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VARIETIES AND SEQUELLAE OF INGESTED FOREIGN BODIES IN BUFFALOES AND CATTLE

(With 13 Tables and 34 Figures)

By

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أنواع ونتيجة تأثير الأجسام الغريبة المبتلعة في الجاموس والأبقار

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تم إجراء هذه الدراسة على عدد ٣٢٧ حيوان (٢٣٣ جاموس و ٩٤ أبقار) مصابة بـأمراض مختلفة نتيجة لإبتلاع أجسام غريبة. وأجريت الدراسة بالمستشفى البيطري التعليمي بجامعة أسيوط وكانت جميع الحيوانات من الاناث وتتراوح أعمارها ما بين 2 – ١٠ سنوات. وتم اختيار هذه الحيوانات اعتمادا على الأعراض الاكلينيكية والفحص الاشعاعى وأستخدام جهاز كشف المعادن. وأجريت لهذه الحيوانات عمليات فتح بطن وفتح كرش وتم استخراج الأجسام الغريبة من داخل المعدة على حسب مكان وجودها. وتم دراسة التوصيف الكامل للاجسام الغريبة التي تم استخراجها وكذلك تشخيص الأمراض التي سببتها هذه الأجسام.

SUMMARY

The present study was carried out on 327 animals (233 buffaloes and 94 cattle) affected by different diseases due to ingestion of foreign bodies. The animals were presented to the veterinary teaching hospital, Assiut university. All animals were females and of age ranging from 2 – 10 years old. Animals under study were selected depending on clinical signs, radiographic examination and metal detector findings. Exploratory laparotomy and rumenotomy were performed and foreign bodies were extracted from reticulum and / or rumen. Full description of the extracted foreign bodies was studied. Diseases caused by foreign bodies were diagnosed.

Key words: *Foreign boddies, Buffaloes, Cattle.*

INTRODUCTION

Ingestion of foreign bodies (f.bs.) is still extremely common in buffaloes and cattle specially in developing countries where the standard of animal management is unsatisfactory. Farm mechanization, rapid industrialization and unorganized farming usually resulting in defective feeding and management (Misk, Nigam and Rifat, 1984).

Because of the rather undiscerning eating habits of buffaloes and cattle, it is quite common for the animal to ingest metallic and non-metallic objects with their food. In addition, the ingestive technique of cattle allows non food items to be prehended and swallowed. Also animals with nutritional deficiencies and pica may ingest various types of foreign bodies deliberately (Hjerpe, 1961; Blood, Radostits and Henderson,1983.; Smith, 1986; Roth and King, 1991and Andrews; Blowey; Boyd and Eddy, 1992).

The objects most commonly contributing are metallic as wires, nails, needles and staples, (Poulsen, 1976; Jennings, 1984; Misk et al., 1984, and Roth and King, 1991), or non-metallic as stones, plastic bags and ropes (Misk et al, 1984).

Subsequent to ingestion of a sharp f.b., four outcomes are possible; attachment of the object to a magnet, if present, without subsequent disease problems; pentration of the reticular wall, with acute inflammation and mild clinical disease if there is no penetration into the peritoneal cavity; perforation of the reticular wall into the peritoneal cavity, with acute localized traumatic reticuloperitonitis (TRP); or migration of the f.b., with penetration into the peritoneal or thoracic cavity and resulting abscessation, vagal indigestion, traumatic pericarditis (T.P.), diaphragmatic hernia (D.H.) and other secondary problems (Dirksen, 1970; Jennings, 1984; Ducharme, 1990; Singh and Singh, 1996; Misk, Semieka and El-Sebaie, 1997; and El-Sebaie, Misk, Semieka and Hofman 1999).

The syndrome shown by any one animal affected with f.b. puncture of the reticulum may be quite variable and depends on a number of factors including; size, shape and nature of the f.b., location and degree of damage at the puncture site and the degree of contamination at the time of/and subsequent to puncture (Jennings, 1984).

The aim of the present study is to state different varieties of f.bs. ingested by buffaloes and cattle and to record their sequellae depending on the type of f.bs.

MATERIALS and METHODS

The present study was carried out on 327 Animals (233 buffaloes and 94 Cattle) presented to the vetrinary teaching hospital, Assiut University. All animals were females and of mature age ranging from 2 – 10 years old. Animals under study were selected from buffaloes and cattle presented to the hospital depending on clinical signs, radiographic examination and metal detector findings. Animals presenting capricious appetite, tympany, reduction of milk yield and loss of body weight in addition to positive metal detector and presence of radiopaque f.bs. on X – ray films were the candidates for our present work.

