

## Ventral Midline Celiotomy in Horses – Advantages and Disadvantages

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**Abstract.** Surgical techniques and post-operative care should decrease the morbidity and mortality associated with abdominal surgery in horses. The objectives of this study is to addresses some of advantages and disadvantages of ventral midline celiotomy observed in a geriatric horse. A ventral midline celiotomy through the linea alba was performed in order to resolve frequent episodes of colic reluctant to conservative management. The equipment, preoperative considerations, anaesthetic protocol, surgical technique and postoperative management are described. Our observations confirm that ventral midline celiotomy represents a modern approach of patients with colic having origin in abdominal viscera and who need surgery.

**Keywords:** celiotomy, colic, horse, linea alba.

### INTRODUCTION

Gastrointestinal disease continues to be a major concern to the equine industry, and a large proportion of horses referred to surgical centres suffer from abdominal disorders (Smith *et al.*, 2005). In case of colic, often early surgical intervention can be life saving. Advances in surgical and anaesthetic techniques as well as post-operative care have resulted in an exponential increase in the survival of horses undergoing abdominal surgery and new techniques and procedures are constantly being developed in this field (Smith *et al.*, 2005). A laparotomy is a highly invasive procedure, which involves both visceral and somatic structures (Graubner *et al.*, 2010). Complications can develop in the ventral median incision in 40% of horses after intestinal surgery, with incisional drainage in 32 to 36% of horses, dehiscence in 3 to 5%, and hernia formation in 6 to 17%. Factors associated with incisional complications include age, size, type of incision, type of suture material, method of closure, the degree of surgical trauma, length of surgery, and the difficulty of anesthetic recovery (Freeman *et al.*, 2002).

This article will discuss some of the advantages and disadvantages observed during an exploratory laparotomy via linea alba in a horse presented with a colic reluctant at medical management.

### MATERIALS AND METHODS

A 17 years old horse, mixed breed, male, was presented with acute episodes of abdominal pain for 48h, reluctant to conservative treatments, so a surgical intervention was proposed.

### Preoperative considerations

The patient was starved for 14 hours before the surgery, antibiotics were administered prior to surgery (procain penicillin 20.000 iu/kg bwt i.m.) and an intravenous catheter was placed to allow fluid replacements. *Pre-anesthetic protocol* was composed by acepromazine 0,03 mg/kg i.m. and xylazine 0.8 mg/kg i.v., diazepam 0.05 mg/kg i.v., again xylazine 0.3 mg/kg i.v., than flunixin 1.1 mg/kg i.v and butorphanol 10 µg/kg i.v. The induction was realised by ketamine 2 mg/kg i.v. The 0,1 mg/kg of xylazine and 0,8 mg/kg ketamine were supplimented once on 5 minutes. The horse was positioned on dorsal recumbency on the Haico Surgery Table (Fig. 1) and the maintenance of anaesthesia was realised with 1-1.5% isoflurane in a 3 l/min. constant volume of oxygene via an anaesthesia machine for large animals. The main functions were monitored peri- and intraoperative with a pulse oximeter (Fig. 2).



Fig. 1. Dorsal recumbency on equine surgery table

### Surgical technique

After a preparation of the ventral abdominal wall, a midline incision of 30 cm on linea alba was performed (Fig. 3). Without an excessive pressure on the intestines (which would increase the risk of iatrogenic tears), most part of ascending colon, jejun and small colon was gradually exteriorized (Fig. 4). After an enterotomy and enteroraphy for removing a foreign material from the caudal part of the jejun (intestinal obstruction - the cause of the colics), the abdominal cavity was lavaged with large quantities of saline solution 0,9%. After that, the closure technique of the celiotomy was realized using polyglycolic acid no. 3 in an interrupted suture pattern (Fig. 5) with a distance between sutures of 1 cm and between sutures and the incisional edges of the linea alba of 1,5 cm. The subcutaneous tissue was sutured with 1-0

polyglycolic acid using a simple continuous pattern. The skin was apposed with surgical silk no. 2. The patient recovered without problems.



