

Diagnosis and Management of Abomasal Disorders in Cattle

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Abstract

The present study was conducted on a total number of 114 cattle of both sexes aged from 6 months to 10 years and suffering from one or more abomasal disorders. The affected animals were belonged to a private animal farm station at Dakahlia Province and cases that admitted to the Mansoura Veterinary Teaching Hospital (MVTH). In addition to the cases surveyed at Mansoura abattoir. Those animals were subjected to well informed case history, clinical examinations, as well as histopathological examinations for some cases of abomasal disorders. Also, ten clinically normal dairy cows were selected and served as control groups for laboratory examinations.

LDA were diagnosed clinically in 34 Holstein cows and confirmed by laboratory tests. The peak of disease occurrence was seen in the late autumn and winter. The affected animals were subjected to left flank omentopexy or left flank abomasopexy, which gave satisfactory results with complete recovery in 27 cows with success rate 84.4% after the third follow up (60 days). AV was diagnosed in a Holstein cow with a history of complete anorexia, sharp drop in milk production, tachycardia, marked depression and dehydration, and was sold for slaughtering. The diagnosis was confirmed by necropsy findings.

Abomasal impaction was diagnosed in a Holstein cow and 3 mixed breed cows. These animals were subjected to laparo-rumenotomy in combination with medical treatment. Good result was obtained only in a cow while the other 3 cases which not respond to the treatment were sold for slaughtering and postmortem examinations. Different types, numbers, locations and sizes of abomasal erosions and ulcers were diagnosed in 35 cattle. Also, different forms of abomasitis were recorded in 40 cattle.

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Introduction

Abomasal disorders of dairy cattle are mostly predisposed by metabolic disturbance, lactation stress and nutritional inadequacies. They include left and right abomasal displacement (LDA, RDA), volvulus (AV), ulceration, impaction and abomasitis (**Trent, 1990; Geishauser, 1995; and Simkins and Nagele, 1997**). Abomasal displacement is a multifactorial disease commonly occurs in dairy cows aged from 3-10 years in the first 2-4 weeks postpartum and at other times in the lactation period (**Coppock, 1974**). It has been reported sporadically in beef breeds (**Martin et al., 1978**), bulls (**Fennelly, 1984**) and calves (**Hawkins et al., 1986**).

A number of etiological factors have been implicated for LDA. These may be grouped as factors that impair abomasal motility or enhance gas production (**Goff and Horst, 1997**), factors that alter normal nutrient digestion or utilization (**Geishauser et al., 2000**), and factors that result in anatomical arrangement of abdominal structures to enhance displacement (**Radostits et al., 2000**). LDA in cattle has found throughout the world with annual incidence ranged from 0.05-4.4 %. It is a common disorder of Holstein-Friesian, Jersey and Guernsey cows that of intensive breeding and husbandry (**Jubb et al., 1991**). However, the incidence of

the disease in Egypt and probably in most other tropical countries is very low (5.7%) (**Sigh et al., 1996 and Misk et al., 2003**).

Geishauser et al. (1995) Radostitis et al. (2000) and Van-Winden and Kuiper (2004) reported that, the occurrence of DA in different seasons are not concise; in general most cases occur in winter. Besides season, there are housing system and quality, weather conditions (rainfall, low temperature and strong wind), altered exercise and feeding patterns caused by management practices and concurrent diseases of abomasal wall and reproductive organs may also contribute to development of LDA. **Misk et al. (2003)** reported that, abomasal displacement in Egypt occurs most commonly in large sized, high producing adult dairy cows in the age group of 3-7 years. Displacement of the abomasum is very rare in buffaloes and native breed cattle and recorded in 5.7% of the studied cases.

Displacement of the abomasum is mainly an illness of cattle that are not pregnant, approximately 90% of all cases and can occur during pregnancy but with low frequency (10%) in the 2nd and 3rd pregnancy (**Godger and Ruppenner, 1984**). Cows with LDA usually had a sudden onset of anorexia, decreased milk production, rise of temperature (39.5°C) and heart rate (100 beat/minute) accompanied by signs of moderate abdominal pain (**Wallace, 1976**). In addition to, an obvious bulge (slab-sided abdomen) caused by distended abomasum may develop in the anterior part of the upper left para lumbar fossa and may extend up behind the costal arch (**Dirksen, 1983**). Simultaneous auscultation and percussion of the left abdomen revealed tympanic resonance (ping sound) over the last three ribs (10th to 13th) along or above line drawn from the left tuber coxae to the elbow and from the elbow to the stifle (**Radostitis et al., 2000**).

The most prominent laboratory findings associated with LDA, include hypoglycemia, hypocalcaemia, hypokalemic metabolic alkalosis and elevated values of urea nitrogen and PCV. LDA must be differentiated from those diseases causing inappetence to anorexia, ketosis, reduced or abnormal reticulorumenal motility and abnormal sounds on ausculto-percussion of the left abdomen. They includes, simple indigestion, ketosis, acute form of traumatic reticuloperitonitis, vagus indigestion, ruminal tympany, pneumoperitonium, fat cow syndrome and posterior functional stenosis of the rumen (**Baker, 1979; Rebhun, 1995; Misk et al., 2003; and Fouda et al., 2004**).

Numerous medical (conservative) treatments have been used with variable success as calcium borogluconate 25%, neostigmine, saline and cathartics. Most of these drugs do not have direct effect on the abomasum but stimulate the gastrointestinal motility in general (**Velden, 1991 and Rebhun, 1995**). Correction of DA may be done physically by rolling or surgically by right omentopexy, right pyloromentopexy, right paramedian abomasopexy, left omentopexy, left abomasopexy and laparoscopy. All of these methods involved decompression (deflation), replacement to normal position and fixation of the omentum or the abomasum to the body wall (**Patty, 1981; Smith, 1981; Jean et al., 1987 and Singh et al., 1996**). Intensive fluid therapy is usually necessary preoperatively and for several days postoperatively to correct the dehydration, metabolic alkalosis and to restore normal abomasal motility. A mixture of sodium chloride 50- 100 gm, potassium chloride 50 gm and ammonium chloride 50-100 gm is given orally daily along with the parenteral fluids necessary. Treatment with potassium chloride 50gm/day orally can be continued daily until the cow regains its normal appetite. (**Rehage et al., 1996 and Radostitis et al., 2000**).

Volvulus (torsion) of the abomasum can occur at different positions (at the omaso-abomasal opening or the reticulo-omasal opening), a long different axis (horizontal or vertical) and in different directions (left or right) resulting in ischemic necrosis, peritonitis, dehydration, vascular compromise and luminal out flow obstruction (**Habel and Smith, 1981**). Usually associated with abomasal dilatation especially RDA. It commonly involves

omasum with occlusion of systemic circulation, necrosis, and luminal out flow obstruction which associated with a poor prognosis (**Smith, 1978, Garry et al., 1988 and Trent, 1990**). Cattle with AV had a visibly distended abdomen, depression and weakness, complete anorexia with progressive drop in milk production and dehydration (Habel and Smith, 1981). The heart rate and respiration are increased. The feces are usually scanty, soft and dark in color (**Constable et al., 1999**). Death usually occur in 48-96 hours from shock and dehydration or abomasal rupture (**Radostitis et al., 2000**).