Exploratory laparotomy and rumenotomy were performed, the diseases affecting them were accurately diagnosed and f.bs. were extracted from the reticulum and/or the rumen. When D.H. was diagnosed, the herniated part of the reticulum was thoroughly examined and f.bs. were extracted. In cases of T.P. animals were bought and slaughtered and f.bs. were detected and extracted. F.bs. causing thoracic oesophageal obstruction were removed through the cardia in rumenotomy operation and that causing cervical oesophageal obstruction were removed through cervical oesophagotomy operation. Pyloric obstruction was detected in one case of abomasal impaction and dilatation at postmortem examination of a cow and a f.b. was extracted. F.bs. responsible for f.b. abscesses were removed during surgical incision of those abscesses. All extracted f.bs were collected and differentiated into two groups; metallic and non-metallic.. Full description for each type of f.b. was performed.

RESULTS

Extracted f.bs. were classified into two groups; f.bs. of metallic origin and f.bs. of non metallic origin (Table 1). Diseases caused by different foreign bodies were diagnosed (Table 2).

Table 1: Illustrates different types of extracted f.bs. and their number in buffaloes and cattle.

Type of f.bs.	No. of f.bs. In Buffaloes	No. of f.bs. In Cattle	Total
I-F.bs. of metallic origin:			
Houschold sewing needles	60	25	85
Wire segments.	162	135	297
Nails	635	121	756
Hair clips	18	3	21
Coins	88	8	96
Other differentiated f.bs.	79	40	119
Non-differentiated f.bs.	380	142	522
Total	1422	474	1896
II- F.bs. of non-metallic orgin:			
Stones	884	158	1042
Masses of leather churn	30	7	37
Glass pieces and balls	24	5	29
Deciduous premolars & insisors	10	1	11
Rubber pieces	5	6	11
F.bs. of plant origin	-	4	4
Ropes	7	4	11
Cloth	7	-	7
Total	967	185	1152
Plastic bags.	Several	Several	Several

Table 2: Illustrates different diseases caused by f.bs. and the number of affected buffaloes and cattle.

Type of the disease	No. of buffaloes	No. of cattle	Total
Traumatic reticuloperitonitis.(T.R.P.)	99	32	131
T.R.P. with perirecticular abscess (TRP/PA)	35	6	41
Traumatic Pericarditis.(T.P.)	18	16	34
Diaphragmatic hernia.(D.H.)	29	1	30
F.b. abscess at the elbow region	2	1	3
F.b abscess at the neck region	-	1	1
Oesophageal obstruction	-	4	4
Reticulo-omasal orifice obstruction	3	-	3
Pyloric obstruction	-	1	1
Non-penetrating reticular and/or ruminal f.bs	47	32	79
Total	233	94	327

Group I: F.bs. of metallic origin:

Household sewing needles (Figs. 1-9):

The total number of sewing needles is 85. They are classified according to the species of animals and their penetration in Table (3).

Table 3: Showing the classification of needles according to the species of animals and their penetration.

Animals sp.	No. of penetrating needles	No. of non-penetrating needles	Total
Buffaloes	56(93%)	4(7%)	60
Cattle	24(96%)	1(4%)	25
Total	80(94%)	5(6%)	85

According to the eye, needles are divided into; Eyed needles =30 (35%) and Broken-eye needles =55(65%). The length of needles varies between 2-12 cm. Penetrating needles were recovered from 80 animals, each by one needle (55 buffaloes and 25 cattle). Non-penetrating needles were extracted from 5 animals (4 buffaloes and 1 cattle). Diseases induced by penetrating needles are illustrated in Table (4).

Table 4: Showing different diseases induced by penetrating needles in buffaloes and cattle.

Diseases	Buffaloes	Cattle	Total
T.R.P.	18	9	27
T.R.P./P.A.	21	3	24
F.b. abscesses	2	2	4
T.P.	9	11	20
D.H.	5	-	5
Total	55	25	80

2- Wire segments (Figs. 10 & 11):

The total number of wire segments is 297, recovered from 56 animals. They are classified according to the species of animals and their penetration in Table (5).

Table 5: Showing classification of wire segments according to their penetration in buffaloes and cattle.

Animal	No. of penetrating segments	No. of non-penetrating segments	Total
Buffaloes	31 (19 %)	131 (81 %)	162
Cattle	16 (12 %)	119 (88 %)	135
Total	47 (16 %)	250 (84 %)	297

The length of penetrating wire segments varies between 1 – 11 cm). The length of non-penetrating wire segments varies between 0.5 – 10 cm

Penetrating wire segments were recovered from 32 animals while non penetrating wire segments were extracted from 24 animals. They were found floating inside the reticular lumen or found entangled inside the reticular cells without penetration. Collection was facilitated by use of a magnet. Diseases induced by penetrating wire segments are illustrated in Table (6).

Table 6: Shows different diseases induced by wire segments in buffaloes and cattle.

Diseases	Buffaloes	Cattle	Total
T.R.P.	11	9	20
T.R.P./P.A.	5	3	8
T.P.	1	1	2
D.H.	2	-	2
Total	19	13	32

3- Nails (Figs. 12 – 14):

The total number of nails is 756. They are classified according to the species of animals and their penetration in Table (7). Full description of nails is given in Table (8).

