COMPARATIVE EVALUATION OF CONVENTIONAL AND LAPAROSCOPIC-ASSISTEDT ECHNIQUE FOR INTESTINAL SURGERY IN DOGS

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Eight dogs with intestinal tumour (02) and intestinal intussusception (06), were diagnosed and operated by laparoscopic-assisted technique (4cases) or conventional method (4cases) under atropine sulphate (0.02 mg/kg s/c), butorphanol tartrate (0.2 mg/kg i/v) and acepromazine maleate (0.02 mg/kg i/v) pre-medicated, propofol (4 mg/kg i/v) induction and isoflurane (2.5%) maintenance anaesthesia. No intraoperative and only minimal postoperative complications were noted in the cases of both groups in this study.
Keywords: Anastomoses, Intestinal biopsy, Intestinal resection, Intestinal tumour, Intussusception, Laparoscopic-assisted technique.

Minimally invasive surgery is being adopted in veterinary medicine with increasing frequency, and with a wider selection of described procedures. Laparoscopic-assisted (LA) intestinal resection and anastomosis for discrete intestinal masses is an effective treatment option for the distal duodenum to the mid-descending colon (Gower and Mayhew, 2011). The minimal invasiveness of the procedure, rapid patient recovery and diagnostic accuracy make laparoscopy a preferred technique over the invasive procedures. The present clinical study was done to optimize its application in intestinal surgery in dogs.

Materials and Methods

Eight clinical cases of intestinal disorders were presented at the BSDP hospital for animals affiliated to Bombay Veterinary College, Parel Mumbai, for diagnosis and management of the condition (table 1 and 2).

Table no.1: Details about the breed, age, sex, weight, deworming status and vaccination status and symptoms of dogs in group I

		(Laparoscopic-assisted intestinal surgery)						
Sr. No.	**Case No.**	**Breed**	**Age**	**Sex**	**Weight (kg)**	**Deworming status**	**Vaccination status**	**Symptoms**
1	B_1	Cocker Spaniel	9 years	Male	23	upto date	upto date	Inappetance, diarrhea, haematochezia, vomiting past 3 weeks
2	D_1	Labrador	4 months	Female	8.7	not done	Primary vaccine	Vomiting, melena, anorexia, weight loss, scanty stool past 5 days
3	E_1	Mongrel	6 months	Male	10	not done	not done	Vomiting, Abdominal pain, anorexia, weight loss, scanty stool past 6 days
4	F_1	Rottweiler	2 months	Female	3	upto date	Primary vaccine	Vomiting, melena, abdominal pain, anorexia, weight loss, scanty stool past 10 days

Part of M.V.Sc. Thesis

Table no.2: Details about the breed, age, sex, weight, deworming status and vaccination status and symptoms of dogs in group II

		Group II (Conventional gastro-intestinal surgery)						
Sr. No.	**Case No.**	**Breed**	**Age**	**Sex**	**Weight (kg)**	**Deworming status**	**Vaccination status**	**Symptoms**
1	B_2	Labrador	13 years	Male	28	upto date	upto date	Diarrhea, weight loss, inappetance, vomiting past 1month
2	D_2	Labrador	6 months	Female	15	upto date	upto date	Vomiting, abdominal pain,anorexia, weight loss scanty stool past 5 days
3	E_2	Great Dane	2 months	Male	3	upto date	Primary vaccine	Vomiting, melena, anorex - ia, Jaundice, weight loss, scanty stool past 2 weeks
4	F_2	German shepherd	15 months	Male	35	upto date	upto date	Vomiting, melena, anorex - ia, weight loss, scanty stool past 2 weeks

Fig. 1 A large cystic mass with some air in it possibly part of bowel was seen cranial to the urinary bladder was seen in case no. B_1

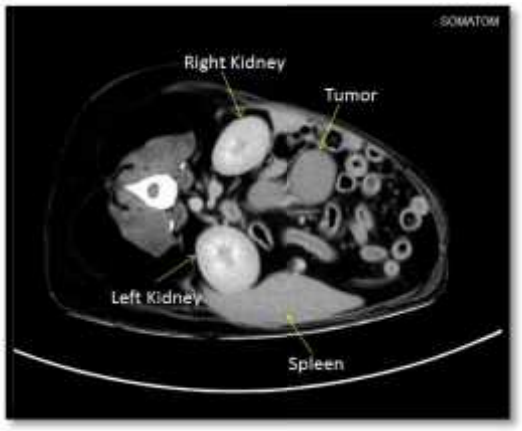

Fig. 2 CT scan imaging shows the presence of an abdominal suspected to be an intra-luminal intestinal mass in case no. B_1

Anamnesis was recorded and dogs were subjected to physical examination. Blood was collected and sent for haemato-biochemical analysis. After physical examination, surgical intervention seemed necessary in all the cases. However, most of the cases posed high anesthetic risk due to their moribund and critical state. All the cases were administered with parenteral fluid therapy prior to surgery.