Abomasal impaction describes a set of condition in which abomasal contents are partially or completely prevented from exiting the abomasum while the abomasum retains a normal anatomical orientation. The outflow disturbance results in distention of the abomasum, alteration in digestion and in circulating electrolytes balance (**Baker, 1979 and Bliklager et al., 1993**). It was frequently seen in dairy cattle and also in calves, sheep, goats and buffaloes. It usually of non specific cause and difficult to established clinically, however the ultimate diagnosis was made during exploratory laparotomy (**Bliklager et al., 1993 and Rebhun, 1980**). Rational treatment of abomasal impaction consists of correcting metabolic alkalosis, hypochloremia, hypokalemia and dehydration. Also, attempting to move the impacted material with lubricants and cathartics or surgically emptying the abomasum (**Trent, 1990 and Simkins and Nagele, 1997**).

Abomasal ulcers were focal or multi focal defects in the mucosa and muscularis of the abomasum of dairy cattle (**Rebhun, 1982**), calves (**Wensing et al., 1986**) and feedlot cattle (**Jensen et al., 1992**). The disease was associated with stress, concentrated rations and concurrent diseases (**Rebhun, 1995**). Abomasal ulceration may occur secondary to other diseases such as lymphoma, left and right abomasal displacement, erosions of abomasal mucosa in viral diseases (Bovine viral diarrhea, Rinder pest, Bovine malignant catarrhal) and enteric form of enzootic bovine leucosis (**Wass et al., 1981 and Murray et al., 1995**). Abdominal pain, Melina, pale mucous membranes, indigestion and dropped milk production were its common clinical finding in cattle. Some animals had abomasal ulceration at necropsy which was subclinical (**Wass et al., 1981; Braun et al., 1991 and Radostitis et al., 2000**).

In a postmortem study in Egypt; **Ibrahim (1991)** found that, the abomasal abnormalities and pathological changes were abomasitis (2.6-12.9% in cattle and 1.2-5.7% in buffaloes), ulcerations (0.9-4.8% in cattle and 0.4-1.8% in buffaloes), impaction (0.0-0.5% in cattle and 0.0-0.4% in buffaloes), displacement (0.0-0.4% in cattle and 0.0% in buffaloes), worm infestations (28.0-72.0% in cattle and 19.0-48.0% in buffaloes), and tumors only one case in buffalo. Abomasitis is a sporadic disorder among adult cattle, calves, sheep and goats caused by many adverse effects of either dietary, environmental, infectious or parasitic stressors. It is characterized by diffuse, hemorrhagic to necrotizing inflammation of the abomasal mucosa (**Dahlgren et al., 1984 and Roeder et al., 1988**). In addition to multiple whitish tiny nodules with parasitic infestation (**Mendez et al., 1995 and Songer et al., 2005**). The aim of this study was to thrown light on the common abomasal disorders occurring in cattle, the role of clinical signs, exploratory laparotomy laboratory investigation and necropsy findings in making the diagnosis and predicting the prognosis of such disorders, the possibilities of medical and/or surgical treatment of such disorders.

Materials and Methods

The present study was conducted on a total number of 2180 cattle from those 114 cattle (47 Holstein, 42 mixed breed and 25 native cattle) aged from 6 months to 10 years and of both sexes, suffering from one or more abomasal disorders (LDA, impaction, ulcer and abomasitis). The affected animals were belonged to a private animal farm station at Dakahlia Province (34 cases), animals that admitted to the Mansoura Veterinary Teaching Hospital (**MVTH**) (11 cases) and those surveyed at Mansoura abattoir (69 cases). In addition to ten

clinically healthy dairy cows were selected and served as control groups for laboratory examination.

Diagnosis and categorization of the affected animals were based on well informed case history, presenting clinical findings, simultaneous auscultation and percussion of the left abdominal wall in an area marked by a line drawn from the left tuber coxae to the elbow and from the elbow to the stifle (Fig.1). Exploratory laparo-rumenotomy and laboratory investigations were performed in addition to histopathological examinations in some disorders.

Two types of blood samples were obtained from each animal by jugular venipuncture. The first blood samples (whole blood) were used for determination of PCV. The second blood samples for separation and collection of serum for biochemical analysis of the selected parameters which were measured spectrophotometrically (Coles, 1986).

The affected animals with left abomasal displacement were subjected to standing left flank omentopexy (Fig.2) or left flank abomasopexy (Fig.3); while in cases of abomasal impaction laparo-rumenotomy in combination with medical treatment was performed (Fig.4).

Necropsy study of abomasal disorders:

This part of the study was conducted on animals that introduced to the abattoir and animals that emergency slaughtered in the farms after failure of their treatment. Those animals were examined for any abomasal lesions after slaughtering. The abomasal mucosa was examined, and the type, number, and location of lesions were recorded. Several sections from the affected abomasa were collected in 10% neuteraled buffered formalin for histopathological examinations according to Bancroft et al. (1996). The obtained data were statically analyzed. The mean values and standard error (SE) were calculated and the significance was determined according to Snedecor and Cochran (1982).

Results

In the present study a total number of 114 diseased cattle were categorized as, 34 cattle with LDA, one cattle with AV, 4 cattle with abomasal impaction, 35 cattle with abomasal erosions and ulcerations, 40 cattle with abomasitis as shown in (Table.1).

Table 1. Categorization of the examined animals according to their diseased condition:

	The examined cattle			Total
	Holestein	Mixed	Native	
Left abomasal displacement	34	-	-	34
Abomasal volvulus	1	-	-	1
Abomasal impaction	2	2	-	4
Abomasal erosions and ulcerations	3	19	13	35
Abomasitis	7	21	12	40
Total	47	42	25	114

I- Left displacement of the abomasum:

LDA was recorded in 34 Holstein cows. The age of the affected cows were ranged from 2–7 years, 27 cases had calved recently (2-4 weeks), six cases were presented after 2–7 months post-partum and one case was present 2 months pre-partum, with a history of reduced milk yield, varying degrees of reduced appetite and scanty feces. Simultaneous auscultation and percussion, of the upper half of the abdomen under the last five intercostals spaces revealed a left tympanitic resonance (ping) sound. A varies degrees of dehydration and rumen stasis were also evident. Rectal examination revealed medial displacement of the rumen and left displacement of the abomasum, which appeared as a soft fluctuant or emphysematous mass in the left abdominal wall.

The peak of disease occurrence was recorded in the late autumn (11cases) and winter (15cases) as apposed to spring (5cases) and summer (3cases) months. The predominant concurrent diseases were ketosis (5cases), hypocalcaemia (7cases), metritis (3cases), traumatic reticulitis (1cases), retained placenta (2cases), abomasal ulcer (2cases), mastitis (2cases), abortion (2cases), and foot root (3cases). In addition to seven cases without apparent concurrent disease. Twins was present only in one cow.

Laboratory findings:

The affected cows with LDA showed marked decrease in serum chlorides, sodium, potassium and calcium and in blood glucose in comparison to control cows. Two cows showed a significant hypochloremia (78mEq/l) and hypocalcemia (4.8mEq/l) which could not be with stand the risk of surgical interference and were sold for slaughtering. The preoperative mean of PCV exceeded the normal range with significantly higher blood urea, serum creatinine, AST, serum albumen, serum alkaline phosphatase, serum total protein and total serum bilirubin in comparison to control cows. Postoperative laboratory findings of blood and serum biochemical and hematological parameters for the operated cows were nearly similar to that of control cows (Table.2&3) (Fig.5&.6).