Table 7: Showing classification of nails according to their penetration in buffaloes and cattle.

Animal	No.of penetrating nails	No. of non-penetrating nails	Total
Buffaloes	261 (34 %)	419 (66 %)	635
Cattle	39 (32 %)	82 (68 %)	121
Total	255 (34 %)	501 (66 %)	756

Table 8: Showing full description of extracted nails in the present study.

Type of description	Number of nails
Straight nails	479 (63 %)
Bent nails	277 (37 %)
Normal nails	687 (91 %)
Screw nails	69 (9%)
Nails with head	669 (88 %)
Nails without head	87 (12 %)

The length varies between 1 – 10 cm. Most of them were 3 - 6 cm.

Diseases induced by penetrating nails were recorded in 187 animals (153 buffaloes and 34 cattle) and are illustrated in Table (9).

Table 9: Illustrates different diseases induced by penetrating nails in buffaloes and cattle.

Diseases	Buffaloes	Cattle	Total
T.R.P.	82	25	107
T.R.P./P.A.	34	4	38
T.P.	8	4	12
D.H.	29	1	30
Total	153	34	187

Non-penetrating nails were extracted from 75 animals (52 buffaloes and 23 cattle) and all were recovered from the reticulum.

4- Hair clips (Figs. 15 & 16):

The total number of hair clips is 21. They are classified according to the species of animals and their penteration in Table (10).

Table 10: Shows classification of hair clips according to their penteration in buffaloes and cattle

Animal	No. of penetrating clips	No. of non-penetrating clips	Total
Buffaloes	13 (70 %)	5 (30 %)	18
Cattle	3 (100 %)	-	3
Total	16 (76 %)	5 (24 %)	21

The length of the short prong of the hair clips varied between 5 – 6 cm and of long prong 6 – 7 cm. The penetrating part is 1 – 3 cm and usually to the ventral reticular wall inducing T.R.P./P.A.

Diseases induced by penetrating hair clips were recorded in 16 animals (13 Buffaloes and 3 Cattle) according to Table (11).

Table 11: Showing different diseases induced by hair clips in buffaloes and cattle.

Diseases	Buffaloes	Cattles	Total
T.R.P.	2	1	3
T.R.P./P.A.	11	2	13
Total	13	3	16

Non-penetrating hair clips (5 clips) were recovered from 5 buffaloes; each had one hair clip.

5- Coins (Figs. 17):

The total number of coins is 96 recovered from 63 animals. 88 coins were recovered from 56 buffaloes and 8 coins from 7 cattle. 43 animals had each by one coin (6 of them are cattle), 13 animals had each by 2 coins (one of them is cattle), 5 animals had each 3 coins, one animal had 5 coins, and one animal had 7 coins. All coins were recovered from the reticulum. The value of coins varies between one malleem (1/1000 of Egyptian pound) and 10 piasters (1/10 of Egyptian pound).

6- Other differentiated metallic F.bs. (Figs. 18, 19 & 20):

Many other differentiated metallic f.bs. were recovered from the reticulum (Table 12). All these f.bs. were found non-penetrating except two metal hooks, one knife blade and one nail driver. TRP was the disease caused by these penetrating f.bs.

Table 12: Showing different varieties of other differentiated metallic f.bs. and their number in buffaloes and cattles.

Types of Metallic f.bs.	No. of f.bs. in buffaloes	No. of f.bs. in cattle	Total
Bolts and screws	25	15	40
Bottle covers	14	8	22
Keys	10	4	14
Springs	5	3	8
Watch pices	4	2	6
Blades	3	3	6
Metal hooks	2	-	2
Bullets	2	-	2
Nail driver	1	-	1
Safty pins	1	1	2
Injection needle	1	-	1
Zebra lock	1	-	1
Shaving machine	1	-	1
Pencil end	8	3	11
Rings	1	1	2
Total	79	40	119

7- Non-differentiated metallic f.bs. (Figs. 21 & 22):

Non-differentiated metallic f.bs. were classified according to their shape in Table (13).

Table 13: Showing different forms of non-differentiated f.bs. in buffaloes and cattle.

Non-differentiated metallic objects	No. of f.bs in buffaloes	No. of f.bs. in cattle	Total
Straight metal objects	30	24	54
Rounded metal objects	29	16	45
Thick irrigular metal objects	11	7	18
Thin irrigular metal objects	310	95	405
Total	380	142	522

All non-differentiated f.bs. were extracted from the reticulum and they were found non-penetrating except 3 metal object causing T.R.P. in 3 animals (two buffaloes and one cattle).

Group II : F.bs. of non-metallic origin :

Stones (Fig. 23 & 24):

The total number of stones is 1042 of variable size, shape and weight. 884 stones were extracted from the reticulum of 147 buffaloes and 158 stones from the reticulum of 24 cattle.

