

EXPERIMENTAL STUDIES OF END-TO-END EVERTING AND INVAGINATING INTESTINAL ANASTOMOSES IN GOATS

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ABSTRACT

Six clinically health Borno white goats weighing 20-30 kg and aged 1.5-2 years were used in this study. Two sites on the intestine 10 cm apart in each goat were chosen. The healing patterns of two techniques, the end-to-end single layer everting and end-to-end single layer invaginating techniques of experimental intestinal ileal anastomoses were compared. Post operative clinical course in the goats, gross and microscopic appearance of anastomotic sites were studied at various time intervals to determine the healing quality. The clinical course was associated with post operative complications which in some goats ended fatally. Grossly, the inverted anastomosed sites showed extensive adhesion formation, leakage on day 3 biopsy samples in one goat and intestinal lumen obstruction in another. There was also persistent inflammatory reaction. The invaginated segment showed lesser degree of swelling and fibrin deposition. Microscopically, biopsy samples revealed non-union of the intestine at day 3 post surgery in both techniques. On day 15, adequate union of intestines was observed for the invagination technique. In the everting technique there was persistence of inflammatory cells. Healing was faster in invaginating than everting intestinal anastomosed sites. The invaginating intestinal anastomoses appears to be a better technique than everting intestinal anastomosis in goats.

INTRODUCTION

There is high rate of intestinal obstruction in caprine in Nigeria due to semi - intensive and free - range management system, which requires surgical intervention (Allen *et al.*, 1989). Intestinal resection and anastomoses though a corrective measure, is associated with complications like ileus leakage at the anastomosed sites and adhesion formation (Singh *et al.*, 1985). Numerous anastomotic techniques for intestinal anastomoses following reaction to re-approximate the severed ends and to restore intestinal continuity in the best possible way have been developed (Singh *et al.*, 1985). These were attempted towards finding a suitable technique that will produce fewer complications as well as enhancing healing process (Allen *et al.*, 1989; Dean *et al.*, 1985; Singh *et al.*, 1985). Single layer suture patterns for end-to-end anastomoses showed consistent alignment of tissues planes, faster healing with minimal scar tissue formation and lesser tendency towards adhesion formation (Dean *et al.*, 1985). Recent studies has shown that apposition of intestinal segments with simple interrupted crushing type suture is adequate (Knecht *et al.*, 1987; Dean *et al.*, 1985). This study was carried out to evaluate the clinical features and healing patterns of the anastomosed intestinal segments grossly and by microscopic techniques at various time

intervals using single layer end-to-end invaginating and everting anastomotic techniques after resection in Borno white goats.

MATERIALS AND METHODS

Experimental Animals

Six clinical healthy Borno white Sahelian goats 1.5-2 years old and weighed 20-30 kg were housed in concrete pens, fed with groundnut leaves and commercial feed concentrate and water was provided *ad libitum*. All the animals were dewormed with Thiabendazole (Thibenzole[®]) and were given a single intramuscular injection of diminazene aceturate (Berenil[®], Hoechst, Germany) at 3.5 mg/kg body weight. Faecal and blood samples were examined 5 days after the treatment as part of presurgical evaluation. The goat was fasted for 12 hours before surgery. Each goats was sedated with chlorpromazine hydrochloride (Largactil[®], M & B, Germany) at 1 mg/kg body weight intramuscularly (Hall and Clarke, 1983). The drug was allowed to take effect, 20 minutes after administration, before the induction of local anaesthesia.

Surgical Procedure

The right flank area was aseptically prepared and 2

per cent Lignocaine Hydrochloride (Xylocaine^R, Astra Laboratories, USA) was infiltrated linearly along the line of incision in each goat. A right flank laparotomy as described by Berge and Wethne (1977) was performed, the small intestine was carefully exteriorised. The contents were kneaded either way from the segment to be resected. Intestinal clamps two on each side placed at 45 - 60° angle to the long axis were applied and the portion resected (Gyang, 1989).

Everting Anastomosis Techniques

The intestine was resected in between the clamps on each side. Four centimetre long intestinal segment with one clamp holding either end of the resected portion of the intestine was removed with the accompanying mesentery from the surgical area leaving a V-shaped space in the mesentery with the wider portion towards the intestines. The other two clamps were left to hold the severed ends of the intestine to prevent the intestinal contents from exuding into the peritoneal cavity. The severed ends of the intestine were cleared by dabbing with sterile gauze. A through and through single layer interrupted Halsted suture pattern using 4/0 silk was performed to create intestinal anastomosis (Kersjes *et al.*, 1985). The suture pattern inverted the intestinal edges. The V-shaped space in the mesentery was closed using simple continuous suture pattern.

Invaginating Anastomosis Technique

The second resection and anastomosis was performed 10 cm distal to the inverted anastomosis. Resection was carried out as in everting anastomotic technique above. The anastomosis was attained using Lembert suture pattern (Knecht *et al.*, 1987). The suture pattern inverted the intestinal ends. The mesenteric gap was closed using simple continuous suture pattern.

The intestine were replaced into the abdominal cavity. Two layer closure of laparotomy incision was done. The peritoneum and abdominal muscles were sutured together in a lock stitches pattern using 3/0 chromic catgut while the skin incision was stitched with 2/0 silk suture using interrupted Halsted suture pattern. The skin stitches were dressed with tincture of iodine.

Body temperature, pulse and respiratory rates of each goat were monitored daily. Feeding, water intake and rumination were also observed. The pens were kept clean to observe passage of faeces.

Laparotomy was performed 8, 10 and 15 days post operation to enable visual observation of the anastomosed sites. After visual observation, 3 cm each of the inverted and invaginated anastomosed segments

were collected in normal saline for histopathological examination. A second anastomoses were performed to appose the intestinal ends from which anastomosed segment samples were collected.

Histological Technique

After collection, the anastomosed intestinal segment samples were washed thoroughly in water and they were transferred into Bouin's solution for 6 hours. The fixed tissues were then embedded in paraffin wax. Sections of 5 µm thick were cut and stained with H&E.

RESULTS

Clinical Findings

Four goats were alert 6-12 hours after surgery while two were dull, anorexic and depressed. Their conditions deteriorated resulting in death three days post operation. In one, the body temperature, pulse and respiratory rates were 40.1°C, 86 and 26 per minute, respectively while the other had a temperature of 39.6°C, pulse of 79 per minute and respiratory rate of 24 per minute. In the other four goats mucous nasal discharges, coughing and moist rales on lung sound auscultation were observed. There were no significant changes in pulse rate and body temperatures. Oxytetracycline (Terramycin^R Q) was administered once daily for 3 days when the signs of respiratory distress were noticed. Their condition improved and the signs disappeared 7 - 10 days post surgery. Faeces were passed by the four goats 1 - 2 days post surgery while the two ailing goats did not pass any faeces up to the time of death.

A third goat showed signs of intestinal lumen impaction and obstruction at the invaginated anastomotic site 5 days post-operation. It was euthanised and anastomosed segments of intestine were harvested for histopathological examination. In the 4th goat, a 15 day biopsy sample of the anastomosed intestinal segment was collected and intestine re-anastomosed. The goat died two hours after operation. Two goats survived the surgery performed on days 10 and 15 to obtain biopsy of the anastomosed intestinal segment beyond 28 days. They were disposed thereafter at the end of the study.

Gross and Microscopic Findings

Day 3

In the two goats that died 3 days post operation, postmortem examination revealed adhesions of the everting anastomotic site to omentum along the suture

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