Table 2. Mean values±SE of serum electrolytes in control cows and in cows affected with LDA pre-and post-operatively: Mean with the same superscripts are not significantly different at ($P < 0.05$).

Elements	Animal groups		
	Control cows	Affected cows	
		Pre-operative	Post-operative
Chlorides mEq/l	92.87 ± 2.04 ^a	84.24 ± 1.84 ^b	99.12 ± 1.9 ^b
Sodium mEq/l	147.63 ± 7.1 ^a	130.69 ± 3.21 ^b	145.24 ± 6.13 ^b
Potassium mEq/l	4.20 ± 0.37 ^a	2.71 ± 0.11 ^b	4.60 ± 0.51 ^b
Calcium mg/dl	12.02 ± 1.01 ^a	6.18 ± 0.23 ^b	9.49 ± 0.84 ^b

Table (3): Mean values±SE of blood biochemical and hematological parameters in control cows and in affected cows with LDA pre-and post-operatively: Mean with the same superscripts are not significantly different at (P< 0.05).

Elements	Animal groups		
	Control cows	Affected cows	
		Pre-operative	Post-operative
Total protein gm/dl	7.3±0.42 ^a	9.9±0.39 ^b	7.25± 0.1 ^b
Urea mg/dl	25.13± 1.6 ^a	59.41 ± 7.3 ^b	35.58 ± 1.52 ^b
Glucose mg/dl	67.69 ± 18.33 ^a	49.72 ± 3.92 ^b	98.12 ±21.75 ^b
A.S.T.u/l	78.72 ± 5.02 ^a	103.84 ± 8.81 ^b	68.32 ± 3.4 ^b
Alkaline phosphatase u/l	58.91 ± 5.12 ^a	88.97 ± 3.88 ^b	56.81 ± 4.33 ^b
Albumine mg/dl	4.93 ± 0.2 ^a	4.47 ± 0.27 ^b	4.48 ± 0.12 ^b
Total bilirubine mg/dl	0.8 ±0.04 ^a	1.23 ± 0.06 ^b	0.78 ± 0.03 ^b
Creatinine mg/dl	0.95 ± 0.03 ^a	1.94 ± 0.1 ^b	0.9 ± 0.04 ^b
P.C.V %	34.6± 1.4 ^a	41.67 ± 1.56 ^b	32.53 ± 1.24 ^b

The affected animals showed no great response to medical therapy and were subjected for surgical intervention through left flank omentopexy (17cows) and left flank abomasopexy (15cows). Out of 32 operated cows, 27cows were recovered without complications and still in their reproductive herd at the time of the third follow up (60days post-operatively) producing nearly a normal quantity of milk as judged by owners/manager. During laparotomy 2 cows showed severe adhesion between the greater curvature of the abomasum and the peritoneum secondary to perforating abomasal ulcer and were sold for slaughter. Also 3 cows were culled because of those cows did not reach the normal level of productivity.

II- Abomasal volvulus:

AV was diagnosed in a Holstein cow with a history of complete anorexia, sharp drop in milk production and tachcardia (120/min). The feces were scanty and dark in color. A marked depression, weakness and dehydration were obvious with animal recumbency within 24-36 hours from the disease occurrence. The blood and serum biochemical analysis for this cow revealed a significant hypochloremic (76 mEq/l), hypokalemic (1.9mEq/l) metabolic alkalosis associated with hypocalcemia (4.3mg/dl) which indicate a poor prognosis. This cow not respond to the traditional medical treatment and could not be with stand the risk of surgical interference (exploratory laparotomy) and so sold for slaughtering. After slaughtering the necropsy findings revealed a distended abomasum with brownish, sanguineous fluid and twisted with omasal involvement. The abomasal and omasal mucosa were grossly hemorrhagic, edematous and gangrenous indicated by bluish or blackish coloration with multiple ulceration. The histopathological examinations showed necrosis with mucinous degeneration and focal replacement of the abomasal mucosa with numerous leucocytic infiltration (Fig.7).

III- Abomasal impaction:

Abomasal impaction was diagnosed in 2 Holstein and 2 mixed breed cows. The animals had a history of complete loss of appetite, deteriorated body conditions which might be masked by abdominal over distension which appeared papple-shaped (pear like on right side and apple like on the left one) when viewed from the rear and failure of the animals to

defecate (Fig.8). Physical examinations revealed fluid-filled rumen with gurgling sound on auscultation of the left side of the abdomen which extended to the left flank. Moderate to severe degrees of dehydration had been observed and manifested by sunken eyes, folding of skin and loss of its elasticity.

Laparo-rumenotomy revealed that the abomasums was impacted and dilated occupying most of the ventral abdominal cavity displacing the rumen dorsally with omasal impaction and dilatation. The consistency of the abomasal contents were hard and difficult to pit under pressure. The contents of the rumen were frothy and large amount of aqueous, bad smell ruminal fluid gush out from the dilated rumen. Medical treatment of the impacted abomasums gave a good result in one case out of the four cases. The other three which not respond to treatment were sold for slaughtering. Necropsy findings showed that the abomasum appeared as a large bag with increased dimensions (90cm in length and 70cm in circumference). On cut section it was over packed by ingesta taking its shape which varies from hard to fragmented material from yellowish to brownish color. The normal soured odour of the abomasums was not detected (Fig.8).

IV- Abomasal erosions and ulcerations:

Abomasal erosions and ulcerations were diagnosed in 35 cattle {10 cases (7calves and 2dairy cows) were clinically diagnosed and 25 cases (1calf, 22feedlot steer and 2dairy cows) were diagnosed by necropsy examinations}. The clinically affected animals showed abdominal pain manifested by arched back and grinding on teeth with foamy salivation, sudden onset of anorexia, excessive water intake, decreased milk production, melina (scanty black and tarry feces), weakness and anemia manifested by pale mucus membranes and dehydration. Abomasal ulcers were seen at necropsy in the fundus and pyloric regions or both of the abomasum as a focal areas of superficial erosions to deep ulcers. They appeared as a whitish, grayish or reddish area of different shapes, varies sizes from 0.25cm-11cm and varies numbers from 1-20 ulcers/abomasum in different locations of the abomasum with shallow to deep base according to the degree of ulceration. According to their shape, ulcers were differentiated into linear, circular and irregular abomasal ulcers (Fig.9, 10 & 11).

V- Abomasitis

Abomasitis was detected in 40 slaughtered cattle. Macroscopically the serosal surface mild degree of congestion. On cut section its wall was occasionally edematous, or contain few amount of ingesta slimy in nature with disappearance of the normal sour odour of the abomasum. The mucosal surface appeared hyperemic in focal or diffuse manner. Microscopically, focal areas of desquamated epithelium with severe leukocytic infiltration, mainly macrophages were detected. In some other cases focal areas of coagulative necrosis in the glandular zone was seen and adjacent to it a zone of inflammatory cells were extending to include the muscularis mucosa. Mild to marked multifactorial edema of the sub mucosa with distinct and prominent inflammatory components observed. Also, small indistinct strips of catarrhal exudates consisted of small areas of detached cells were seen on the abomasal surface (Fig.12).

