

# CLINICAL, HAEMATOLOGICAL AND PATHOLOGICAL CHANGES FOLLOWING BILATERAL URETERAL LIGATION IN BORNO WHITE GOATS- A PRELIMINARY REPORT.

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## ABSTRACT

Bilateral ureteral ligation was performed through the left paralumber fossa in 4 clinically healthy adult Borno White goats. Clinical effects or uraemia were observed 24 hours after surgery when anuria had set in and included inappetence, depression, coughing, stretching of the neck, laboured breathing with inspiratory wheezing sound, serous to mucous ocular and nasal discharges, and terminal paralysis and convulsion. Haematological changes observed included anaemia from day 2 after surgery and lymphocytosis on days 1 and 2, leucocytosis on day 3, neutrophilia on days 3 and 5 and eosinopenia on days 9 and 11 after Surgery. At post-mortem, the major lesions observed were bronchopneumonia, renal tubular necrosis and gastroenteritis.

## INTRODUCTION

Extrarenal lesions associated with renal failure in ruminants have been shown to differ from those in monogastric animals (Watts and Campbell, 1970, 1971) and they vary between and within species (Blood *et al.*, 1983). The pathological effect of urinary retention has been previously studied following experimental bilateral nephrectomy or ureteral ligation in cattle, sheep and goats (Vyas *et al.*, 1978; Jalaluddin *et al.*, 1986). This paper reports the clinical signs, haematological and pathological changes following bilateral ureteral ligation in Borno White goats to assist the clinician in assessing the prognosis of anuric patients among this breed.

## MATERIALS AND METHODS

Four clinically healthy Borno White goats weighing 10-14kg and aged 1.5-2.0 years were used.

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The goats were purchased from the livestock market in Maiduguri. They were housed in concrete-floored pens and dosed with morantel tartrate (Banmith, Pfizer, Nigeria). They were fed groundnut hay and maize bran and water was given *ad libitum*. They were observed for 2 weeks before the experiment.

Bilateral ureteral ligation was performed through the left paralumber fossa using chlorpromazine hydrochloride (Largactil, May and Baker, England) as sedative and Lignocaine hydrochloride (Xylocaine, Astra, Sweden) as local anaesthetic respectively.

Blood samples (2.5ml) were collected with ethylene diamine tetra-acetate (EDTA) as anticoagulant before surgery and every 24 hours for 3 days after surgery and every 48 hours subsequently until death. With the blood samples, the packed cell volume (PCV) was determined by microhaematocrit method, haemoglobin (HB) concentration by cyanmethaemoglobin method, the white blood cell count was done by haemocytometry and the differential white blood cell count was done using blood films stained with Giemsa stain (Schalm *et al.*, 1975).

Clinical signs were observed until death. After death, post-mortem examination was carried out and tissue specimens were collected and fixed in 10% formalin. The tissues were processed, embedded and cut at 5 - 10 microns and stained with haematoxylin and eosin for histopathological examination (Druby and Wallington 1967). Data was summarized as Mean  $\pm$  standard deviation (SD) and significant difference assessed by t-test (Charfield, 1983).

## RESULTS

### *Clinical Signs:*

The goats recovered fully from anaesthesia within 2-6 hours after Surgery. They were alert and maintained normal appetite for about 24 hours after which there was inappetence. They were completely anorexic a day before death. The animals were depressed at about 24 hours after Surgery and coughing, stretching of neck, inspiratory wheezing sound and laboured breathing were observed. There was bilateral serous ocular and nasal discharges which became mucopurulent as the condition progressed. Other clinical signs included grinding of teeth, slight urine-like odour of breath, copious salivation, ruminal atony, rough hair coat, anuria and weakness. Scanty faeces of hard consistency were voided. Few hours before death, there was paralysis of the limbs followed by brief convulsion. The goats died between 86 and 302 hours after surgery.

The changes in the haematological parameters after the surgery are presented in Table 1. There were significant decreases ( $P < 0.05$ ) in PCV from day 2 onwards and in HB on day 5. There were significant increases ( $P < 0.05$ ) in the WBC count on day 3, neutrophil (segmented) count on days 3 and 5, lymphocyte count on days 1 and 2 after surgery. There were no significant variations in the monocyte count. The eosinophil count significantly decreased ( $P < 0.05$ ) on days 9 and 11 after Surgery.