The following criteria was followed to operate the case by Laparoscopic-assisted (LA) or conventional method:

a. If the dog was in a critical condition and diagnosis seemed unclear, laparoscopic technique was used to perform exploratory laparoscopy for confirmatory diagnosis followed by a LA surgery if possible (case no. E_1).

b. In unstable cases suspected for abdominal tumors, exploratory laparoscopy was performed for diagnosis followed by a biopsy of the tumour either by total laparoscopic or LA method (case no. B_1).

c. In unstable cases suspected for intussusception, laparoscopy was used for confirmatory diagnosis followed by LA surgical intervention (case no. D_1, E_1, F_1).

d. In critical or stable cases, when the diagnosis was obvious by anamnesis, abdominal palpation and diagnostic imaging modalities like plain or contrast radiography and abdominal ultrasound, the conventional

e. approach was attempted. (case no. B_2, D_2, E_2 and F_2).

All the dogs were pre-medicated with Atropine Sulphate (0.02mg/kg body weight) s/c 15 minutes before the induction of anaesthesia. Butorphanol Tartrate (0.2mg/kg body weight) was injected i/v followed by Acepromazine maleate (0.02mg/kg body weight). Ten minutes after the administration of premedicants. Anaesthesia was induced with Propofol (4mg/kg body weight) i/v. Anaesthesia was maintained by inhalation anaesthesia using Isoflurane- Oxygen mixture.

Procedure for Laparoscopic-assisted intestinal surgery

The animal was positioned in dorsal recumbancy. The ventral abdomen was prepared aseptically.Veress needle was introduced near the umbilicus through a skin incision. Flexible tubing was used to connect the Veress needle to the insufflator and insufflation done with CO_2 to establish pneumoperitoneum. A laparoscopic portal (6 mm or 11 mm) was placed on the midline between the xyphoid and the umbilicus as per the requirement. The laparoscope was placed through this trocar to enable visualization of the abdominal organs. Additional ports were placed as per requirement. The abdominal contents were examined laparoscopically. A magnetic blunt probe was used to examine the abdominal contents. The diseased portion of the gastro-intestinal tract (GIT) was identified and a 5 mm laparoscopic grasping forceps was inserted through one of the additional ports which was used to grasp the portion of the GIT to be exteriorized. Laparotomy sponges were used to pack off the exteriorized portion of the GIT and extracorporeal gastro-intestinal surgery was performed as per routine method.

In case B_1, a working port was made, using a 6-mm threaded trocar on the left cranial quadrant of the abdomen almost parallel to the camera port. In case D_1, E_1 and F_1, a working port was made along the ventral midline caudal to the camera port.In case B_1 the intra-luminal intestinal tumour was located and a biopsy was taken using the biopsy cup forceps.The abdomen was lavaged with warm sterile normal saline and the fluid was removed using suction (VET PUMP). The abdominal muscles and subcutaneous tissue were closed using Catgut no. 2-0 with simple interrupted sutures. The skin was closed using Ethilon No. 0 with cross mattress suture. In case D_1, E_1 and F_1after exploratory laparoscopy, the affected portion of intestine was identified as intussusception. In case no. D_1, E_1 and F_1, the intussusceptions were reduced manually by gently applying traction on the neck of the intussusceptum while milking its apex out of the intussuscipiens. Care was taken to avoid excessive traction, because this could lead to tears on the compromised intestine. In some cases, the intestine was milked to a point where necrosis and adhesions were minimal. The reduced intestine was then evaluated for viability and perforation. Resection and anastomosis of the non-viable portion of intestine was performed when manual reduction was impossible, and tissue is devitalized, or mesenteric vessels have been avulsed from a portion of the involved intestine. The intestinal contents were gently milked 4 to 5 cm to either side of the intended incision.The procedure for enterectomy and intestinal anastomosis was carried out.

Procedure for Conventional Intestinal Surgery

The procedure for enterectomy and intestinal anastomosis (case no. B_2, D_2, E_2) and enterotomy (case no. F_2) was carried out.

The following surgical parameters such as surgical operating time, pain during surgery and the length of the skin incision were noted in all the cases. All the cases were maintained on injection cefotaxime (50 mg/kg i.v. bid), metronidazole (15 mg/kg i.v. bid), RL (40-90 mg/kg i.v. as per the hydration status of the dogs), DNS (40-90 ml/kg i.v. as per the hydration status), amino acid preparation (4-6 ml/kg i.v. bid) along with B-complex and antacid injections for 5 days. The dogs were kept nil-by-mouth for 21 hours and then they were allowed on oral water intake and if no vomiting was noted

semi solid food in the form of lapsi was provided in small quantities 3-4 times in a day. Postoperative pain scores were assessed according to the Colorado State University, canine acute pain scale. They were judged one day post operatively.