The number of stones in each case varied between one stone up to 86 stones. The weight varied between 0.5 gm up to 11 grams. Stones less than 0.5 gm in weight are not taken in consideration. All stones were recovered from the floor of the reticulum except one only was found obstructing the reticulo-omasal orifice in one buffalo.

Masses of leather churns (Figs. 24 & 25):

The total number of leather masses was 37 recovered from 32 animals (25 Buffaloes and 7 Cattle). Leather masses varied in shape, size and weight. (varies between 20 - 850 grams). 31 masses were extracted from the reticulum, two of them were found obstructing the reticulo-omasal orifice and another two masses were found enveloped metal objects. 6 masses were recovered from the rumen.

Deciduous premolar and incisor teeth (Fig. 26):

10 dental caps (deciduous premolars) and one deciduous incisor were swallowed by 6 buffaloes and were extracted from the floor of the reticulum.

Pieces of glass and glass balls (Fig. 27):

29 pieces of glass and glass balls were extracted from the reticulum of 15 animals (12 buffaloes and 3 cattle). In all cases, glass pieces were found floating.

Rubber objects (Fig. 28):

The total number of rubber objects is 11 pieces. They were extracted from the rumen of 7 animals (4 buffaloes and 3 cattle) and from the thoracic oesophagus of one cattle in which it caused partial oesophageal obstruction at the cardia.

Foreign bodies of plant origin (Fig. 29,30 & 31):

One orange and one onion were extracted from the thoracic oesophagus just cranial to the cardia through rumenotomy operation in two cows. The orange and onion were intact and caused complete oesophageal obstruction in both cases. In a third case, an intact potato was found obstructing the cervical oesophagus in one cow and removed via cervical oesophagotomy. A bath sponge of plant origin was detected at the pylorus resulting in pyloric obstruction which lead to abomasal dilatation and impaction in one cow.

Ropes (Fig. 32):

Eleven ropes of different types were extracted from the rumen of eleven animals (7 buffaloes and 4 cattle) and were found entangled with other types of f.bs. resulting in huge masses.

Cloth (Fig. 33):

Different types of cloth include pants, T-shirts and scarf were extracted from the rumen of 4 buffaloes.

Plastic bags (Fig. 34):

A large amounts of plastic bags were extracted from the rumen of 34 animals (24 buffaloes and 10 cattle) with other types of soft foreign bodies as ropes and cloth. Due to the churning movement of the rumen a large huge masses were formed and extracted with difficulty from the rumen during rumenotomy operation. In one cow a plastic bag filled with ingesta was found completely obstructing the thoracic oesophagus and extracted through the cardia in a rumenotomy operation.

DISCUSSION

Ingested f.bs. by buffaloes and cattle are divided into two main categories; the first category is f.bs. of metallic origin such as needles, wire segments, nails, hair clips, coins and many other differentiated and non-differentiated metal objects and the second category is f.bs. of non-metallic origin such as stones, leather masses, rubber pieces, glass pieces and balls, foreign bodies of plant origin, plastic bags, ropes and cloth. Most of them are ingested accidentally but sometimes animals aintended to prehend them to overcome nutritional difficiencies they suffer (Blood et al., 1983 and Jennings, 1984). Varieties of f.bs. depend mainly on the surrounding environments where the animals were raised (Smith, 1986 and Roth and King,1991).

In general, nearly all metallic and most of non-metallic f.bs. find their way directly to the reticulum. In rare cases, some metallic f.bs. such as needles penetrate the upper part of gastrointestinal tract inducing subcutaneous f.bs. abscesses. Also some f.bs. of plant origin were found obstructing the cervical or thoracic oesophagus. Most of plastic bags, cloth, ropes and rubber objects were recovered from the rumen. The large size and the light weight of these objects may be the cause of their presence in the rumen and not in the reticulum. Most of masses of leather churn were found in the reticulum because of their heavy weight. The passage of f.bs. to the abomasum and intestine could not be

determined except in one case in which a foreign body of plant origin was discovered accidentally obstructing the pylorus in postmortem examination of a cow with abomasal dilatation and impaction.

The presence of metallic and non-metallic f.bs. in the reticulum doesn't guarantee that they will penetrate the reticular wall. Penetration is not a simple process and no one knows at what time one or more f.bs. will penetrate the reticular wall. Most of f.bs. were found lying at the floar of the reticulum and some were found floating.

Several factors may play a role in the process of f.b. penetration. Some of these factors belong to the characters of the foreign body such as its size, shape, weight and sharpness. Other factors belong to the reticulum such as its contractility, size and contents. The fact that many f.bs. which are lodged in the reticular wall may return sooner or later into the reticular cavity can not be neglected (Stober,1967).

