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Testicular reperfusion injury, post ligation of the spermatic cord in Canine species

CA Awasum^{1*}, AZ Hassan¹, E Ameh², NHY Mbibu², CR Achi⁴, DK Raoul³ and II Onoja¹

¹Department of Veterinary Surgery and Medicine, Ahmadu Bello University, Zaria, Nigeria

²Department of Surgery, Ahmadu Bello University Teaching Hospital, Zaria, Nigeria

³Department of Pathology, Ahmadu Bello University Teaching Hospital, Zaria, Nigeria

⁴Veterinary Teaching Hospital, Usmanu Danfodiyo University, Sokoto, Nigeria

*Corresponding author: Tel: +2348036427523, E-mail address: awasumca@yahoo.com

Abstract

This experiment was aimed at investigating the level of tissue regeneration following sanguineous reperfusion post ligation of the spermatic cord in dogs. A total of 5 adult Nigerian local dogs conditioned for 3 weeks, laboratorily evaluated twice weekly prior to surgery were maintained for 1 month. Dogs were aseptically operated under general anaesthesia. A prescrotal mid-ventral incision was made to access the tunics and ligated (with 2-0 chromic catgut) as in closed castration in canines. Two ligatures were placed proximal and distal on the tunics of the spermatic cord 1.5cm apart to each other to completely occlude the vascular supplies to the testicles. Skin closures were by a single horizontal suture stitch. A second operation was performed to undo the ligatures placed on the spermatic cords as follows: Dog 1 (24 hours), Dog 2 (72 hours), Dog 3 (96 hours), and Dog 4 (120 hours) and Dog 5 (144 hours) to allow for reperfusion. A third operation was performed two weeks later to harvest the testicles together with their spermatic cords but noticed that all ligated testicles were complete necrotized and degenerated. Tissue necrosis was suggestive of severe ischaemia due to the fact that the scrotal sac and its contents are highly sensitive and respond to pain extremely fast. From our finding, it is realized that the resistibility of these organ to injury is very low and dies very fast when its vascular supply is interrupted.

Keywords: Reperfusion, Injury, Ligation, Canine Spermatic cord.

Introduction

Iatrogenic injuries of the spermatic cord and the testes are rare but do occur in minor surgical procedures around the pubic and scrotal region. This injury has been reported less frequently in dogs except in situations where the testes and the spermatic cord gets trapped between two hard wares. The most vulnerable structure of the spermatic cord is the venous plexus due to rupture post prolonged haemorrhage (Johnston, 1965). Varicoceles with thrombosis have occurred leading to circulatory stasis in the testes (Johnston, 1965). Despite the exposed position of the testes, it is rarely subjected to trauma and this is attributed to the shape and the ability to move freely within the scrotum. The testes and the spermatic cord may also be inadvertently cut, crushed, or devascularised.

Once a ligature or clamp has been applied to the spermatic cord, the ultimate degree of injury may be difficult to assess initially. The testicular germinal epithelium is particularly sensitive to adverse influences and its degeneration is probably the most frequent cause of infertility in male animals (Jubb and Kennedy, 1963). In humans, trauma to the testes are common and when

they occur, they are life threatening. This study is aimed at investigating the outcome of reperfusion of traumatized testicles.

Materials and Methods

Five adult local breed dogs (numbered 1, 2, 3, 4 and 5) were used for the study. They were conditioned for 3 weeks with laboratory evaluation performed twice weekly prior to surgery and maintained for 1 month. All dogs were judged to be clinically healthy as ascertained by physical examination and full blood count. All dogs were shown to be free of ecto – and endo-parasites. Food and water were withheld from the dogs 3 hours before the commencement of surgery. Following liberal clipping of the ventral perineal region, the dogs were aseptically operated under general anaesthesia with atropine sulphate (0.05mg/kg) and chlorpromazine (4mg/kg) intravenously as premedication and thiopental sodium (15mg/kg intravenously) as the final anaesthetic agent in continuous intravenous infusion. The dogs were placed on dorsal recumbency and a 2.5cm prescrotal mid-ventral incision was made to access and exteriorise both testes in each dog. The tunics were left intact and

the spermatic cords were ligated (with 2-0 chromic catgut) as in closed castration in canine species. Two ligatures were placed proximal and distal 1.5cm apart to completely occlude the vascular supplies to the testicles. Skin closures were by a single horizontal interrupted suture pattern on all dogs.

The dogs entered for a second round of surgical operations as follows: Dog 1(24hours), Dog 2(72hours), Dog 3(96hours), and Dog 4 (120hours) and Dog 5 (144hours). The second operation was undertaken to remove the ligatures on the spermatic cord and allow for reperfusion. The third operation performed two weeks later revealed a complete necrosis of the spermatic cords at the point of ligation down to the testicles. The wounds were treated satisfactorily.

Results

Mean (n=21) pre- intra- and post- surgical temperature (38.8oC) and mean (n=14) haematological parameters (Table 1) were within normal range for all dogs despite inflammatory process. Severe testicular tissue changes were observed on gross before the removal of stitches especially with increased duration of ligation. Significant tissue changes noticed upon removal of ligatures were severe hyperemia and congestion of testicular microvasculature as well as tenderness of the testicular capsules. Those of over 96 hours post ligation were apparently liquefied; appearing as cysts. There were severe diffused necrosis; degenerative serosanguinous discharges at the wound sites with marked scrotal sac discoloration approximately a week post removal of stitches. Later, there was sloughing of the sac. These were treated as open wounds until full recovery was attained. This severe tissue necrosis was suggestive of hypoxic ischaemic degeneration.

Table 1: Mean Haematological values (n=14)of dogs that underwent kidney harvest at the Ahmadu Bello University Veterinary Teaching Hospital Zaria

Parameter (Normal)	Dog 1	Dog 2	Dog 3	Dog 4	Dog 5
PVC % (37-55)	45.6	46.4	48.0	53.0	50.0
Hb gm/dl(12-28)	15.2	15.4	16.0	17.6	16.6
WBC/L(6-17x10 ⁹)	10.4x10 ⁹	11.4x10 ⁹	11.3x10 ⁹	11.4x10 ⁹	11.3x10 ⁹
Neut% (60-70)	66.0	60.0	67.0	62.0	62.0
Lymp% (12-30)	30.0	30.0	29.0	30.0	31.0
Mon% (3-10)	4.0	3.0	3.0	3.0	4.0
Eosin% (2-10)	4.0	3.0	3.0	3.0	5.0
Baso % (rare)	0.0	0.0	0.0	0.0	0.0
T. Protein gm/100m/s (6-7.5)	7.8	7.4	7.7	7.8	8.1

Discussion

Cautious attempts to maintain asepsis were observed. The scrotal sacs including its contents are highly sensitive to trauma and would respond to pain extremely fast with the animal showing tenderness around the perineum.

The moderate temperature shown by the experimental animals were due to the intervention with antibiotics (Procaine penicillin 20000 iu/kg and streptomycin 15mg/kg all administered for five days). Reperfusion injury could not be evaluated since the testicles degenerated faster than expected. The observed changes at gross examination are in consonance with organs or tissues under ischaemic degeneration. According to Gresham (1967), arterial and venous blockages results in ischaemic degeneration suggestive of loss of tissue viability at cellular level with necrosis, and discoloration due to local anaemic effect and shrinkage (Runnell *et al.*, 1977).

From our finding, it is realized that the resistibility of these organ to injury is very low and dies fast when severely ischaemically injured.

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