Discussion

Abomasal displacement cause economic losses due to treatment costs, discarded milk, decreased milk yield, extended interval from calving to conception, loss of body weight, culling and death (Martin et al., 1978; Milian-Suazo et al., 1988; and Grohn et al., 1998). In the present study eighty to 90% of LDA were recorded within one month post partum (transition period). Similar observations were recorded by Daniel (1983) and Martens (2000) who mentioned that this period, from 2weeks prepartum to 2 – 4 weeks postpartum is the major risk period in the etiology of LDA as it is characterized by pre-partum intake depression, followed by increase in postpartum intake, positional changes of the abdominal viscera during late pregnancy or ruminal atony.

LDA occur more commonly in countries where feed consists of high grains and concentrates than roughages (**Constable et al., 1992; and Shaver, 1997**). Contradictory the incidence of this disease in **Egypt** and probably most other tropical countries is very low due to higher proportion of roughages than grains in the feed (**Singh et al., 1996; and Misk et al., 23003**). The present study show a higher number of LDA which diagnosed in private farms supplying high grain feeds than roughages. Thus result is in agreement with **Fouda et al. (2004)**.

The time around calving and early lactation seems to be a period in which cows are highly susceptible to metabolic and reproductive disorders. In the present study about 79.4% of cows diagnosed with LDA have at least one concurrent disease such as Milk fever, ketosis, metritis and abomasal displacement. This was agreed with the result of **Klerx and Smolders (1997) Heuer et al. (1999) and Kim and Suh (2003)** who attribute this condition to the high energy demand for nutrients, and decreased activity of the immune system in this period.

The risk of developing LDA increased with age up to 7 years with the greatest risk at 2.5 to 5.5 years of age. This result agreed with **Markusfeild, (1986) Constable et al., (1992) and Zadink et al., (2001)** who added that, the youngest cows had a higher risk of developing LDA, which showed the longest period between the first recognizable signs to the confirmed diagnosis. Also, greater exposure to factors that induce abomasal atony. In the present study the highest number of LDA was recorded in the late autumn and winter seasons. It may be related to factors that induce abomasal atony, seasonal changes in rumen volume in corresponding to seasonal variation in roughage, higher frequency of calving or relative inactivity and low environmental temperatures in winter increase the energy requirement of cows. This attribution was reported by **Cameron et al., (1998), Zadink et al., (2001), and Silva et al., (2004)**.

Our results revealed a hypochloremia accompanied the cases suffered from LDA. This could be attributed to continuous secretion of chloride ions into the abomasum which was refluxed through omasal canal due to pyloric stenosis or obstruction and consequently returned to rumen. The same results were obtained by (**Geishauser and Sech, 1996; and Rohn et al., 2004**).

Hypokalaemia in our study was explained by anorexia associated with the displacement or due to potassium shift into the cell during alkalosis to permit hydrogen exchange and its continued loss by the kidney, or may explained by shift in potassium ion from the extracellular to the intracellular fluid spaces or to the intestinal or bone system, as a result of starvation or impaired renal function as mentioned by **Hafez & Mottelib, (1994); Delgado- Lecaroz et al, (2000); and Fouda et al., (2004)**. Hypocalcaemia was observed in LDA cases in the present study. These results are in concern with that obtained by **Daniel (1983); Massey et al., (1993); Shaver (1997); Rohrbach et al., (1999) and Delgadolecaroz et al., (2000)** who mentioned that the in appetite developed with abomasal displacement and reduced absorption from the gut causing abomasal atony.

In the present study 2 cows diagnosed with LDA, had a significant hypochloremia and hypocalcaemia which could not with stand the risk of surgical interference for LDA correction. This result was in concern with **Massey et al. (1993) Singh et al. (1996) Delgado- Lecaroz et al. (2000) and Zadnik et al. (2001)** who reported that animals having serum chloride level equal to or below 79 μ Eq/L, hypocalcaemia below 4mg/dl and heart rate equal to or greater than 100/min have a poor prognosis.

Left flank omentopexy was used for treatment of LDA with reported success rate 94.1%. The abomasum was anchored to the ventral body wall by fixation of the greater omentum adjacent to the greater curvature resulting in formation of adhesions between the omentum and peritoneum. No signs of fistulation or suture sinuses were noted. Nearly similar observation was reported by **Stanhaut et al. (1974) Smith (1981) and Treant (1990)**.

The results of the present study indicated that left flank abomasopexy was successful for correction of LDA with success rate 86.6%. It allow good exposure by palpation of the LDA with variable amount of greater omentum visible to incision, minimal stress on the animal, minimal restraint requirement and more familiar orientation of the viscera during exploration and offers direct fixation of abomasum to the ventral body. This was in agreement with **Baker (1973) Turner and McIlwraith (1989) and Singh et al. (1996)**. While 2cows with LDA have concurrent perforating abomasal ulcerations with severe adhesion of the greater curvature with surrounding tissues, have a poor chance for survival and were sold for slaughtering. This findings were compatible with that reported by **Cable et al. (1998)**.

The success rates after LDA surgery in our study were 84.4% of the operated animals which were remained productive. Two cows showed abomasal adhesion with peritoneum due to abomasal ulcerations. Also, 3cows were culled from the herd as they not return to their normal productivity. This is in agreement with **Steanhaut et al. (1974) Treant (1990) and Hirvonen and Pyorala (1998)**.

In this study AV with omasal involvement was diagnosed in a Holstein cow with a history of anorexia, sharp drop in milk production, dehydration, tachycardia and significant hypochloremic, hypocalcemic metabolic alkalosis associated with hypocalcaemia. The affected cows could not with-stand the risk of surgical interference. Slaughtering was the option in such case due to poor prognostic indicators. Thos was in agreement with that recorded by **Garry et al. (1988) Constable et al. (1991) and Delgado-Lecaroz et al. (2000)**.

The onset of abomasal impaction in cattle was gradual. The body condition was poor, anorexia was present and the quantity of faces was decreased. Abomasal contents were generally firm and the rumen usually distended with fluid contents. Similar findings were reported by **Baker (1979) Breukink and Kuiper (1980) Cebra et al. (1996) and Misk et al., (2003)**. Abomasal impaction is usually difficult to be established clinically in larged sized cattle, but a history of gradual abdominal distension, loss of appetite, reduced fecal output, failure of traditional treatment and postmortem findings were diagnostic. However, the ultimate diagnosis for abomasal impaction and related obstruction of fore stomach was made during the exploratory laparotomy or rumenotomy. Similar remarks were mentioned by **Baker (1979) Trent (1990) and Misk et al., (2003)**.

Treatment of abomasal impaction depends on the severity and chronicity of the disease and value of the animal. It includes; slaughter, medical therapy, rumenotomy and abomasotomy. Medical trials for treatment of abomasal impaction are usually unsatisfactory, but correction of electrolytes and acid base imbalance is so necessary and will be helpful. Also, supportive therapy before surgery such as parenteral calcium solution and electrolytes are indicates in this condition (**Rebhun et al., 1988; Radostitis et al., 2000**). In this study, abomasal impaction was surgically corrected only in one case through emptying the abomasum by laparo-rumenotomy with direct administration of liquid paraffin into the omasum as described by **Blikslager et al. (1993); Simkins & Nagele (1997) and Fouda et al. (2004)**.