In our present study we found that 95% of needles and 76% of hair clips were penetrating, while a lesser number of nails and wire segments were found penetrating (35% & 16% respectively). Other types of metallic objects were rarely found penetrating the reticular wall in spite of their presence in large number. Non metallic f.bs. such as glass pieces and dental caps were non penetrating. Undoughtedly they may induce several injuries and lacerations to the reticular mucous membrane specially at its ventral wall resulting in chronic inflammation and mild or non clinical disease (Dirksen 1970; Ducharme,1990; Singh and Singh,1996; and Misk et al. 1997). Foreign bodies such as stones, coins and leather masses are heavy in weight and usually located at the bottom of the reticulum leading to its insufficient contractility.

Penetration of the reticulular wall usually induce acute localized T.R.P. with or without formation of perireticular abscess. and with subsequent occurance of vagal indigestion when the branches of vagal nerve are incorborated in the inflammatory process and formed adhesions (El-Sebaie et al., 1999).

Migration of f.bs. mainly seen restricted to needles, wire segments and some nails and usually occurred towards the thoracic cavity through the diaphragm resulting in T.P., D.H. and many other problems (Ducharme, 1990; Singh, and Singh 1996; and Misk et al., 1997).

Household sewing needles appeared to be the most dangerous f.b. ingested by animals. Most of them were found penetrating and many were found migrating mainly to the thoracic cavity and detected in the pericardial sac or inside the heart. Also some of them were the cause of

foreign body abscesses at the neck or behind the right elbow (Misk and Amer, 1981).

65% of needles were seen with broken eyes that means they were discarded into the garbage after the eye was broken and animals ingested them. Most of needles were 4-5 cm in length and this represents the normal length of the most common used household sewing needles.

Needles were responsible for 59% of cases of T.P. Each case was induced by a one migrating needle only. When the needle penetrates the ventral or lateral reticular wall, it usually causes T.R.P. with or without P.A. In this case needle may be alone or sharing other f.bs. as nails in inducing such condition. In five cases of D.H., needles were extracted from the wall or lumen of the herniated part of the reticulum with other types of f.bs. That means they are sharing other f.bs. specially nails in inducing diaphragmatic rupture and reticular herniation. In two cases of f.b. abscesses behind the elbow, needles were the cause and also in one cow, abscess at the neck was formed due to a migrating needle.

A considerable number of wire segments were extracted from the reticulum, but only a small number was found penetrating (16%). Fortunately, the reason may be attributed to the short length of most of wire segments and their bad quality which resulted in rusting and fragmentation. In one work on cattle, Fifty nine of wire segments, ranged from 5-14 cm long, and one nail were responsible for 60 fatal cases (Roth and King,1991). In our present study the main disease induced by long wire segments was T.R.P. with or without P.A. They are found penetrating the reticular wall alone or with other f.bs. Also long wire segments were found migrating alone to the thoracic cavity inducing T.P.

Nails were the most common sharp metallic f.bs. recorded in the present study, however the number of penetrating nails was around 34% of all recovered nails. The most common nail was the normal one (91%) with head (88%), straight (63%) and prevalent length was between 4-6 cm. Nails were responsible for 65% of T.R.P. and 49% of TRP with P.A. alone or with other f.bs. Nails were the main cause of DH in all cases reported in the present study. It is clear that nails can not migrate easily from the reticulum due to presence of their heads, and thus they are hanged with head and hitting the diaphragm several times resulting in its rupture. This may explain the presence of nails in all cases of D.H. inside the herniated part of the reticulum. In 12 cases out of 34, nails were found the solely cause of TP and they are found migrating inside a

tract connecting the reticulum with the pericardial sac through the diaphragm

Women's hair clips are an interesting f.bs. In spite of their small number as compared with other f.bs., the hazards induced by them were relatively large. They were found penetrating the reticular wall in an erected manner by the long prong of the hair clip while the other short prong was rested on the reticular mucous membrane without penetration. 76% of them were found penetrating, and inducing T.R.P. mostly with P.A., alone or with other f.bs.

Other differentiated and non differentiated metallic f.bs. were less hazardous to animals as they rarely found penetrating the reticular wall, however, they may induce several injuries and lacerations of the reticular wall resulting in reticulitis and thickening of the reticular wall thus affecting its contractility.

F.bs. of non metallic origin were variable. Many of them were recovered from the reticulum only such as stones, glass pieces and balls, dental caps while others were extracted from the rumen only such as ropes, cloth and plastic bags. Leather churn masses were extracted mostly from the reticulum and sometimes from the rumen. Churn is made of goat leather and used for preparation of butter from milk. When they are perforated, farmers throw them nearby animals. Salted character of these churns encourage animals to ingest them. By the churning movement of the reticulum and rumen they are transformed into an irregular heavy masses with sharp edges affecting the reticular wall and its contractility. The same was happened with ropes, plastic bags and cloth in the rumen they are space-occupying f.bs. which are transformed into a huge mass resulting in reduction of food intake and leads to many indigestion problems.

