

Diagnostic and prognostic indicators, antibacterial sensitivity pattern and surgical treatment of perireticular abscess in cows and buffaloes

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ABSTRACT

Prospective evaluation and long term follow up of surgically treated cases of perireticular abscess in 15 buffaloes and 3 cows was done. Majority of the animals (94.4%) were adult and were either recently parturated (7) or pregnant (7). Seventeen animals recovered after surgery but 13 survived on long term follow up and 11 became productive members of the herd. The survivability could not be correlated to the haematological values, age, rumen motility and duration of illness. Radiography helped in diagnosis of perireticular abscess in 45.4% cases only. Majority of the abscesses were located cranioventrally and were single (of size less than 5 inches) and were associated with potential metallic foreign bodies in the reticulum. In 5 animals, a metallic foreign body embedding the abscess was observed. Reticulophrenic adhesions were observed in all the animals. Presence of both ruminoperitoneal adhesions and abscess of size more than 5 inches was assessed as poor prognostic indicator. The organism isolated from culture of pus samples (10) were *Staphylococcus aureus* (5), *Escherichia coli* (2), *Corynebacterium pyogenes* (2), and *Streptococcus pyogenes* (1). The isolates were highly sensitive to gentamicin, chloramphenicol, streptomycin, ciprofloxacin and kanamycin. A high percentage of resistance was observed for cephalexin, ceftriaxone, cefotaxime, penicillin G, cloxacillin and oxytetracycline. Surgical drainage of perireticular abscess into reticular lumen and parenteral medication with amoxicillin, cloxacillin and gentamicin along with supportive medication resulted in successful surgical outcome.

Key words: Antibacterial, Bovine, Laparorumenotomy, Perireticular abscess, Radiography

Exploratory laparorumenotomy is indicated for removal of metallic foreign bodies, confirmation of abscess and its treatment (Kumar *et al.* 1983, Ducharme 1990, Saini *et al.* 2005). There are scanty reports on perireticular abscess in cows (Braun *et al.* 1998), antibacterial sensitivity pattern and long term outcomes of surgically treated cases of perireticular abscess in buffaloes. The present study was planned to record the postoperative recovery or survival, wound healing, complication(s) or recurrence, production and reproduction performance of surgically treated cases of perireticular abscess in cows and buffaloes.

MATERIALS AND METHODS

Buffaloes (15) and cows (3) suffering from perireticular abscess during 2004 to 2006 were studied. Tentative diagnosis was made on the basis of history, clinical, haematological and radiographic findings. Laparorumenotomy was done under

2% lignocaine hydrochloride infiltration anesthesia for confirmation. During rumenotomy 2/3 to 3/4 contents of the rumen and reticulum were evacuated. Penetrating and non-penetrating metallic foreign bodies in the reticulum were removed. Any turgid or firm oval mass obstructing the reticular lumen was tentatively diagnosed as reticular abscess. Needle aspiration through the reticular wall confirmed the diagnosis. A sample of pus was collected for culture and antibiotic sensitivity test. Location and approximate size of abscess was recorded. The abscess was drained into the reticulum by a stab incision through the reticular wall and flushed with povidone iodine solution. Reticulophrenic adhesions were assessed by pulling the reticular wall away from the diaphragm. The rumen and laparotomy wounds were closed in a routine manner. All the animals were administered normal saline (0.9%) @ 40ml/kg, intravenously, on the first day and subsequently for the next 3 days based on dehydration and water intake status. Inj. amoxicillin and cloxacillin (@ 15 mg/kg, IM, twice daily for 10 days), inj. gentamicin (@ 2 mg/kg, IM, twice daily for 5 days), inj. meloxicam (@ 0.2 mg/kg, IM, once daily for 3 days), bolus yeasac (2 orally daily for 15 days) and powder Liv 52 (50 g daily for 15 days) were administered, postoperatively. The

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surgical wound was dressed twice daily with povidone iodine and skin sutures were removed after 12–15 days. The surgically treated cases were followed postoperatively, on telephone or client visits.

Pus samples (8 buffaloes and 2 cows) were cultured on blood agar and plates were incubated at 37°C for 24 to 48 h. The isolates were identified on the basis of morphology, cultural and biochemical features. Various antibacterials like amoxycillin (30 mcg), ampicillin (10 mcg), cloxacillin (10 mcg), ceftriaxone (10 mcg), gentamicin (30 mcg), penicillin G (10 iu), streptomycin (10 mcg), pefloxacin (5 mcg), norfloxacin (10 mcg), cefotaxime (30 mcg), oxytetracycline (30 mcg), chloramphenicol (30 mcg), doxycycline HCl (30 mcg), ofloxacin (5 mcg), neomycin (30 mcg), kanamycin (30 mcg) and cephalexin (30 mcg) were tested for the sensitivity against bacteria isolated from bovine perireticular abscess by disc diffusion method (Bauer *et al.* 1966).