Diagnosis of abomasal ulceration was difficult clinically even with presence of some clinical signs as they were variable according to the type, site, number, extend or the cause of the ulcers. Definitive diagnosis was generally based on observation during surgery, necropsy or at inspection of slaughtered cattle. This is in agreement with **Smith et al., (1983)** who mentioned that, the prevalence of abomasal ulcers in clinical cases was 2.17% however, at abattoir the prevalence may reach 6%.

In the present study there was increase in incidence of abomasal erosions and ulcerations in male (88%) than female (12%) cattle. This high incidence may be attributed to

the great number of male at risk of heavy grain feeding for fattening. This was agreed with **Pearson et al., (1987), and Ibrahim (1991).**

The gross and histopathological appearance of different forms, types, and numbers of ulcers were seen in different areas of the abomasal mucosa were similar to that reported by **Smith et al., (1986), Braun et al., (1991), Ibrahim (1991) and Misk et al., (2003).** The postmortem examinations and histopathological alterations of abomasitis were nearly similar to that reported by **Roeder et al., (1988); Ibrahim (1991); Hosein et al., (1995) and Songer et al., (2005)** who said that abomasitis is not concerned with certain age in cattle and usually co-existed with many diseases and stress conditions. It frequently observed at necropsy or at inspection of slaughtered cattle, while its diagnosis on clinical basis is still obscure.

From the proceeding results it can be concluded that, LDA was commonly recorded in Holstein cows aged from 2.5-5.5 years and subjected to the stress of high intense production. The establishment of the invasive and noninvasive methods in combination with laboratory investigation provides good diagnostic data for surgical interference of LDA and its differentiation from other digestive disorders of the same medical history. Left flank omentopexy and left flank abomasopexy can be used with high success for the treatment of LDA, with special preference for left flank omentopexy. Surgical intervention coupled with medical treatment of early cases of abomasal impaction seemed to be helpful in prognosis and recovery of these cases. The necropsy and histopathological examinations are essential diagnostic tools in differentiation of different types of abomasal ulcers, abomasitis, and in confirmation the diagnosis of AV and abomasal impaction.

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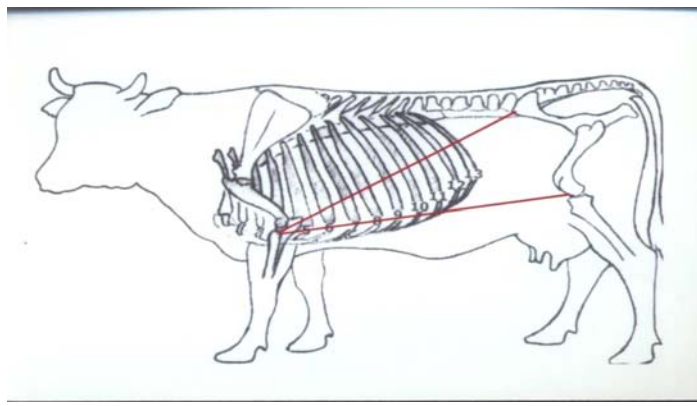


Fig (1): Showing the typical area of tympanitic resonance (ping) heard over the left side of the abdominal wall of adult cattle on the drawn region.

