ded into two groups viz Group I and Group II each consist ng of six an mals

In Group I the calves with extra abdominal umbilical infection and in Group II the calves with combined extra abdominal and intra abdominal umbilical infections were included

The calves in Group I were within the age group of eight weeks and had the history of swelling at the umbilicus for at least a period of eight days which varied in its type consistency and tenderness on palpation The size of the swelling was maximum of 10 5 cm in diameter with no connect on or extension into the abdominal cavity The swelling was either draining to the exterior through a fistula or closed The cavity of the swelling was from 3 4 cm to 15 cm in length containing pus which varied in its consistency color and odour The physiological parameters were all within normal range The haemogram was also within physiological range except for an increase n the neutrophil count Abdominal palpation and retrograde contrast radiography confirmed that the swelling is confined to the exterior of the abdomen The causative organisms were detected and the calves were successfully treated

by routine drainage and dressing All the calves recovered completely except one which had recurrence of the infection during the study period

In Group II the calves were aged between one month to five months and the maximum duration of the illness five months was reported from the oldest calf in that group They had history of recurrence or persistence of umbilical swelling after the treatment of the swelling The swelling was either open or closed from which pus was obtained The swellings were mostly hot and hard The pus varied in its consistency colour and odour The swellings could be felt on abdominal palpation as an extension of the umbilicus towards the liver and bladder The extent of the cavity was measured by a probe and was able to measure 20 cm long tract The respiration rate pulse rate and the rectal temperature were found to be within the normal range The haemogram showed leucocytosis and an increase in the neutrophil count The affected structures were identified as umbilical vein that was extending towards the liver and as urachus which was extending towards the bladder by retrograde contrast radiography The causative organisms were identified and the calves were successfully treated by surgical excision of the affected structures along with the umbilicus