Fig. 3Port placememt for Case B_1

Fig. 4 Laparoscopic intestinal biopsy of intestinal mass using Clickline biopsy forceps (case no.B_1)

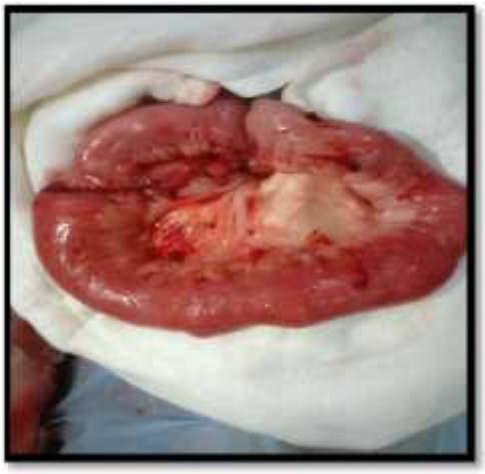

Fig. 5. End-to-end anastomoses of intestine and Omentalization after intestinal end-to-end anastomoses

Results and Discussion

Skin sutures were removed on the 12th day post-surgery. The post-operative care and follow up done was adequate and led to good healing with no complication.

Laproscopic-assisted procedure:

Though the laparoscopic assisted method is more challenging to master and execute requiring hours of practice and patience, it has its own advantages over the traditional method of GI surgery. The most important factor that was experienced during surgery was the visibility. The same level of magnification or visibility cannot be achieved by the naked eye. Similar advantages, associated with magnification have been documented by Rawlings *et al.* (2003), Rawlings (2009), Pinel *et al*. (2013) and Case and Ellison (2013). During laparoscopy, a sweeping examination could also be carried out of all abdominal organs to detect abnormality. Biopsies can also be taken if necessary, as also described by Rawlings *et al*., (2003). In case B_1, in addition to exploratory laparoscopy for confirmatory diagnosis of the intestinal mass, an intestinal biopsy was also obtained, which was much easier compared to conventional method. Claudio *et al.* (2011) opined that minimal invasive procedures like biopsies could be taken directly from the desired site with

minimal post-operative discomfort. It helped in confirmatory diagnosis of the gastro-intestinal disorder, especially in cases when diagnosis was doubtful using other modes of diagnostic imaging like radiography (plain or contrast x-rays, ultrasound and CT-scan). This procedure may be preferred, when surgical intervention seemed necessary especially in critical cases.

Conventional intestinal surgery:

Surgical procedures viz. enterectomy and anastomosis and intestinal biopsy were performed by the conventional method via ventral midline abdominal incision. The procedures were performed without difficulty and with minimal complications.

The mean surgical time was 109.50 ± 21.67min and 97.50 ± 16.03min for group I and group II respectively. There was no significant difference between the groups. Almost similar surgical time for both groups could be due the conversion of LA technique to open method in majority of the procedures performed in group I.The group I took longer time due to multiple additional steps like insufflation, insertion of trocars and telescope, removal of trocars and desufflation.

The mean incision length was 5.43 ± 1.32 in group I and 8.88 ± 1.21 in group II. There was no significant difference between the groups. This could be due to lengthening of the incision to exteriorize the intussusception (case no. D_1, E_1, F_1) depending on its size.

In case F_1, peritonitis was noted on exploratory laparotomy as also reported by Ralphas et al. (2003). The intestines also seemed friable. Lesser pain was felt in Group I, possibly due to lesser tissue trauma. Though both groups were provided with the same postoperative analgesia, dogs in group II showed more discomfort. Case and Ellison (2013) has also stated that laparoscopic assisted technique is associated with decreased pain. Case no F_1 showed extreme signs of abdominal pain on palpation due to peritonitis and anastomoses leak 3 days post-surgery.

On comparing the two techniques, visibility, magnification and lower incidence of infection and pain were found to be major advantages in the technique employed in group I. However, bigger sized tumors, foreign bodies (linear), intussusceptions etc. seem to be a limitation to laparoscopic assisted GI surgery (Table3 and 4).

Table no.3: Details about the symptoms, diagnostic imaging, diagnosis, treatment and outcome of dogs In group I

	Group I (Laparoscopic-assisted intestinal surgery)			
Case No.	**Diagnostic Imaging**	**Diagnosis**	**Surgical Treatment**	**Outcome**
B_1	CT-scan	Intraluminal Intestinal tumour	Exploratory, laparoscopy and laparoscopic intestinal biopsy	survived, prognosis poor
D_1	Plain and contrast x-ray, USG	Intussusception	LA, Enterectomy and anastomosis	survived
E_1	x-ray	Intussusception	LA, Enterectomy and anastomosis	survived
F_1	Plain and contrast x-ray, USG	Intussusception	LA, Enterectomy and anastomosis	died 3 days post-surgery due to peritonitis

Table no.4: Details about the symptoms, diagnostic imaging, diagnosis, treatment and outcome of dogs in group II

	Group II (Conventional Intestinal surgery)			
Case No.	**Diagnostic Imaging**	**Surgical Treatment**	**Diagnosis**	**Outcome**

B_2	x-ray USG	Exploratory laparotomy, Intestinal biopsy Spleenectomy	Intestinal Tumour, metastasis to spleen Intestinal biopsy	died 4days post- surgery due to peritonitis, metastasis in chest
D_2	x-ray	Enterectomy and anastomosis	Intussusception	survived
E_2	Plain and contrast X-ray, USG	Enterectomy and anastomosis	Intussusception	Died due to liver failure and renal failure
F_2	x-ray, USG	Enterotomy	Foreign body (mango seed) in small intestine	survived

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