Dental caps and deciduous incisors were recovered in small number from the reticulum. The cause of presence of 10 deciduous premolars and only one deciduous incisor is that the latter usually fall down outside the month cavity while the deciduous premolars fall down inside the mouth cavity and then swallowed with food materials.

Looking generally for the disorders induced by sharp metallic f.bs. we found that T.P. was induced by one migrating f.b. which was needle, nail or a wire segment. On the contrary, the main causative agent of DH was nails, one or more, and in few cases needles were sharing them in inducing the disease. T.R.P. alone or with P.A. was induced by all types of sharp metallic f.bs. such as needles, nails, wire segments and

hair clips. One or more of them were found inducing the condition in one animal.

F.bs. abscesses either at the elbow or neck are induced mainly by household sewing needles. The main cause of oesophageal obstruction was f.bs. of plant origin as orange, onion, and potato in addition to plastic bags. The cause of reticulo-omasal obstruction was churn masses and stones and finally the cause of pyloric obstruction was a bath-sponge of plant origin.

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LEGENDS OF FIGUERS

Fig. 1: Showing different types of needles extracted from buffaloes and cattle in the present study.

Fig. 2: Foreign body abscess at the level of the pharyngeal region caused by household sewing needle.

Fig. 3: Foreign body abscesses just behind the right elbow caused by household sewing needles.

Fig. 4: Lateral radiograph of a foreign body abscess behind the elbow in a buffalo showing a sewing needle inside it.

Fig. 5: Showing a sewing needle embedded in the wall of the reticulum in a case of T.R.P. (A) and another needle in a fibrous tissue tract in a cases of T.P. (B) in post mortem examination.

Fig. 6: Showing a sewing needle penetrating the heart tissue resulting in T.P. in a buffalo.

Fig. 7: Showing a household sewing needle at the wall of the herniated part of the reticulum in a case of D.H. in a buffalo (Post-mortem examination):
a= herniated reticulum, b= diaphragm
c= hernial ring, d= sewing needle

Fig. 8: Lateral radiograph of the caudal thoracic region showing a household sewing needle penetrating the apex of the heart causing T.P. in a cow.

Fig. 9: Lateral radiograph of the caudal thoracic region showing a 12 cm long sewing needle extending from the reticulum to the thoracic cavity just behind the base of the heart in a buffalo.

Fig. 10: Showing different forms and lengths of wire segments extracted from buffaloes and cattle in the present study.

Fig. 11: Lateral radiograph of the cranial thorax showing a migrating wire piece infront the level of the heart in a buffalo.

Fig. 12: Showing different forms of nails extracted from animals of the present study.

Fig. 13: Showing a nail in a fibrous tissue tract in a case of T.P. in a cow.

Fig. 14: Lateral radiograph of the caudal thorax and cranial abdomen showing –different types of nails inside a hernial swelling in addition to some stones and coin in a case of D.H. in a buffalo.

Fig. 15: Showing different types of hair clips collected from buffaloes and cattle in the present study.

Fig. 16: Lateral radiograph of the caudal thorax and cranial abdomen showing hair clip inside the hernial swelling in a case of D.H. in a buffalo.

Fig. 17: Showing different types and values of coins extracted from the reticulum in the present study.

Fig. 18: Showing different types of differentiated metal objects including; bolts & screw, bottle covers, keys, springs, watch pieces, blades, metal hooks, bullets, nail driver, safty pins, hypodermic needles, zebra lock, shaving machine, pencil points and rings.

Fig. 19: Showing a large reticular ulcer inP.M. examination induced by knife blade in a 5 years old cow.

Fig. 20: Lateral radiograph of the caudal thorax and cranial abdomen showing a key inside the reticulum of a buffalo.

Fig. 21: Showing different forms of non-differentiated metal objects, straight metal object (a); rounded metal objects (b); thick irregular metal objects (c) and thin irregular metal objects (d).

Fig. 22: Lateral radiograph of the caudal thorax and cranial abdomen showing a large amount of differentiated and non differentiated metal objects in the reticulum of 6 years old buffalo suffering from T.R.P.

Fig. 23: Showing different forms and size of stones extracted from the reticulum in the present study.

Fig. 24: Showing different forms of leather masses of churn extracted from the reticulum in the present study.

Fig. 25: Lateral radiograph of caudal thorax and cranial abdomen showing different forms of leather masses of churn inside the reticulum with other types of f.bs. and sewing needle at the thorax causing T.P. in a buffalo.

Fig. 26: Showing different forms of decidious premolar and incisor teeth extracted from the reticulum.

Fig. 27: Showing different forms of glass pieces and balls extracted from the reticulum of buffalo and cattle.

Fig. 28: Showing different forms of rubber pieces extracted from the rumen.

Fig. 29: Lateral radiograph of the dorso-caudal part of the thorax showing the soft tissue density of an intact orange at the thoracic oesophagus of a cow.

