INCIDENCE AND CONSEQUENCE OF SURGICAL REMOVAL OF GASTRIC FOREIGN BODIES IN WEST AFRICAN DWARF GOATS IN IBADAN

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Received *August 6, 2019;* ***Revised*** *September 6, 2019;* ***Accepted*** *October 29, 2019*

ABSTRACT

Gastric Foreign Body (GFB) in West African Dwarf (WAD) goats increased in cases presented to Ruminant section of a tertiary Veterinary institution. This study evaluates incidence and effects of surgical removal of GFB in WAD goats. Ambulatory cases during the dry season, cases presented to the Ruminant section and WAD goats acquired for this study were evaluated. GFB in the study goats were removed surgically and blood collected for both haematology and biochemistry weekly for three weeks after. Prevalence in ambulatory cases (n=809) was 43%, in cases presented to the clinic (n=70), 73% and the nineteen goats purchased for the study had nylon GFB (100%). The study revealed a significant neutrophilia following removal of nylon GFB. The blood biochemistry also revealed significant difference (p<0.05) in AST between the second and pre-surgical treatment, one and third week values. Protein values were also significantly different (p<0.05) in the first week to other values. These suggest that removal of nylon GFB causes significant changes in blood and biochemistry post-operatively. Thus removal of GFB in WAD goats requires post-operative nursing care. Enforcement of legislation to discourage littering with nylon and feed supplementation during scarcity of forage may reduce incidence of GFB in WAD goats.

Keywords: Nylon gastric foreign body, Incidence, Surgical removal, West African Dwarf goat

INTRODUCTION

Goats are the most numerous of livestock animals in Nigeria (Olatunji-Akioye and Adeyemo, 2009) and they are kept for different reasons depending on their location. In the north, they are reared for food but are transported to the south for sale to raise funds. In the south, however they are kept as security for hard times, a sort of wealth storage system. This informs the difference in the manner in which these animals are reared in each geographic location. In the north, they are reared semi-intensively except for when the weather makes food difficult to acquire at which time they are allowed to forage. In the south, they are reared mainly extensively, where food is given only to supplement what is ingested during the long periods of foraging. There are however seasonal variations in availability of forage which determines how much is available to the animals. This takes on a larger importance when the main source of feed is forage as is common in the south western part of the country. The encroachment of urbanization on foraging areas also places a

huge burden on the animals to search further for forage or utilize whatever material is available as food. The littering of the environment with nylon bags in copious use for storage makes its availability abundant.

It is generally conceded that sheep and goats, because they are delicate and selective feeders, are substantially less notorious than cattle for ingesting foreign bodies (Hailat *et al*., 1998). Ingested foreign bodies (plastics in particular) may play an important role in the pathogenesis of rumenitis in sheep and represents one of the distinct types of rumenitis (Hailat *et al*., 1997). Clinical presentation of indigestible foreign body in sheep in semi-arid region of the country was characterized by emaciation, abdominal distension, asymmetry, lack of faeces in the rumen, foamy salivation, recumbency and inappetence (Igbokwe *et al*., 2003). Hyperglycaemia, hypoproteinemia and hypoalbuminemia occurred in some clinical cases (Igbokwe *et al*., 2003). The main pathological lesions encountered in sheep and cattle with plastics in their rumens are rumenitis, erosion and focal hyperplasia (Hailat *et al*., 1995; El-Maghraby and Hailat, 1997).

Ruminal indigestion in goats has been attributed to foreign bodies and progressive toxicity was proposed to be the cause of deaths in many goats with ruminal foreign body indigestion (Fouad *et al*., 1980).

It is possible that goats may ingest foreign bodies because of shortage of feeds and forage (Rossow and Horvath, 1985). In some cases, plastic bags contain food debris, and while goats are searching for food in them, the bags are eaten as well (Hailat *et al*., 1998).

This study was therefore conducted to estimate the prevalence and incidence of nylon bag varieties as GFB through exploratory laparotomy as well as evaluate the effect on blood haematology and serum biochemistry in the postoperative period following removal of the nylon from the gastrointestinal system of the goats.