RESULTS AND DISCUSSION

In the present study 18 animals (15 buffaloes + 3 cows) suffering from perireticular abscess were diagnosed and treated surgically. Majority of the animals (17) were more than 4 years of age and 1 was heifer. Out of these, 7 animals were pregnant, 7 were recently parturated (<3 months) and 3 were in late lactation (>3 months). High incidence of bovine reticular abscess in adult periparturient cows (Braun *et al.* 1998, Kumar *et al.* 2001) and buffaloes (Saini *et al.* 2005) has been reported in the literature. Pressure exerted by gravid uterus, anteriorly, in advanced gestation might have predisposed the potentially penetrating metallic foreign bodies to perforate reticular wall resulting in perireticular abscessation (Saini *et al.* 2005).

All affected animals had normal haemoglobin (11.4 ± 0.56 g/dL) but mild leukocytosis (12920 ± 1580 /cumm) with absolute (7980 ± 1280 /cumm) and relative neutrophilia ($61.7 \pm 17.22\%$). Mean absolute counts of lymphocytes (4770 ± 580 /cumm), monocytes, eosinophils and basophils were within the normal physiological range. Leukocytosis along with neutrophilia and lymphocytosis was reported in bovine traumatic reticuloperitonitis (El-Sebaie *et al.* 1999, Saini *et al.* 2005). However, haematological values cannot be relied upon for diagnosis, as any inflammatory condition may cause such change (Khan *et al.* 1997). Hypermotility of the rumen (3.37 ± 0.73) and tympany, in the present study, corroborates to earlier findings that report weak but increased rumen motility in animals suffering from reticular abscess (Braun *et al.* 1998, Saini *et al.* 2005). It might be due to stimulation of vagal nerve by pressure exerted by abscess or mass. A nonsignificant difference in haemoglobin, total leukocyte count, differential and absolute leukocyte count was observed among survivor and nonsurvivor animals of the present study. Also the survivability, in the present study, could not be correlated to the age, frequency of rumen contractions and duration of illness.

Radiographic examination was performed in 11 cases but diagnosis of an abscess could be made in 5 cases (45.4%) only based on radiographic signs of oval or round radioluscent density adjacent to the diaphragmatic line with or without penetrating metallic foreign body (Partington and Biller 1991, Braun *et al.* 1998).

Laparorumenotomy was performed in all the animals. Fourteen animals had abscess associated with metallic foreign bodies in the reticulum. Among them most of the animals (13) showed potentially penetrating metallic foreign bodies confirming that metallic foreign bodies being the most possible cause for the formation of the perireticular abscess (Ducharme 1990). In 4 cases no metallic foreign body could be recovered during rumenotomy which suggests that the abscess could also be a result of penetration of non-metallic foreign bodies (Saini *et al.* 2005) or haematogenous causes. These metallic foreign bodies were removed and abscess was treated by giving an incision on the abscess through the reticular wall to drain its contents into the reticulum followed by flushing the abscess cavity with povidone iodine. Most of the abscess had liquid contents except in 3 animals which had semisolid or thick fibrinous contents, which were drained by digital manipulation through the stab incision. In 5 cases (3 buffalo and 2 cows) a metallic foreign body embedding the abscess was diagnosed and in 4 cases it could be removed during rumenotomy. In 1 cow, the embedding metallic foreign body (wire) could not be removed during rumenotomy and the presence of foreign body was confirmed by radiography after the operation. But interestingly, the animal recovered, survived and produced satisfactorily on the follow up period of 7 months but owner observed that animal seldom feels pain and walks with abducted elbows.

Reticulophrenic adhesions, in varying degree, were observed in all the animals in the present study. In 44.4% cases, mild fibrinous peritoneal adhesions on dorsolateral and/or ventral aspect of rumen wall were also observed which might be associated with rumen trocarization to relieve tympany. Reticulophrenic adhesion (local peritonitis) results from damage to reticular wall or perireticular structures by perforation of metallic foreign bodies. Presence of reticulophrenic adhesions have been reported to be beneficial as it prevents contamination of peritoneal cavity while draining abscess. Presence of ruminoperitoneal adhesions in addition to reticulophrenic adhesions has been observed to a poor prognostic indicator. All the animals of the present study had single perireticular abscess and majority of the abscesses (61.1%, n=11) were located cranioventrally. It corroborates to the earlier finding (Saini *et al.* 2005). Other locations of perireticular abscess included caudoventral (2), right lateral (3) and medial reticular wall (2).

In 12 animals, abscess was less than 5 inches in size while in 6 animals the size was more than 5 inches. Out of 5 animals that died, after the discharge from the hospital, 4 had abscess of size more than 5 inches. The cause of death may be related

to incomplete drainage of the large abscess leading to toxæmia. Necropsy findings of these cases were not available as animals died at owner's place.