### *Gross Lesions:*

The carcasses were emaciated and the visible mucous membranes were pale. The abdominal and thoracic cavities contained 40 - 1100ml and 15 - 40ml of serous fluid respectively. The trachea and bronchi contained frothy creamy exudate and the mucosae were congested. The ventral parts of the cranial and cardiac lobes of the lungs were congested, oedematous and consolidated and there was adhesion of this part to the thoracic wall in one goat.

The liver was enlarged and congested. There was accumulation of serous fluid between the renal capsule and the parenchyma. The kidneys were enlarged and oedematous with focal pale necrotic area of about 3mm diameter on the

caudal poles. The urinary bladder was shrunken and contained a creamy pus. The bone marrow was fatty and the brain was congested and oedematous.

### *Histopathological Lesions:*

The lungs had focal purulent bronchopneumonia. The inter-aveolar septae were thickened by oedema fluid and purulent exudate. The aveolar walls were desquamated and the aveolar lumina were infiltrated by purulent exudate consisting of neutrophils, necrotic debris, red blood cells and desquamated aveolar cells.

There were focal areas of haemorrhage in the myocardial muscles of the right and left ventricles in one goat. The hepatic central veins were filled with blood. Lymphocytes were sparsely distributed in the lymphoid nodules of the spleen of 3 goats.

The kidneys were congested and had tubular necrosis and desquamation of tubular epithelium. There were proteinaceous casts in the Bowman's capsule and the tubular lumina. There was minimal lymphocytic infiltration into the interstitial tissues.

There was erosion of the epithelium of the urinary bladder. The cerebral blood vessels were congested. There was inflammation of the abomasum, small and large intestines characterized by congestion, epithelial necrosis and desquamation and neutrophilic infiltration of the submucosa.

## DISCUSSION

Uraemia in farm animals is usually due to obstructive urolithiasis (Smith *et al.*, 1972) and the ureteral ligation simulates such an obstruction. In this study, the survival time of the goats after ureteral ligation was 86 - 302 hours. This time compares with 4 - 7 days (96 - 188 hours) reported by Vyas *et al.* (1978) in goats after bilateral nephrectomy and 5 - 12 days (120 - 288 hours) reported by Jalaluddin *et al.* (1986) after ureteral ligation in calves.

Noticeable clinical effects of uraemia were observed 24 hours after surgery when anuria had set in. The clinical signs indicated disturbances in appetite, respiration and excitability which

TABLE 1: EFFECT OF BILATERAL URETERL LIGATION ON THE HAEMOGRAM OF BORN WHITE GOATS

DAYS AFTER SURGERY	NO. OF ANIMALS	PCV(%)	HB (g/dl)	WBC $\times 10^9/L$	NEUTROPHILS			DIFFERENTIAL WBC ( $\times 10^6/L$ )		
					BAND	SEGMENTED	LYMPHOCYTES	MONOCYTES	EOSINOPHILS	
0	4	30.0 $\pm$ 4.1	9.0 $\pm$ 1.4	12.00 $\pm$ 3.33	1.88 $\pm$ 0.77	4.70 $\pm$ 1.47	4.03 $\pm$ 0.36	0.71 $\pm$ 1.02	0.80 $\pm$ 0.48	
1	4	27.5 $\pm$ 6.4	7.0 $\pm$ 0.0	17.55 $\pm$ 6.08	1.30 $\pm$ 0.33	5.71 $\pm$ 0.58	9.23 $\pm$ 4.25 <sup>a</sup>	0.46 $\pm$ 0.28	0.75 $\pm$ 0.49	
2	4	24.0 $\pm$ 2.8 <sup>a</sup>	7.0 $\pm$ 0.0	18.52 $\pm$ 5.48	1.15 $\pm$ 0.59	9.19 $\pm$ 6.45	7.42 $\pm$ 1.31 <sup>a</sup>	0.44 $\pm$ 0.01	0.41 $\pm$ 0.26	
3	3	24.5 $\pm$ 3.9 <sup>a</sup>	7.0 $\pm$ 0.0	25.98 $\pm$ 2.16 <sup>a</sup>	1.28 $\pm$ 0.26	19.83 $\pm$ 3.84 <sup>a</sup>	4.61 $\pm$ 0.08	0.00 $\pm$ 0.00	0.24 $\pm$ 0.35	
5	2	21.5 $\pm$ 0.7 <sup>a</sup>	5.6 $\pm$ 0.8 <sup>a</sup>	12.68 $\pm$ 8.10	0.69 $\pm$ 0.97	16.45 $\pm$ 9.28 <sup>a</sup>	3.84 $\pm$ 1.56	0.80 $\pm$ 1.13	0.62 $\pm$ 0.48	
7	1	19.0 <sup>a</sup>	7.2	12.45	1.13	6.35	4.48	0.13	0.62	
9	1	19.5 <sup>a</sup>	6.4 <sup>a</sup>	12.05	1.45	6.74	3.61	0.00	0.15 <sup>a</sup>	
11	1	19.0 <sup>a</sup>	5.9 <sup>a</sup>	14.40	1.49	9.50	4.17	0.43	0.00 <sup>a</sup>	