Fig. 30: Lateral radiograph of the neck showing a soft tissue density swelling in the cervical oesophagus and at the level of trachea in a 6 years old cow.

Fig. 31: Showing a dilated and impacted abomasum (a), the pyloric part contains a f.b. (b) and a bath sponge which extracted from the pylorus (c) in a cow.

Fig. 32: Showing different types and forms of ropes extracted from the rumen.

Fig. 33: Showing different types of cloth and ropes extracted from one buffalo.

Fig. 34: Showing different types of plastic bags, ropes and cloth extracted from the rumen of one buffalo, 6 years old.

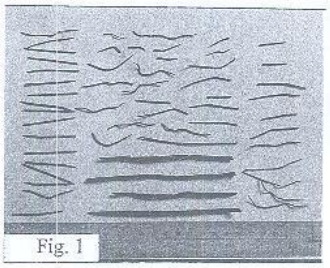


Fig. 1


Fig. 2

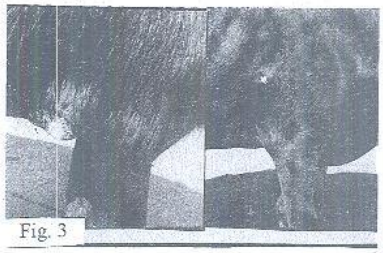
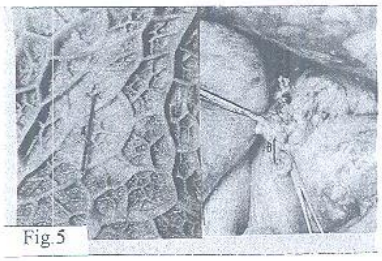


Fig. 3


Fig. 4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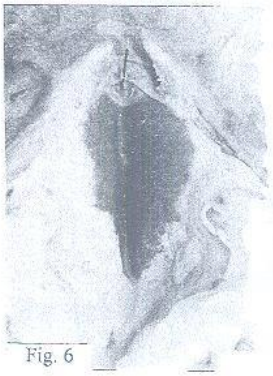
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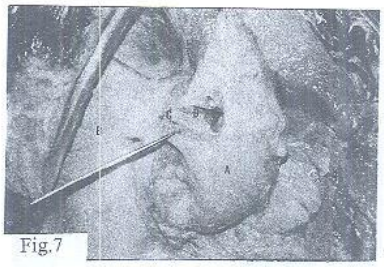

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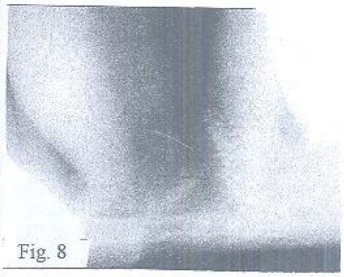

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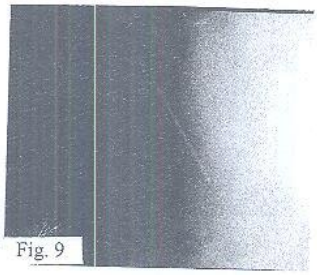

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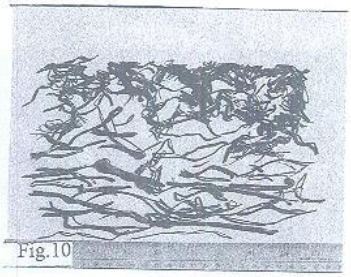

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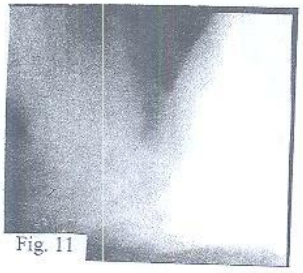

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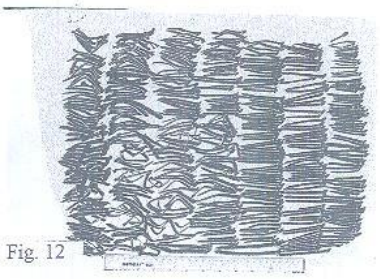

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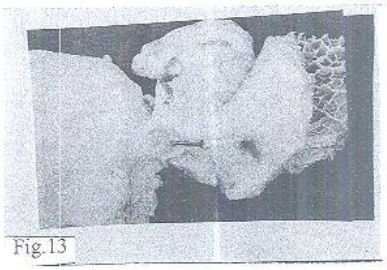
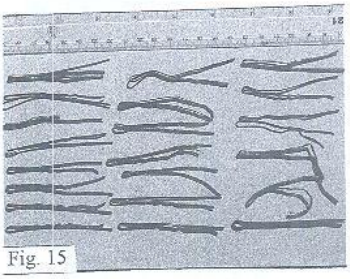


