INTRODUCTION

In veterinary practice exploratory laparotomy is one of the most common abdominal surgeries performed.

Indications for exploratory surgery are usually but not restricted to;

1. Acute-onset abdominal pain and clinical findings suggestive of intra-abdominal pathology requiring emergency surgery. Examples of these are; peritonitis, intestinal obstruction, and abdominal haemorrhage.
2. Abdominal trauma with hemoperitoneum and hemodynamic instability.
3. Chronic abdominal pain (good imaging facilities have restricted the use of exploratory laparotomy in these conditions).

All cases should have an adequate diagnostic work up before performing an investigative exploratory laparotomy. It is not a benign procedure and inappropriate surgery can severely compromise the survival of a sick patient.

The main contraindication for performing an exploratory laparotomy is where the patient is too unstable to undergo anaesthesia.

If the patient is a chondrodystrophic breed please rule out suspected intervertebral disc disease before performing a laparotomy as we frequently see this in practice.

Exploratory laparotomy is sometimes a good diagnostic tool but if the appropriate skill and equipment is not present to treat the abnormalities found then they should potentially not be performed. A hasty exploration should be avoided as non therapeutic abdominal exploration is associated with significant morbidity, including adhesive intestinal obstruction, peritonitis, pain and incisional herniation.

An evaluation of the abdomen and its contents requires a large surgical approach. A systematic approach is required to avoid missing relevant pathology.

Equipment

A standard laparotomy tray is usually sufficient for an exploratory laparotomy. This should include the normal surgical instruments used in a spay plus a few more. Here is the list of the instrument that are in my instrument tray for this surgery;

Halstead Mosquito Forceps, Curved,
Mayo Straight,
Halstead Mosquito Forceps, Straight,
Mayo Curved,
Rochester Pean Forceps, Curved,
Metzenbaum Straight,
Rochester Pean Forceps, Curved,
Metzenbaum Curved,
Mixter Forceps, Right Angle,
Metzenbaum Curved,
Babcock Intestinal Forceps,
Allis Tissue Forceps,
Kocher Forceps, Straight,
Adson Brown,
Kocher Forceps, Curved,
Adson Brown Multi-tooth,
Foerster Sponge Forceps,
Thick Forceps,  
Doyen's intestinal clamp,  
DeBakey Forceps / Gossett retractors,  
Large Laparotomy sponges,  
Swabs with radio-opaque markers,  
Suction,  
Electrocoagulation.  

**SURGICAL APPROACH**

A wide clip and preparation of the abdomen extending over the ventral thorax is required. In the male dog, the skin incision caudal to the umbilicus should be made paramedian. The subcutaneous tissue is dissected to allow incision on the midline of the body wall. A ventral midline celiotomy is performed.

A ventral midline celiotomy from xyphoid to half way between the umbilicus and pubis is necessary for routine exploratory laparotomy. A celiotomy from xyphoid to pubis is necessary to evaluate the urinary bladder, neck and pelvic structures.

The most common complications I see with exploratory laparotomies are due to inadequate exposure so you should not be afraid to make a large incision as the consequences of missing a clinically relevant abdominal pathology can be life threatening for the patient.

A self-retaining abdominal retractor (Gossett or Balfour) along with moistened laparatomy sponges are one of the most important tools in gaining an adequate exposure. Radio opaque swabs (counted on and off the table) are also necessary to prevent leaving a swab in the abdomen.

**EXPLORATORY TECHNIQUE**

The steps of exploration depend on the initial findings and are governed by the principles of systematic survey and priority for life-saving maneuvers.

A sample should be obtained of any other fluid present by aspiration with a syringe.

Massive hemoperitoneum suggests two things. First, the patient may have a major source of bleeding. Second, the presence of blood within the peritoneum interferes with adequate exploration. The ideal strategy is to lift the small bowel and its mesentery out of the peritoneal cavity, to rapidly suction the blood within the peritoneum, and to place laparotomy pads in the 4 quadrants of the peritoneum. Once this is done, each pad is carefully removed to allow inspection of each quadrant.

Identification of the source of bleeding is much easier in the absence of massive amounts of blood. Once the source of bleeding is identified, necessary corrective measures must be taken.

Following this a systematic evaluation of the abdominal contents must be performed in all cases. Some surgeons divide the abdomen in quadrants and explore each quadrant in turn. Others start in the cranial quadrant and systematically evaluate each portion of intestine and associated abdomen and viscera. I use a mixture of the two. Irrespective of which technique used this search must be performed systematically, starting from the stomach. The anterior aspect of the stomach is inspected, followed by the duodenum. Subsequently, the small bowel is inspected carefully, starting from the duodenojejunal flexure. Each segment of the intestine is held up, and all surfaces are inspected.