MATERIALS AND METHODS

Several groups of animals were used for the study; the herds in farms around the University, cases presented to the Ruminant section of the Veterinary Teaching Hospital (VTH) and the animals procured to evaluate effect of nylon GFB and the effect of its removal on haematology and blood biochemistry.

Ambulatory cases from farmers with goat herds around the University confusing these signs with pregnancy presented at the Veterinary Teaching Hospital (VTH). 60 – 120 goats were evaluated and a diagnosis of gastric foreign body was arrived at, based on clinical signs. Owners were advised to slaughter the infected goats, and the post mortem findings formed part of the results presented. Eight hundred and nine animals in all were sampled during the dry season which ran from October 2017 to March 2018 in Ibadan, south western Nigeria. This comprised 506 females and 303 male WAD goats with weight ranging between 15 – 23 kg.

Seventy (70) animals made up of 53 males and 27 females presented at different times to the Ruminant Section of the VTH with signs such as dullness, anorexia, abdominal distension, failure to thrive, rough hair coat, wheezing and unproductive cough were examined. Fifty-one (51) of these animals underwent exploratory laparotomy.

Nineteen animals were purchased from homestead farms around Ibadan and kept in the goatry. There were minimal interventions prior to surgery but animals were adjudged as showing signs of GFB at the point of purchase. Three of the animals died before any intervention could be carried out on them. Necropsy findings are presented as part of the results. The remaining animals were prepared for aseptic surgery and exploratory rumenotomy (Figure 1).

Blood samples were collected weekly, 5 ml per animal, 3 ml in sample bottles with ethylene diaminetetraacetic acid (EDTA) and 2 ml in plain bottles slanted to facilitate separation of serum for biochemical analysis for up to three weeks post operation. Packed cell volume (PCV), haemoglobin (Hb), red blood cell (RBC) counts were determined as described (Jain, 1986), haematometric indices were determined from values of RBC count, Hb and PCV, and white blood cell (WBC) counts were determined

as described by Coles (1989). The samples were obtained and assayed pre-surgical treatment removal of nylon GFB and three weeks post-surgical treatment removal of nylon GFB on a weekly basis.

Figure 1: Goat with nylon ruminal gastric foreign body

From the plasma, total protein was measured using biuret reaction, while albumin was measured by colorimetric estimation using sigma diagnostic reagent (Sigma Diagnostic, UK.), which contained bromocresol green (BCG). Globulin was obtained from difference of total protein and albumin. Aspartate and alanine aminotransferases were determined using a commercial kit based on the method by Henry *et al*. (1960).

Statistical Analysis: The data on prevalence were summed and percentages calculated using Microsoft Excel**.** The data on haematology and biochemical indices were subjected to one way analysis of variance (ANOVA) using GraphPad Prism, version 5.0, San Diego, CA. P values of less than 0.05 were regarded as significant. The results were expressed as mean ± standard error of mean (SEM).

RESULTS

Out of 809 goats (ambulatory cases at VTH), 348(43 %) had gastric foreign bodies, while 72(21 %) had nylon gastric foreign bodies. Furthermore, out of 70 goats (cases presented to VTH), 51(73 %) had gastric foreign bodies, while 37(73 %) had nylon gastric foreign bodies. Similarly, all the 19 goats (purchased for the study), had nylon gastric foreign bodies (Table 1).

Table 1: Animals in each study group and percentage with gastric foreign body (GFB) and nylon GFB

Sources of goats	Total number of goats	Number of goats with GFB	Number of goats with nylon GFB
Ambulatory cases at VTH	809	348 (43%)	72 (21%)
Cases presented to VTH	70	51 (73%)	37 (73%)
Study goats	19	19 (100%)	19 (100%)

The weekly effect on haematology and blood biochemistry after the surgical removal of the nylon GFB for up to three weeks is presented in Tables 2 and 3. The PCV and Hb significantly decreased ($p<0.05$) from week one to week three post-surgical treatment. The RBC were statically similar ($p>0.05$) in weeks one to three post-surgical treatments. The WBC, platelets and lymphocytes significantly increased ($p<0.05$) from week one to week three post-surgical treatment. Other haematological indices are as presented in Table 2.