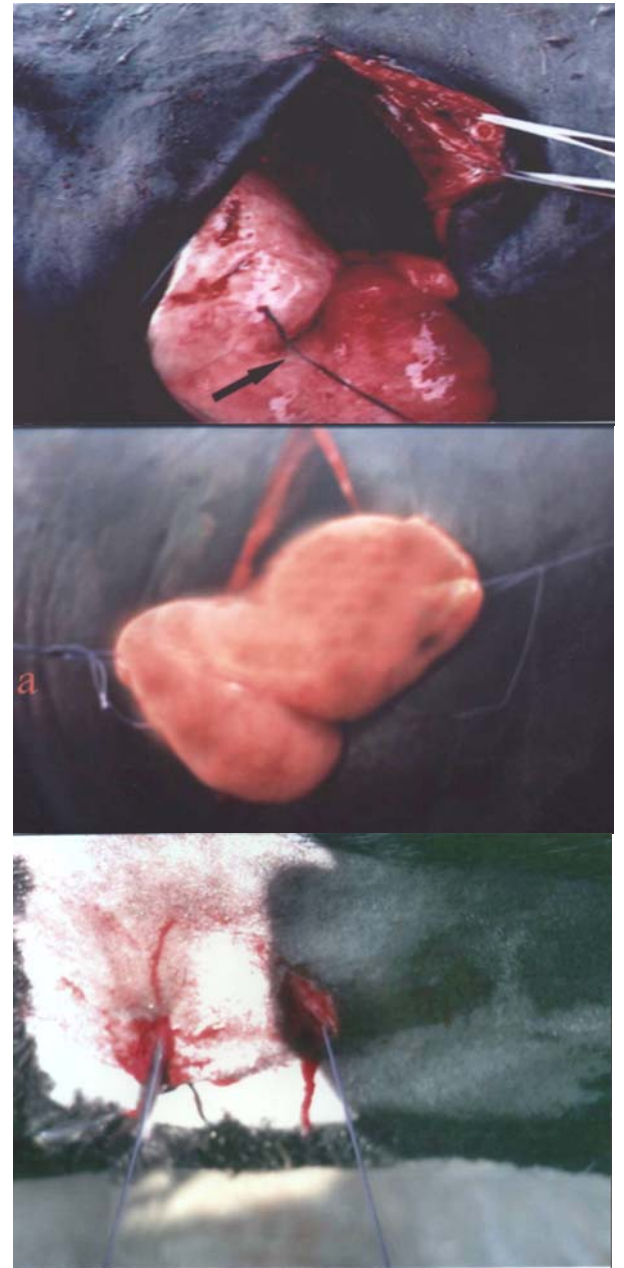
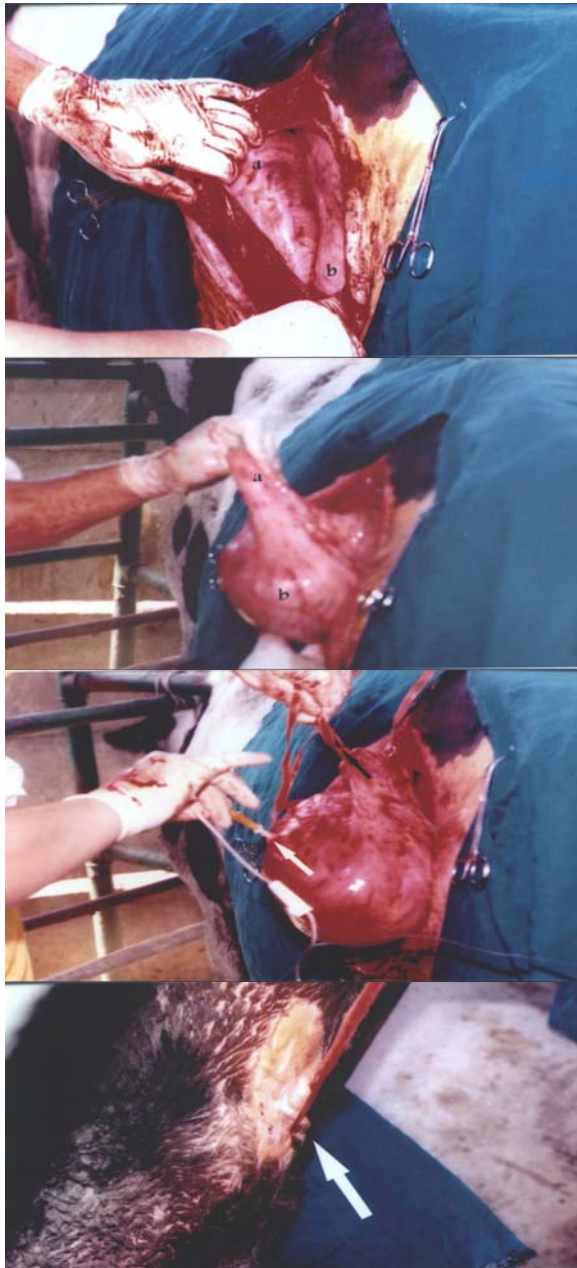
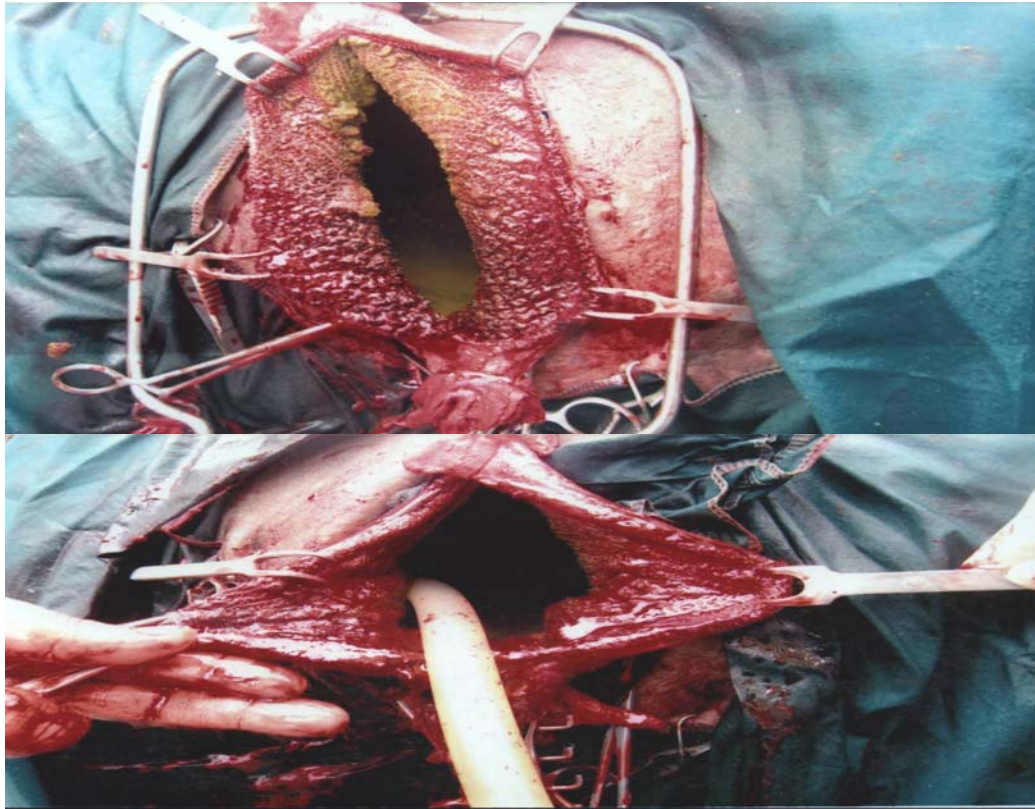


Fig (2): Showing the distended abomasum which lies immediately under the laparotomy incision(a) and upward the rumen(b) in a Holstein cow. Abomasal deflation by using a 13-14 gauge needle(white arrow) attached to infusion set, and two cross mattress suture by hernial tape(black arrow) in the omental attachment to the abomasum for left flank omentopexy. The ends of the hernial tape (arrow) pulled outside the ventral abdominal wall, 10 cm cranial to the umbilicus to be tied out.

Fig (3): Showing two cross mattress sutures passed in a seromuscular fashion in the greater curvature of the abomasum for left flank abomasopexy by using No.3 polygalactin 910(Vicryl) or by using silk(No.2). The two free ends of polygalactin 910 (Vicryl) pulled outside the ventral abdominal wall to be tied firmly in this site with interval 10cm in between for complete the left flank abomasopexy.



Fig(4): Showing the left flank laparo-rumenotomy by Weingerth's technique. The ruminal incision and evacuation of the ruminal contents with pumping of liquid paraffin (3-5L) through a tube placed in the reticulo-omasal orifice into the omasum and abomasum for treatment of abomasal impaction.

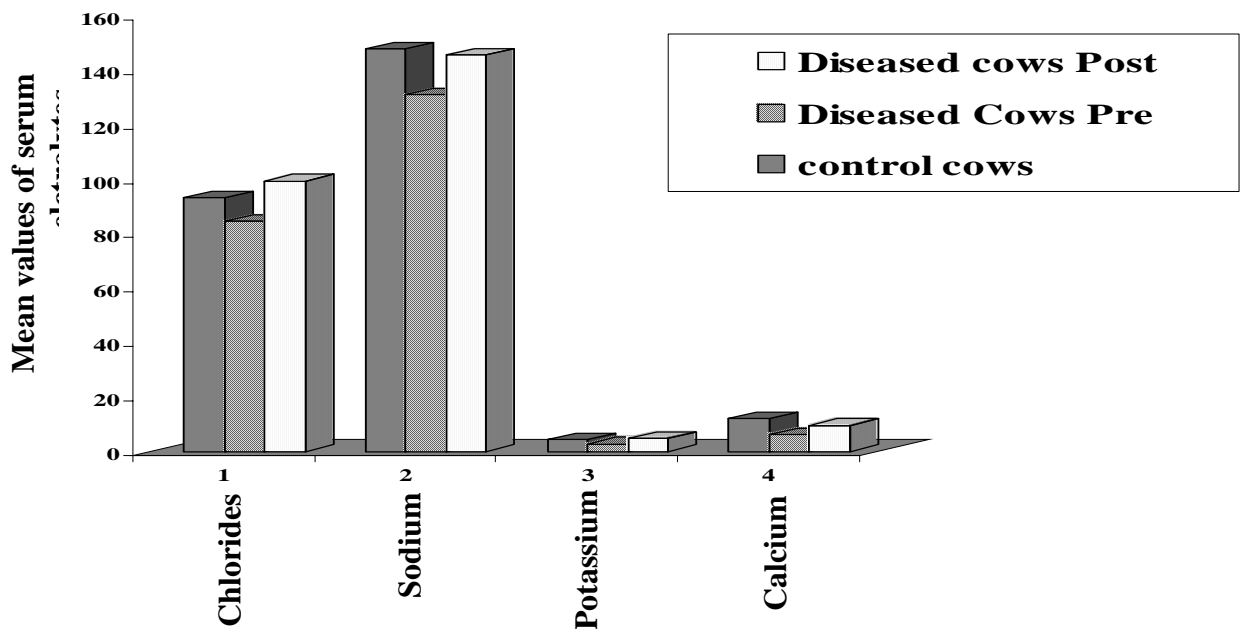


Fig (5): Illustrate the mean values of some serum electrolytes in healthy (control) cows and in diseased cows with LDA pre and post operatively.

