Enteric biopsy, enterotomy, and intestinal resection and anastomosis are surgical procedures commonly performed in private and referral practice. Dehiscence with leakage of intestinal contents from an enteric incision is the most serious potential complication of intestinal surgery, and is associated with high morbidity and mortality due to the development of septic peritonitis. Mortality rates for dogs and cats with septic peritonitis are ~30–70%.

The most common cause of septic peritonitis in dogs and cats is gastrointestinal tract leakage. Due to the morbidity and mortality associated with septic peritonitis, perioperative strategies for preventions of leakage have been widely sought after in human and veterinary medicine. Halstead’s principles are the foundation for perioperative strategies to prevent dehiscence after intestinal surgery.

Tissues should be gently handled during GI surgery. Stay sutures, DeBackey forceps and Babcock forceps are all atraumatic, and can be used to manipulate bowel, although the use of instruments to grab or manipulate tissues should be minimized. If an assistant is not available to provide digital occlusion of the bowel during enterotomy or resection and anastomosis, Doyen intestinal forceps which are atraumatic should be used. Strict aseptic technique should be adhered to during preparation and surgery. Perioperative peritoneal contamination can be minimized by milking intestinal contents from the segment of bowel to be operated and packing off the bowel with saline-moistened lapatotomy sponges. The abdomen should be copious lavage at the end of the procedure if any contamination occurred.

Bowel should be dissected sharply using a scalpel blade or Metzenbaum scissors, so as not to crush tissues to be sutured. Careful and very exact hemostasis is imperative to allow visualization of tissues, while preventing overzealous ligation or cautery use which could compromise the blood supply to the segments of bowel to be sutured. The segments to be sutured or anastomosed should not be under any tension, as this increases the chances of dehiscence postoperatively. Any tissues that is deemed non-viable, or appears questionable at the time of surgery should be resected.

In small animals, the submucosa is the holding later of the intestine. The submucosa is collagen rich, has a good lymphatic and blood supply, and is the strongest of the intestinal layers. It must be incorporated into the intestinal closure to prevent dehiscence. Both interrupted and divided continuous suture patterns engaging the submucosa can be used for enteric closure. Appositional, non-crushing suture patterns are most commonly used in small animal surgery. Absorbable suture materials such as polydioxanone, polyglyconate, or poliglecaprone 25 with a swaged-on taper needle are generally recommended for closure, while catgut should be avoided due to its rapid degradation. In severely hypoalbuminemic animals, non-absorbable sutures such as nylon or polypropylene may be considered. Various stapling instruments have also been used successfully in human and veterinary surgery. While they add expense to the surgery, they have been shown to significantly decrease operating times.

Once the intestinal closure has been performed, a leak should be used to assess intraoperative enteric suture line security. It is performed by injecting an appropriate volume of saline intraluminally into an occluded intestinal segment, while the enteric suture line is observed for leaks. The volume of saline necessary to achieve peristaltic pressure during leak testing of canine small intestinal biopsy sites has been determined. With digital occlusion, the volume of
saline needed to achieve 20 and 34 cm water intraluminal pressure were 10.9–13.6 and 16.3–19.0 mL, respectively with digital occlusion and 8.5–11.1 and 12.1–14.8 mL, respectively with Doyen occlusion.

Testing may impact the number of sutures used to close an enteric incision, hopefully limiting such number to that appropriate to achieve secure closure. Potential negative consequences of superfluous suture placement during enteric wound closure are excessive foreign material and potential damage to the vasculature. Findings during leak testing should help minimize the use of excessive sutures.

Dehiscence of enteric incisions most commonly occurs 3-5 days post operatively, which coincides with the lag phase of healing. Leak testing should be performed at the time of surgery, since during the lag phase of healing the integrity of the enterotomy or resection and anastomosis site is almost entirely depended on the sutures placed by the surgeon.

The omentum should be gently placed over the enterotomy or resection and anastomosis site at the end of surgery. An alternative it to perform a serosal patch, which should be considered if the closure integrity is questionable, in septic animals after dehiscences are repaired, and in systemically ill animals that may be slow to heal, such as patients with intestinal cancer, Cushing’s disease, severe hypoalbuminemia, or diabetes mellitus. To perform a serosal patch, the antimesenteric border of an adjacent loop of intestine is sutured over the suture line from the enterotomy or resection and anastomosis.

In conclusion, strict adherence to Halstead’s principles is indicated to prevent dehiscence in gastrointestinal surgery. Adjunct techniques such as leak testing, and omental and serosal patching may help to decrease dehiscence postoperatively.

\(^1\)Saile K, Boothe HW, Boothe DM. Saline volume necessary to achieve predetermined intraluminal pressures during leak testing of small intestinal biopsy sites in the dog. Vet Surg. 2010 Oct;39(7):900-3.