**Pancreas Biopsy**

If this is performed then the pancreas must be handled gently. I find the easiest technique is to remove the tip of a lobe by looping a section of suture material around it before using a scissors to remove it. Do not damage the blood supply to the duodenum or of the pancreas.

**Mesenteric Lymph Node Biopsy**
I generally avoid lymph nodes adjacent to the major mesenteric vessels and I am very careful to maintain the blood supply to the intestine. Use a fine, curved mosquito haemostat to establish a dissection plane. I can either remove the whole lymph node or just remove a portion of it. If you make a hole in the mesentery then it is important to close this once the biopsy is taken.

**Liver Biopsy**

If a liver biopsy is not performed then treatment of liver disease can be ineffective or it may just not work. No matter what method is chosen, the patient must be carefully evaluated before collecting a hepatic biopsy. This evaluation should include complete blood work, but also a coagulation profile, a platelet count, and a buccal mucosal bleeding time. Multiple biopsies must be taken. Liver biopsies should be taken prior to more dirty procedures such as intestinal biopsies. There are a number of techniques of liver biopsy but my favourites are

1. Baker’s biopsy punch (skin biopsy punch) is useful for lesions away from the periphery. Use the biopsy punch the same way you use it in the skin. With a punch biopsy avoid penetrating more than half the thickness of the liver with each biopsy. A hemostatic sponge agent can be used to pack the hole to control bleeding.

2. A biopsy of the hepatic margin may be obtained by the "guillotine" method. Place a loop of suture around the protruding margin of a liver lobe. Pull the ligature tight and allow it to crush through the hepatic parenchyma before tying it. As the suture tears through the soft hepatic tissue, vessels and biliary ducts are ligated. Cut the hepatic tissue distal to the ligature. Do not handle the biopsy sample with tissue forceps to avoid crushing it and causing artifacts. If it is a larger sample then several overlapping guillotine sutures can be placed around the margin of the lesion and then it can be excised.

**Gastrotomy technique**

Place two stay-sutures in the stomach or more to aid manipulation and reduce the risk of spillage of gastric contents. The stomach is then isolated with moistened laparotomy swabs to pack off other abdominal contents and again to protect from spillage. Make a stab incision at a non-vascular part of the ventral gastric wall into the gastric lumen and use the stay-sutures to put tension the gastric wall. Metzenbaum scissors are used to extend the excision and make a full-thickness cut through the gastric wall. Suction is used to aspirate the gastric contents and prevent spillage. A full-thickness gastric biopsy is taken by cutting a portion of the edge of the gastrotomy wound with a scissors. Fingers should not be used in the gastric lumen so foreign bodies are removed using swab-holding forceps or Allis tissue forceps. Any instruments that were used within the gastric lumen are discarded and gloves are changed.

The gastric wall should be closed in two layers. I use a simple continuous appositional suture in both the mucosal/ submucosal layer and the outer muscularis/ serosal layer. Absorbable monofilament 3 metric and 2 metric sutures ( polydioxanone, poliglecaprone 25) are suitable for larger dogs, and small dogs and cats. Don’t use chromic catgut. Just because you have found one foreign body it doesn’t mean there are not more so keep on looking and be systematic. There is nothing worse then having to go back in again to find something you should have found the first time. It is really frustrating and very difficult to explain to a worried client.

**Enterotomy/Small Intestinal Biopsy**

Indications for enterotomy include the removal a foreign bodies and inspection of the mucosa for evidence of ulceration, stricture or neoplasia. For suspected IBD or other diffuse infiltrative disease, biopsy of three areas of the small intestine (duodenum, jejunum, ileum) is recommended. The suspect segment of intestine is exteriorized and the bowel is occluded by an assistant’s fingers or with atraumatic clamps (Doyen). A full-thickness incision is made in the antimesenteric border with a scalpel and enlarged with scissors. For a biopsy extend with scissors for centimetre parallel to the long axis of the intestine and used the scissors to remove a crescent of tissue from this border. Any everted mucosa is trimmed with scissors before closure. The defect is closed with a simple interrupted or simple continuous suture
pattern of 3-0 or 4-0 monofilament absorbable suture on a taper needle. The suture bites should be 2-3 mm from the cut edge and 2-3 mm apart. I usually find the simple interrupted suture easier to maintain appropriate tension across the surgical site.