Use of stapling devices for intestinal anastomosis in small animal surgery.

Development and the current evidence on stapled versus hand-sewn anastomosis.

FACULTAT DE VETERINÀRIA

Albert Aguilera Padrós - June 2016

UAB Universitat Autònoma de Barcelona

Introduction

The stapling methods are widely used in veterinary medicine. In the last few years the development and improvement of new anastomosis techniques have gained importance over the normal hand-sewn methods, thanks to its potential and speed. In this academic work, has been done a review of numerous studies that compares both techniques with the following **objectives**:

- Describe the main complication and limitation of the staplers in gastrointestinal surgeries.
- Review the advantages and disadvantage of stapling anastomosis.
- Investigate about the latest techniques in the bowel anastomosis matter.

Stapling techniques

Triangulation end-to-end anastomosis: Place three stay sutures, which appose the ends of the intestine and divide the circumference into three iqual parts. Apply tension between two of the sutures, and fire the stapler or apply staples with the skin stapler. These steps are repeated a second and a third time to complete the anastomosis. *(Figure 5)*

Inverting end-to-end anastomosis: use an EEA stapler. Insert the stapler cartridge into the intestinal lumen through an enterotomy 3 to 4 cm from the enterectomy site. Insert the anvil into the other intestinal end. Tie purse-string sutures around the shaft of the stapler and fire the stapler. After completing the anastomosis, close the enterotomy with a TA. *(Figure 6)*

Functional end-to-end anastomosis: use a GIA stapler. Fully insert the stapler into the stomas of each intestinal loop and fire the stapler. Close the resultant enterotomy with a TA or a GIA stapler. (*Figure 7, 8, 9*)

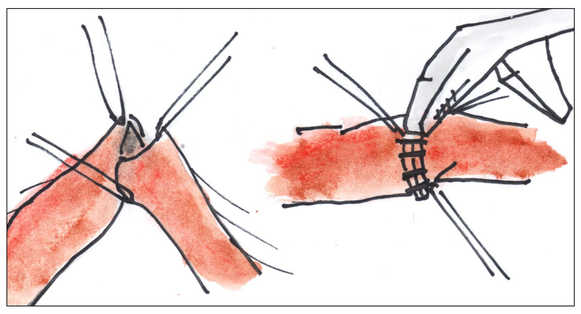

Figure 5: *Triangulation end-to-end anastomosis with a skin stapler device.*

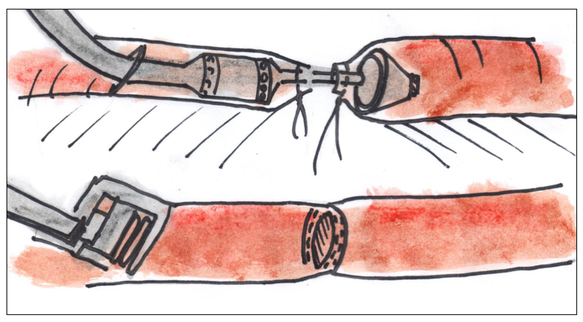

Figure 6: *Inverting end-to-end anastomosis with a EEA stapler device, and a TA.*

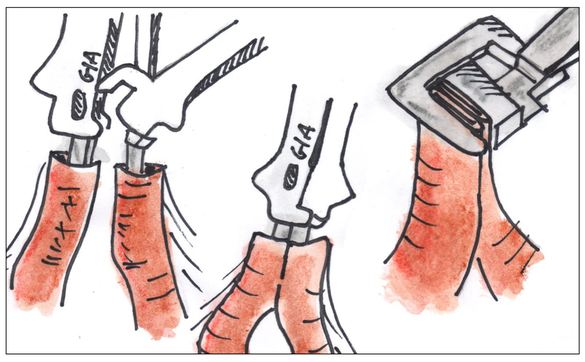

Figure 7: *Functional end-to-end anastomosis with a GIA stapler and a TA.*

Stapling devices

Skin stapler

TA stapler

GIA stapler

EEA stapler

Figure 1-4: There is a large number of staplers depending on the commercial brand. Surgeons must be familiar with the disassembly and reassembly of these units to assure proper function of the stapler intraoperatively.

New methods

Laparoscopy techniques have grown in the last decades and have influenced the stapling systems. In broad terms the techniques are similar to those used in open surgery but endoscopic staple guns are continually being developed.