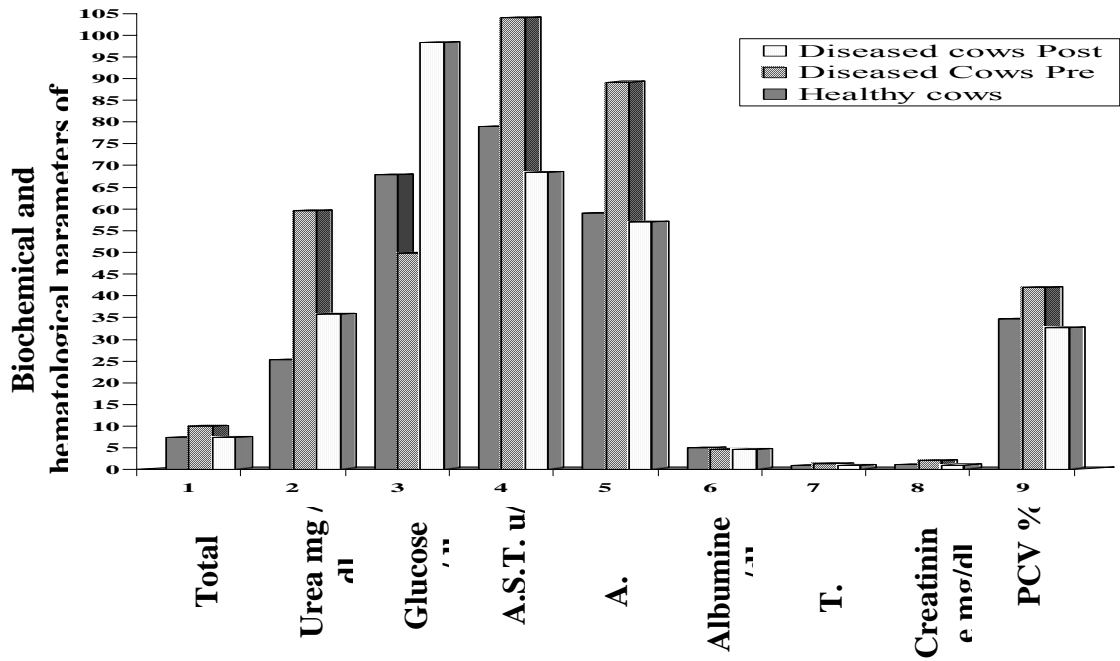


Fig (6): Illustrate the mean values of some blood biochemical and hematological parameters in healthy (control) cows and in diseased cows with LDA pre and post operatively.

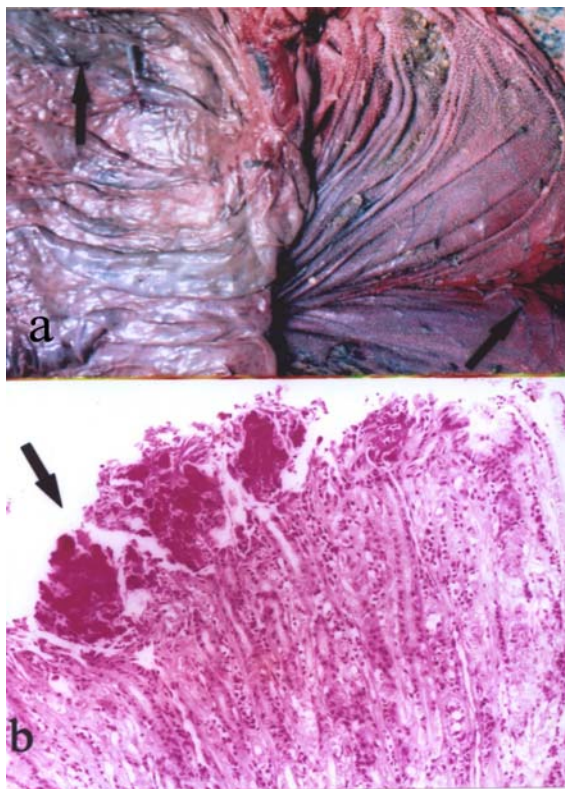


Fig. (7): Abomasum volvulus showing gangrenous mucosa with multiple ulceration and congested omasal mucosa (a) represented by coagulative necrosis of the mucosa, numerous mucinous degeneration and focal replacement of the tunica mucosa with numerous leukocytic infiltration (b) H&E x130.



Fig(8): A foreign Holstein cow showing abdominal distension (papple-shaped abdomen) in case of abomasal impaction (rear view). The impacted abomasum appeared at necropsy as a large bag with increased dimensions (a). On cut section, it was over packed by hard ingesta taking its shape (b).

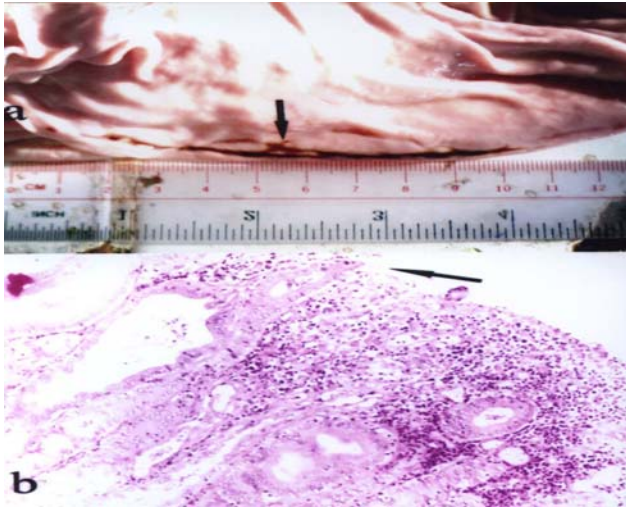


Fig.(9): Abomasum showing a long linear ulcer(11cm) at the fundic fold(a) represented by periglandular leukocytic infiltration with complete loss of mucosal epithelium H&E x130(b).

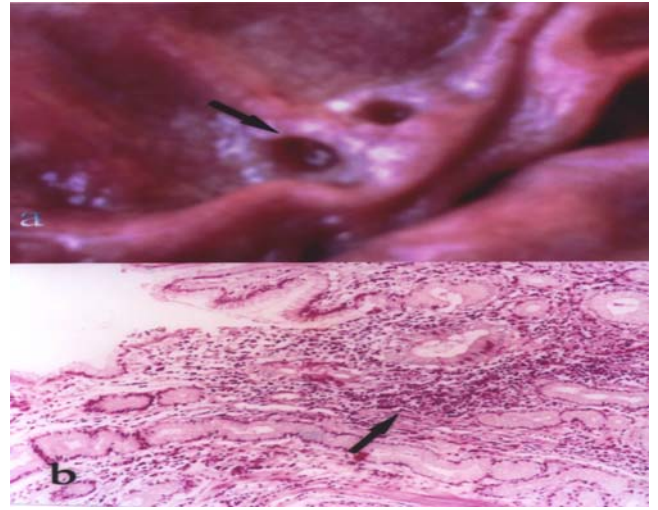


Fig.(10): Abomasum showing two large rounded ulcers at the fundic region(a) characterized by focal replacement of the tunica mucosa with numerous leukocytic infiltration and fibrous connective tissue proliferation(b) H&E x130.