The levels of creatinine, bilirubin, albumin and fibrinogen in WAD goats with nylon gastric foreign body were statistical similar ($p>0.05$) for week one to three post-surgical treatments when compared to the pre-surgical treatment value. The levels of BUN in goats with nylon gastric foreign body was statistical similar ($p>0.05$) for week one to three post-surgical treatments, but significantly different ($p<0.05$) when compared to the pre-surgical treatment value (Table 3). The pre-surgical serum protein level in goats with nylon gastric foreign body differed significantly ($p<0.05$) from week one and week three post-surgical treatments protein levels, but was statistically similar ($p>0.05$) with week two post-surgical treatments protein levels. The level of AST in goats with nylon GFB significantly increased ($p<0.05$) from the pre-surgical treatments to week two post-surgical treatment (Table 3).

Table 2: Haematological parameters of WAD goats with nylon gastric foreign body

Parameters	PreST	1st week PostST	2nd week PostST	3rd week PostST
PCV (%)	30.7 ± 2.9^{c}	26.3 ± 4.2^{b}	23.3 ± 0.6^{a}	23.3 ± 5.9^{a}
Hb (g/dL)	10.0 ± 1.1^{c}	8.6 ± 1.5^{b}	7.6 ± 0.2^{a}	7.9 ± 2.0^{a}
RBC (x10^{6}µL)	10.5 ± 1.1^{a}	10.8 ± 0.6^{a}	10.5 ± 0.2^{a}	11.4 ± 1.6^{b}
WBC (x10^{6}µL)	9433.3 ± 1474^{a}	14166.6 ± 5706^{b}	13983.3 ± 4548^{c}	15233.3 ± 28.9^{d}
Platelets	109666.7 ± 67039.0^{b}	211666.7 ± 41956.3^{d}	106333.3 ± 78155.8^{a}	192000.0 ± 86602.5^{c}
Lymphocytes (%)	62.0 ± 5.3^{c}	37.7 ± 15.5^{a}	45.7 ± 14.2^{b}	61.0 ± 15.6^{c}
Neutrophils (%)	33.0 ± 4.6	58.3 ± 15.4	46.0 ± 10.4	30.7 ± 6.4
Monocytes (%)	3.0 ± 1.0	0.7 ± 1.2	4.0 ± 1.7	6.7 ± 9.8
Eosinophils (%)	2.0 ± 1.7	3.3 ± 0.6	4.3 ± 4.2	1.7 ± 0.6
MCH	9.5±0.2	8.0±0.3	7.3±0.3	6.9±0.2
MCV	29.2±0.2	24.4±0.3	22.2±0.2	20.4±0.2
MCHC	32.6±0.3	32.7±0.2	32.6±0.2	33.9±0.2

Legend: PVC = packed cell volume, Hb = haemoglobin, RBC = red blood cell, WBC = white blood cell, MCH = mean corpuscular haemoglobin, MCV = mean corpuscular volume, MCHC = mean corpuscular haemoglobin concentration, PreST = Pre-surgical treatment, PostST = Post-surgical treatment, mean values on the same row with different superscript letter are significantly different (p<0.05)