In the search for new instruments, the compression anastomosis clip (CAC) is investigated. The CAC is a double-ring device. The continuous compression of the bowel walls leads to necrosis. At this point, the device detaches itself and is expelled with the feces, and the necrotic perimeter results in a uniform perfectly functioning anastomosis. With the same idea, a technique called *Magnamosis*, performs the same effects with two circular magnets.

Titanium and its alloys are the mostly used materials in medicine. However, this type of implants does not match with animal tissues and due to its non-degradability, it cannot be absorbed. To avoid those inconveniences, a biodegradable implant is the best choice. Currently, degradable polymers are available and, for example magnesium alloys, have shown potential suitability. Also the use of tissue glues, like cyanoacrylate, could be an alternative to the traditional procedures.

Conclusions

- The main anastomotic complications include leak, stricture, bleeding and dehiscence.
- These methods are safe alternatives to conventional manual suturing techniques, and these have gained increasing acceptance for use in the daily surgery.
- The principal advantage is a decreasing of the surgical time, despite of its higher costs.
- The decrease of the anesthetic time benefits the patient with a faster postoperative recovery.
- In literature, there are lots of reviews comparing both methods, and any of those have shown either technique to be superior. Moreover, results of these studies are conflicting and there are no evidences about differences in security terms.
- The decision on which technique to use must remain in the surgeon, based on his personal experience, circumstantial facts and resources available.
- Because of the rapidly improvement of surgery techniques, new stapling devices are appearing aimed primarily for laparoscopic procedures, that will improve surgical and postoperative results.

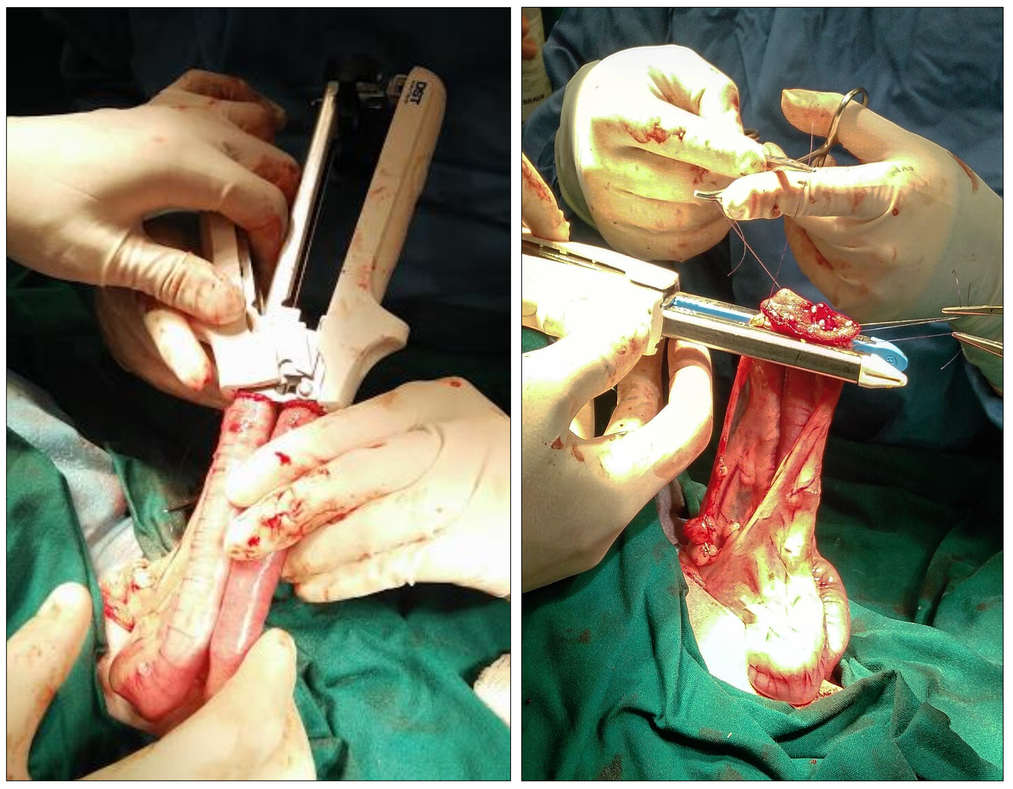

Figure 8-9: Functional end-to-end anastomosis in a dog with a GIA stapler. This is the preferred technique for small intestinal anastomosis because the resulting stoma is larger than the original (Images courtesy of Dr. Félix García)