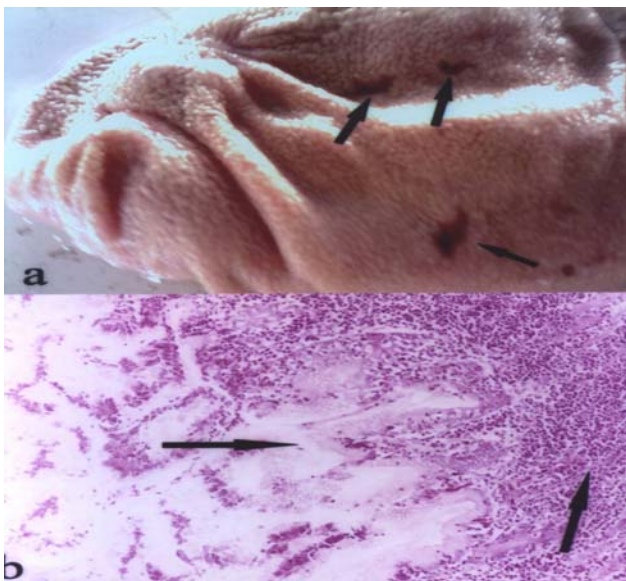


Fig.(11): Abomasum showing multiple irregular ulcerations at the pyloric part of the abomasum(a) characterized by coagulative necrosis of the mucosal epithelium beside focal replacement of the mucosal glands by numerous leukocytic infiltration(b) H&E x520.

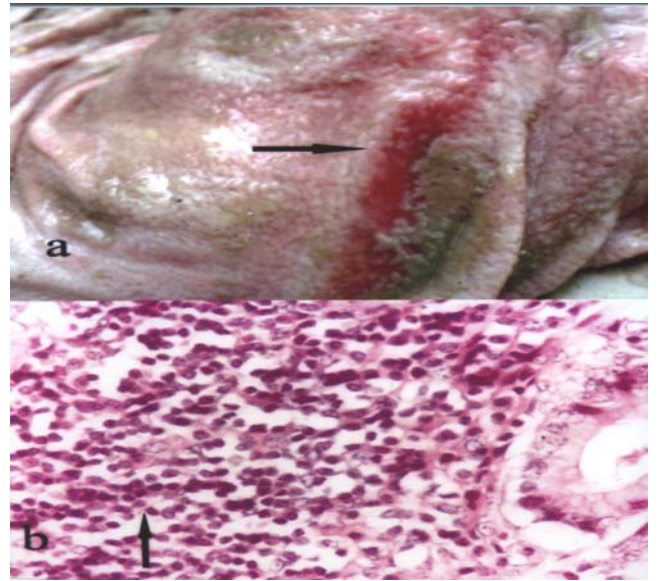


Fig.(12): Abomasum showing catarrhal abomasitis and erosions in the pyloric region represented by mucosal desquamation with loss of normal mucosal rugae and local lines of hyperemia, congestion and hemorrhage (a) which characterized histologically by oedematous and necrotic mucosa infiltrated with mononuclear cells of mainly macrophages and widely separate the mucosal glands(b) H&E x520.

التشخيص والتعامل لإضطرابات المعى الرابع في الماشية

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الملخص العربي

أجريت هذه الدراسة علي عدد ١١٤ بقرة من الجنسين وتتراوح أعمارهم بين ٦ شهور - ١٠ سنوات تعاني من واحدة أو أكثر من اضطرابات المنفحة. هذا بالإضافة إلى ١٠ بقرات سليمة تم استخدامها كمجموعة ضابطة للمجموعات المريضة، في بعض مزارع الألبان بمحافظة الدقهلية وعلي الحيوانات الواردة لمستشفى المنصورة البيطري التعليمي، وعلي الحيوانات المذبوحة بمجازر المحافظة. تم التشخيص الاكلينيكي لهذه الإصابات باستخدام السماعه والأعراض الظاهرية و عمل التحاليل البيوكيميائية والصفة التشريحية لمنفحة الحيوانات المذبوحة ومن ثم عمل الفحص الهستوباثولوجي لهذه الإصابات المختلفة لتأكيد نتائج الصفة التشريحية. تم تشخيص الانحراف اليساري للمعى الرابع إكلينيكيا في ٣٤ بقرة هولشتين وتم تأكيد باستخدام التحاليل البيوكيميائية. حيث كانت أكثر الإصابات في موسمي الخريف والشتاء. تم تأكيد التشخيص الإكلينيكي والمعملي لهذه الأبقار المصابة وذلك بالتدخل الجراحي عن طريق الشق الجانبي لجدار البطن من اليسار ثم عمل التثبيت اليساري للمنديل في الجدار السفلي للبطن أو التثبيت اليساري للمنفحة في الجدار السفلي للبطن، وكانت نسبة نجاح الجراحة في هذه الحالات هي ٨٤,٤% حيث تم شفاء ٢٧ بقرة من أصل ٣٤ بقرة مصابة بدون أي مضاعفات وعادت إلي معدلات إنتاجها الطبيعي. بينما استبعدت حالتين أثناء الجراحة لوجود التصاقات بين المنفحة وجدار البطن وخمس أخرى تم استبعادها من القطيع لعودة المرض إليها ثانية بعد شهرين من المتابعة. أما التواء المنفحة فقد تم تشخيصية في بقرة هولشتين واحدة كانت تعاني من فقدان تام للشهية وانخفاض حاد في إنتاج اللبن بالإضافة إلي تدهور حالتها الصحية العامة مما لم يسمح بالتدخل الجراحي لها فتم بيعها للذبح وعمل الصفة التشريحية لها لتأكيد التشخيص.

أما لكمة المنفحة فقد ظهرت في أربع أبقار لم يستجيبوا للعلاج الطبي التقليدي لذلك تم علاجهم جراحيا وبالتدخل الجراحي (فتح الكرش) مع العلاج الطبي أعطي نتائج معتدلة في حالة واحدة من هذه الحالات الأربع وتم بيع الثلاث أبقار المتبقية للذبح وعمل الصفة التشريحية. وبعمل الصفة التشريحية لمنفحة الحيوانات المذبوحة اضطراريا أو في المجازر والتي دلت علي وجود أنواع مختلفة من التقرحات بأعداد وأحجام مختلفة في أماكن متعددة من المنفحة في ٣٥ بقرة. كما دلت الصور التشريحية علي الأشكال المختلفة لالتهاب المنفحة في ٤٠ بقرة. حيث تم عمل الفحص الهستوباثولوجي لهذه الإصابات المختلفة لتأكيد نتائج الصفة التشريحية.