Fig. 2. Intraoperative monitorisation



Fig. 3. Ventral midline incision



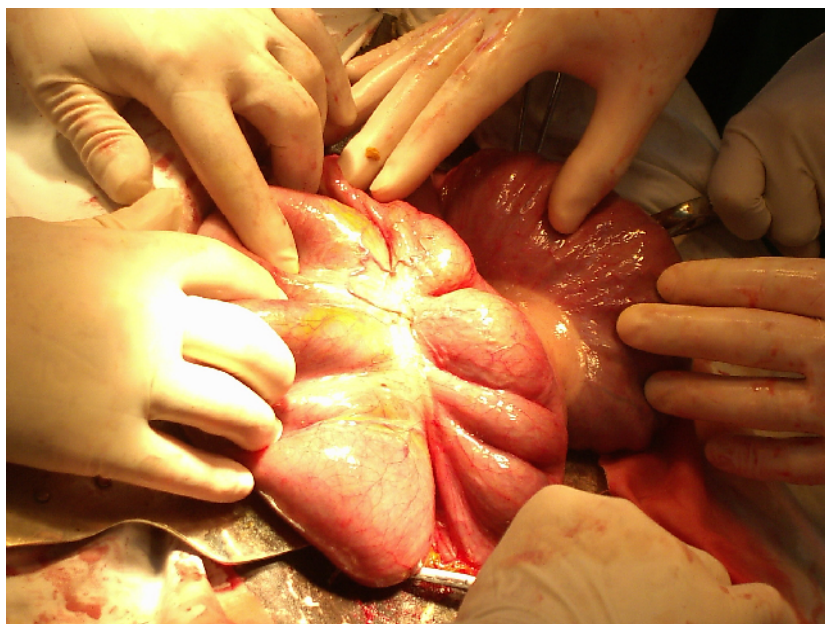


Fig. 4. Exteriorization and exploration of the ascending colon

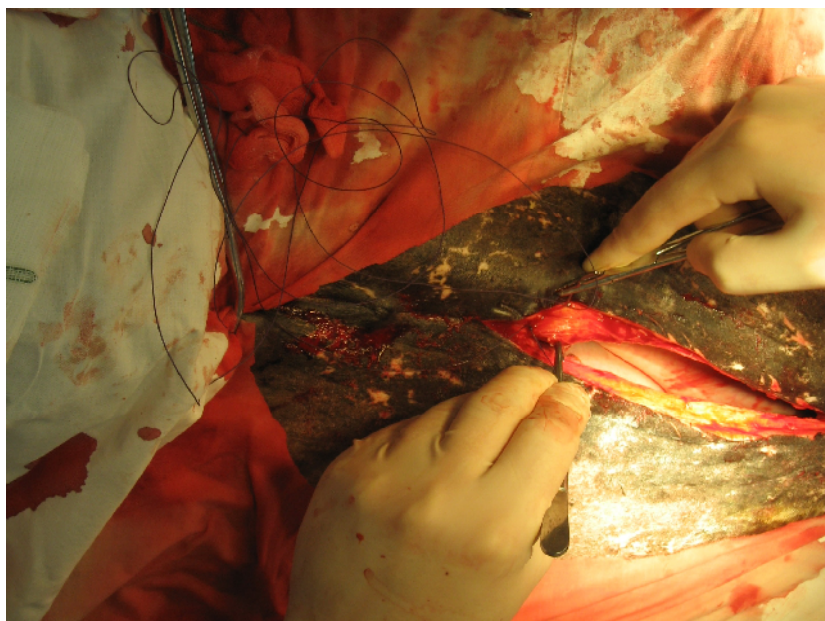


Fig. 5. Closure technique of the celiotomy

#### Postoperative management

The antibiotics were continued for 4 days postoperative. The patient remained under observation for 2 weeks and the food was progressively introduced in diet. Daily easy walks was an appropriate post-operative exercises protocol, which accelerated the resorption of ventral edema and favoured healing.

## RESULTS AND DISCUSSION

Three days after surgery, a small seroma and preputial edema were observed (Fig. 6). The swelling decreased considerably on the fourth day postoperative and disappeared fully after eight days. The first day after surgery, the patient had a good appetite for food, but showed mild signs of abdominal discomfort suggested by pawing. After 2 weeks it was clinically normal with no signs of abdominal discomfort.



Fig. 6. Abdominal and preputial edema

The incision about 30 cm offered a good access to explore the abdominal cavity. The ascending colon, jejun and small colon were easily exteriorized and palpated. The intraoperative hemorrhage was minimal.

It seems that for ventral midline closure, polyglycolic acid is significantly stronger than polydioxanone and monofilament nylon, but polydioxanone has better mechanical performance after implantation (Freeman *et al.*, 2002). Although a continuous suture pattern in the linea alba is quicker to perform and is stronger than most interrupted patterns (Freeman *et al.*, 2002), we prefer the last ones, because we consider that the risk of postoperative dehiscence is minimal. Anyway, the closure techniques of the celiotomy incision vary between surgeons and are usually a matter of personal preference (Auer, 2005). We let a distance between sutures was 1 cm without excessive tension, an excessive tension on sutures causing microscopic tissue necrosis and is the most common surgical error made during closure of the linea alba (Auer, 2005)

Although closure of subcutaneous tissues is optional, we consider this suture like a supplementary resistance. In case of skin we prefer surgical silk for closure, although skin staples can be used. A study regarding using of skin staples after a ventral midline celiotomy showed that this procedure, despite its ease and speed of application, can lead to an increase in celiotomy wound complications in horses (Torfs *et al.*, 2010).

The seroma is a frequent minimal complication which can be prevented with bandages. Unfortunately, these materials are expensive and not used routinely, although its

protect the incision from contamination and trauma, and reduce edema (Freeman *et al.*, 2002). Anyway, in our case, the edema resolved without any medications, and we did not observe local infections. In a study performed on 300 horses, Mair and Smith (2005) observed in 8% of horses, ventral hernia formation, occurred in horses that had had postoperative wound drainage or infection. Anyway, knowledge of the risk factors for postoperative complications allows more accurate prognostication postoperatively and suggests ways in which the risk of postoperative complications can be minimised (French *et al.*, 2002).

Recent advances in surgical techniques and postoperative care include laparoscopy as a minimally invasive procedure that has applications as a diagnostic, therapeutic and prognostic technique in case of abdominal sources of colic in horses (Smith *et al.*, 2005). Unfortunately, specialized equipment and personnel are necessary to perform equine laparoscopy, the procedures being more expensive than a ventral midline celiotomy.

Without possibility of laparoscopy, ventral midline celiotomy is an alternative which decreases the morbidity and mortality associated with abdominal colic in horses.

## CONCLUSIONS

- Ventral midline celiotomy performed in a horse with acute episodes of colic, offered us an excellent access to ascending colon, jejunum and small colon, the segments where the origin of colic was suspected.
- Closure technique of the celiotomy using an interrupted suture pattern with polyglycolic acid, apposition of subcutaneous tissue also with polyglycolic acid and skin sutured with surgical silk induced a strong and resistant fibrous matrix without any sign of postoperative dehiscence in our patient.
- The disadvantages of the technique consist in the fact that the procedure needs special equipment and rooms, a complete inhalatory anaesthesia, complex intra- and perioperative monitoring, trained specialists, so, this kind of surgery may be expensive for owners.

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