Fig. 13


Fig. 14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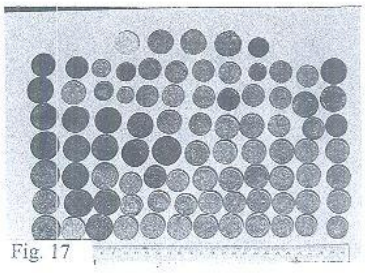
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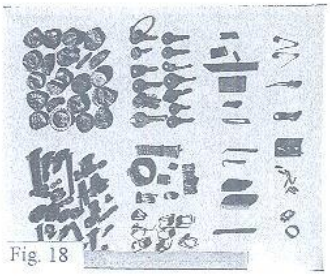
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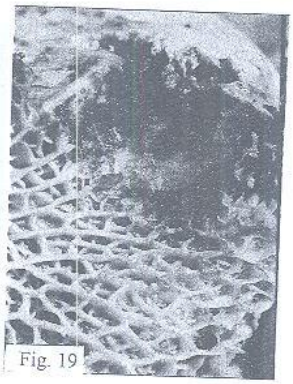
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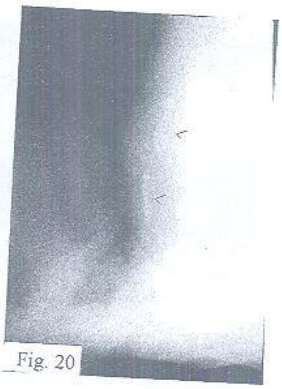
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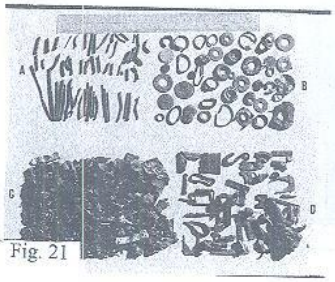
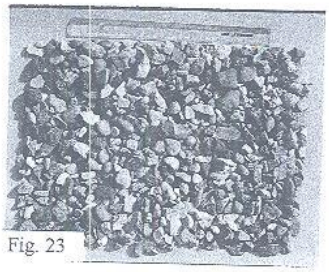


Fig. 21


Fig. 22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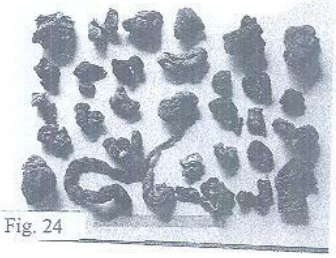
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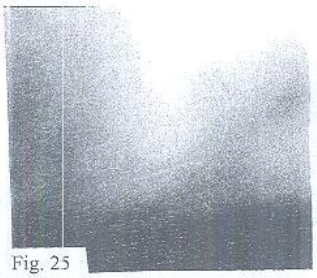

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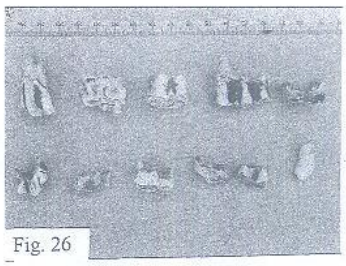

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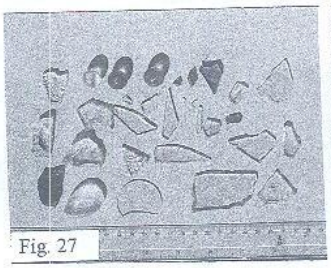

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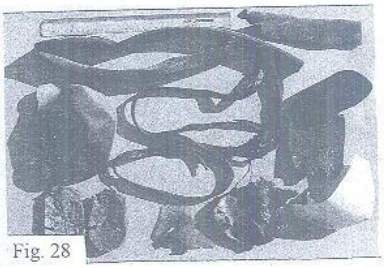
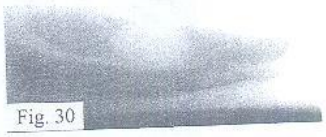


Fig. 28

Fig. 29



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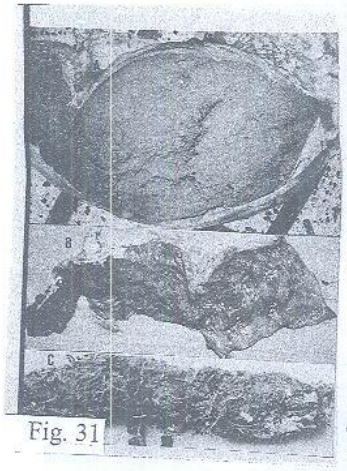

Fig. 31


Fig. 32

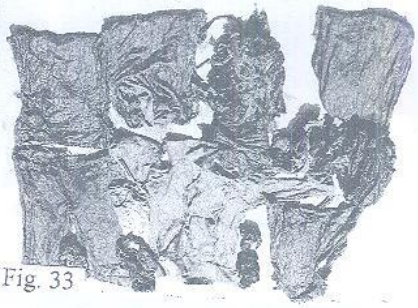
Fig. 33


Fig. 34