Out of 18 animals, 17 (15 buffalo and two cows) responded favourably to the surgical treatment and restored appetite, passed faeces and were healthy at the time of discharge from the hospital (3–5 days after surgery). One cow did not respond to the surgical treatment. Uneventful recovery in most of the animals, in the present study, indicates the possibility of mechanical interference caused by perireticular abscess in the pathogenesis of the disease. Drainage of abscess might have relieved pressure on vagal nerve resulting in normal return of forestomach motility. Pressure exerted by perireticular abscess on vagus nerve or entrapment of vagus nerve by reticulophrenic adhesions has been reported to be a cause for vagal indigestion in cattle (Rebhun *et al.* 1988, Fubini *et al.* 1989, Ducharme 1990, El-Sebaie *et al.* 1999). Prognosis in such cases depends upon degree of damage to vagus nerve. Long term results showed disease free and normal productive survival of 72.2% (n=13) animals (11 buffaloes and two cows) while 4 buffaloes and 1 cow died. Majority of the animals (n=15, 83.3%) had normal healing of surgical wound and skin sutures were removed after 12–15 days. Three cases showed infection and suture abscess formation which were managed successfully.

Out of 10 lactating animals, in the present study, 8 survived and produced on an average of 37% of the peak milk yield/day, in the same lactation. Further follow up revealed onset of estrous after a mean period of 7.8 ± 2.8 months of the operation and all calved at full term with normal production levels in the next lactation. Out of 7 pregnant animals, all survivors (4) calved at full term normally and yielded full milk production in the subsequent lactation. Return of normal production and reproduction performances, in the present study, corroborates to earlier reports in cows (Fubini *et al.* 1989, Braun *et al.* 1998) and buffaloes (Singh *et al.* 1987, Saini *et al.* 2005).

Reticulophrenic adhesions did not appear to have any ill effect on survival. Four out of 5 nonsurvivors had mild to moderate ruminoperitoneal adhesions in addition to reticulophrenic adhesions. However, 4 animals in the survivor group also showed ruminoperitoneal adhesions. All the nonsurvivors had normal wound healing but died after a period of 1–3 weeks of operation. In survivor group, 2 buffaloes were culled after 1 to 2½ months of operation because of poor health, production and reproduction performance.

The pus samples (8 buffaloes and 2 cows) retrieved from the perireticular abscess were submitted for culture and antibacterial sensitivity test. The organism isolated were *Staphylococcus aureus* (5), *E. coli* (2), *Corynebacterium pyogenes* (2), and *Streptococcus pyogenes* (1). The isolated organisms were 100% sensitive to gentamicin (8), chloramphenicol (4), streptomycin (3) ciprofloxacin (3) and

kanamycin (2). High sensitivity for ofloxacin (85.7%, n=7), amoxicillin (77.7%, n=9), neomycin (75%, n=4), doxycycline (66.7%, n=6), pefloxacin (66.7%, n=3), ampicillin (66.7%, n=3) and norfloxacin (66.7%, n=3) was also observed. In the present study a high percentage of resistance was observed for cephalixin (100%, n=2), ceftriaxone (80%, n=5), cefotaxime (75%, n=8), penicillin G (66.7%, n=6), cloxacillin (57.2%, n=7), and oxytetracycline (50%, n=6). In the present study organism isolated from perireticular abscess and antibacterial sensitivity pattern was similar to Kumar *et al.* (2004) who cultured peritoneal swabs of adult buffaloes suffering from traumatic reticuloperitonitis.

In the present study, the abscess was managed surgically by giving an incision in the reticular wall from the lumen and draining the abscess into the reticulum. Surgical drainage of the perireticular abscess using hypodermic needle (Kumar *et al.* 1983) or by an incision in the reticular wall (Singh *et al.* 1987, Fubini *et al.* 1989, Ducharme 1990) is often satisfactory, but ultrasound guided percutaneous drainage (Braun *et al.* 1998), post xiphoid surgical approach (Sobti *et al.* 1994, Sharma *et al.* 1996) and repetitive drainage and debridement through rumen fistula (Kumar *et al.* 2001) were also other modalities used for treatment of bovine perireticular abscess. A good prognosis and uneventful recovery of the bovine reticular abscess was reported by various workers (Singh *et al.* 1987, Fubini *et al.* 1989, Braun *et al.* 1998, Saini *et al.* 2005).

In summary, perireticular abscess is a disease of periparturient adult buffaloes and cows usually associated with reticular foreign bodies. Radiography aids in tentative diagnosis of perireticular abscess. Usually a single abscess is observed, which is located on the cranioventral aspect of the reticulum. Surgical drainage of small-size abscess into the reticular lumen results in successful surgical outcome. But alternative surgical approaches may be required for successful surgical management of bigger-size abscesses.

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