Table 3: Blood biochemistry of WAD goats with nylon gastric foreign body

Parameters	PreST	1st week PostST	2nd week PostST	3rd week PostST
Creatinine	1.4 ± 0.2^{a}	1.4 ± 0.2^{a}	1.3 ± 0.2^{a}	1.4 ± 0.2^{a}
BUN	20.7 ± 3.1^{b}	17.0 ± 7.0^{a}	16.0 ± 8.7^{a}	16.0 ± 6.0^{a}
Bilirubin	0.03 ± 0.1^{a}	0.03 ± 0.1^{a}	0.04 ± 0.1^{a}	0.03 ± 0.1^{a}
Protein	7.2 ± 0.5^{b}	6.1 ± 0.5^{a}	7.0 ± 0.5^{b}	6.5 ± 0.5^{a}
Albumin	1.6 ± 0.2^{a}	1.6 ± 0.2^{a}	1.6 ± 0.2^{a}	1.5 ± 0.3^{a}
Fibrinogen	0.2 ± 0.1^{a}	0.2 ± 0.2^{a}	0.1 ± 0.1^{a}	0.2 ± 0.1^{a}
AST	173 ± 3.0^{a}	205 ± 33.8^{b}	246 ± 17.4^{c}	172 ± 7.2^{a}
ALT	15.7 ± 0.6^{a}	17.3 ± 0.6^{c}	16.3 ± 2.1^{b}	15.3 ± 1.5^{a}
ALP	161.3 ± 47.0^{c}	168.7 ± 60.5^{d}	153 ± 48.6^{b}	145 ± 61.9^{a}

Legend: BUN = Blood Urea Nitrogen, AST = aspartate transferase, ALT= alanine transferase, ALP = alkaline phosphatase, PreST = Pre-surgical treatment, PostST = Post-surgical treatment, mean values on the same row with different superscript letter are significantly different (p< 0.05)

The level of ALT and ALP in goats with nylon GFB significantly decreased (p<0.05) from week one to week three post-surgical treatment (Table 3).

DISCUSSION

The prevalence of GFB in WAD goats in this study far exceeds the incidence reported in sheep (Igbokwe *et al.*, 2003) and that of the nylon variety also far exceeds that of indigestible foreign bodies which indicates an increase in incidence.

The animals presented as clinical cases consisted mainly of WAD goats and their crossbreeds and they represented the bulk of the animals in the herds visited. Few Red Sokoto goats were part of these herds and were clinically normal which may have been due to the fact that they were transported in from other areas of the country and have had no opportunity to forage and ingest these foreign bodies. Shortage of feed has been implicated in the abnormal appetite/pica which leads to gastric foreign body in arid zones and countries. Urbanization and indiscriminate disposal of refuse may be contributory in areas where feed shortages are not common. Free range system of rearing WAD goats predisposes them to GFB thus the increasing incidence (Igbokwe *et al.*, 2003). Abnormal appetite in animals is associated with phosphorus deficiency (Fraser and Broom, 2003) and may have been

implicated in ingestion of the foreign bodies (Rossow and Horvath, 1985).

Haematological changes observed were in agreement with the microcytic hypochromic anaemia observed in sheep with gastric foreign bodies in Jordan (Hailat *et al*., 1998) and persisted till about the third post-surgical week. While some of these haematological changes were not significant, the final values were approaching normal except for a persistent neutrophilia which was similar to observations in the study of effect of surgical removal of foreign body from the rumen of goats in Southern Darfur (Ghurashi *et al*., 2009). Changes in protein were at variance with the hypoproteinemia observed in some clinical cases and suggest removal of nylon GFB should be encouraged.

In a study comparing haematological and biochemical values of WAD with GFB and those without, it was noted that haematological parameters can be used as predictive for the good influence of nursing care following removal of nylon GFB (Akinrinmade and Akinrinde, 2012).

Enforcement of legislation is required to limit use and indiscriminate disposal of nylon waste in the environment. With increasing cases of nylon GFB, it may be prudent to supplement feeding for animals particularly when the dry season arrives.

Conclusion: Nylon GFB is seen to be increasing in incidence in WAD goats and surgical removal of the GFB is the treatment of choice. The effect on haematology and biochemistry necessitates nursing care which should assist the clinician to prepare the farmer or animal owner during animal recovery and future breeding. Legislation is required to clean up the environment to prevent further indiscriminate disposal and ingestion of these nylon GFB by domestic animals. Supplementation of diet during periods of scarce forage may aid in reducing the incidences of cases of GFB seen.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the staff of the VTH and animal handlers who assisted during many of the procedures on the field.

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