a = SIGNIFICANTLY DIFFERENT (P &lt; 0.05) FROM VALUE ON DAY 0.

suggested the presence of organic lesions. The grinding of teeth may have been due to pain (Sharma *et al.*, 1982).

The haematological changes after surgery were anaemia leucocytosis, lymphocytosis, neutrophilia and eosinopenia. Prolonged uraemia has been reported to cause anaemia due to bone marrow depression (Smith *et al.*, 1972). The lymphocytosis, leucocytes changes may be associated with stress (Sharma *et al.*, 1982).

Ureteral ligation obstructs urine flow leading to anuria. The reflux of urine causes retention of toxic metabolites and may have applied pressure at the renal hilus creating a space between the capsule and the parenchyma for urine to accumulate in the subcapsular spaces as observed. Pressure and toxic injury may have been responsible for the renal pathology observed which were similar to those described in calves by Jalaluddin *et al.* (1986) after bilateral ureteral ligation. The renal hypertension that was likely to have developed could have caused the hydrothorax and ascites observed. Because urine flow was stopped and the urinary bladder was not continuously flushed, the normal microbial flora in the bladder might have overgrown to cause the pus observed in the bladder.

While Jalaluddin *et al.* (1986) reported congestion and focal haemorrhages in the lungs of calves after bilateral ureteral ligation, this study showed that the goats had focal purulent bronchopneumonia after similar surgical intervention. It appeared that the goats suffered more severe pulmonary injury than the calves. The respiratory lesions were therefore responsible for the coughing, inspiratory wheezing and laboured breathing shown by the goats.

The inflammatory reaction observed in the abomasum and intestine of the goats has been previously reported in uraemic dogs but buccal and pharyngeal ulcers reported in uraemic dogs were not observed (Smith *et al.*, 1972). The gastroneuritis has been reported to be associated with the effect of toxic ammonia liberated from bacterial action on the urea in the gastrointestinal tract (Helmer and Batley, 1971).

The nervous signs observed could be linked with the congestion and oedema of the brain which may have caused increased intracranial pres-

sure. Furthermore, it has been reported that convulsion in uraemic animals may be due to lowering of blood calcium (Smith *et al.*, 1972). The disturbance in appetite was perhaps due to the central nervous system depression and the lesions in the gastrointestinal tract. The faeces of the goats were hard and scanty probably because of reduced feed and water intake (Simesen *et al.*, 1979).

It is concluded that bilateral ureteral obstruction in Borno White goats would lead to severe lesions in the kidneys, lungs and gastrointestinal tract.

Clinical obstructions in the ureters or lower in the urinary tract therefore require early diagnosis and surgical intervention to prevent the untoward effects which would lead to death within a few days. An expanded study on the pathological effects of urinary retention in the Borno White goats is going on and a more comprehensive picture will emerge in future.

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