

## Laparoscopic Adhesiolysis in a Mini Pony

Pedro Paulo Maia Teixeira<sup>1</sup>, Otávio Luiz Fidelis Junior<sup>2</sup>, Regina Mendes Medeiros<sup>2</sup>,  
Marco Augusto Machado Silva<sup>1</sup>, Leandro Nassar Coutinho<sup>1</sup>, Tatiana Silva Poló<sup>3</sup>,  
José Antônio Marques<sup>2</sup> & Wilter Ricardo Russiano Vicente<sup>1</sup>

### ABSTRACT

**Background:** Intraperitoneal adhesions are common in equines, especially following exploratory celiotomy. Adhesiolysis is the treatment of choice for patients presenting postsurgical adhesions. Laparoscopic approach for adhesiolysis presents several advantageous aspects in human patients. The aim of the current study was to report a case of successful laparoscopic adhesiolysis in a mini pony horse.

**Case:** A male Shetland Pony, weighing 140 kg, was admitted under complaint of right hind limb trauma and treated surgically for metatarsal fracture reduction. The patient has also had intermittent episodes of colic and was always treated clinically without major complications. The pony had no history of previous abdominal surgery and no episodes of acute abdomen were seen during hospital stay. Three months following osteosynthesis, an exploratory laparoscopic approach was carried out to assess the possible cause or consequences of the episodes of acute abdomen. The patient was submitted to general anesthesia, positioned in dorsal recumbency and the abdomen was clipped and aseptically prepared for surgery. During the laparoscopic inspection, there were adhesions involving the ventral abdominal wall and a ventral mesogastric segment of duodenum. Laparoscopic adhesiolysis was performed using a two-port approach, by gently breaking the adhesion bands using meticulous traction with a 10-mm laparoscopic atraumatic Babcock forceps. Afterwards, the intestinal loop was rinsed with heparin sodium solution diluted in normal saline. The pneumoperitoneum was completely drained and the trocars sequentially withdrawn from the abdominal wall. The synthesis of the muscular layer was carried out using an interrupted cross mattress pattern, followed by synthesis of the skin with an interrupted cushion pattern. Total surgical time was 58 min. the patient was able to recover without complications. In the early postoperative period, the surgical recovery was considered excellent. No apparent adhesion involving the previously affected intestinal loop was found during the ultrasound exam following 15 days of surgery. Furthermore, the surgical wounds had healed completely, with no complications.

**Discussion:** In the current case report, the primary cause of the acute abdomen episodes was not determined since the patient had never undergone abdominal surgery. It was hypothesized that an acute inflammation of the duodenal loop that was involved by the adhesion bands may have triggered the adhesiogenesis. Laparoscopy was efficient and presented a short operative time, due to magnification of image and adequate observation of structures surrounded by adhesion bands. Although the use of Babcock forceps is not usually recommended for adhesiolysis in the current literature, it was both effective in manipulating the bowel and performing the adhesiolysis. The heparin solution diluted in normal saline was effective in preventing the recurrence of new adhesions, which was evidenced by ultrasonography following 15 days. The laparoscopic approach usually minimizes the new formation of adhesions as trauma to the peritoneal surfaces is minimized by the use of delicate instruments, as observed in the current study. In addition, laparoscopy reduces the possibility of contact among the peritoneal surfaces and foreign bodies, such as gauze, glove powder and room air particles. Moreover, it maintains the abdominal surfaces in adequate humidity environment.

**Keywords:** laparoscopy, endosurgery, equines, adhesiolysis, intraperitoneal adhesions.

## INTRODUCTION

Peritoneal adhesions are common complications in horses following exploratory laparotomy, especially those involving the small intestine [4,5,7]. Adhesiolysis is the treatment of choice. Moreover, the laparoscopic approach has been reported to present several beneficial effects over the conventional approaches for adhesiolysis in human patients [6]. However, little information is known about the use of minimally invasive endoscopic techniques for adhesiolysis in equine species so far.

Within such context, the aim of this case report was to describe a successful case of minimally invasive laparoscopic adhesiolysis in a mini pony horse.

## CASE REPORT

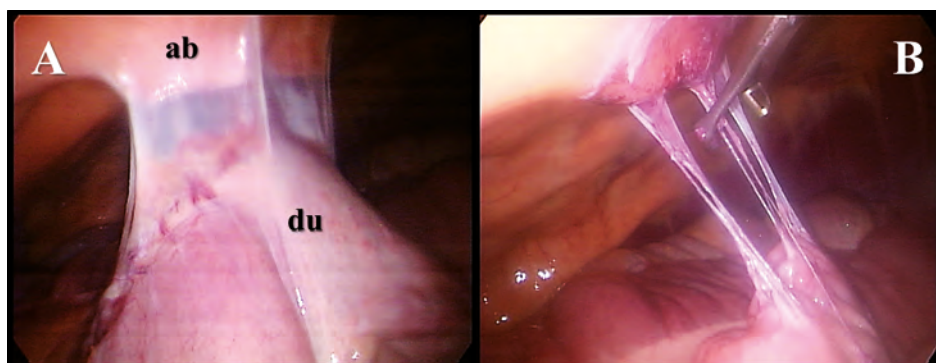
The patient, a male Shetland Pony, weighing 140 kg, was admitted at the Large Animal Surgery Division of the Veterinary Teaching Hospital “Governador Laudo Natel” of the School of Agricultural and Veterinary Sciences “Júlio de Mesquita Filho”, São Paulo State University (HV/FCAV/UNESP), under complaint of right hind limb trauma, and submitted to metatarsal fracture osteosynthesis. During the anamnesis, it was reported that the patient had been presenting intermittent episodes of acute abdomen and had always been treated clinically without complications. Additionally, there was no record of previous abdominal surgery and no episodes of acute abdominal pain were observed during the hospitalization period.

A diagnostic laparoscopic approach was suggested in order to aid in the diagnosis of the recurrent acute abdomen episodes and possible surgical treatment. The patient was fasted for 12 h and premedicated

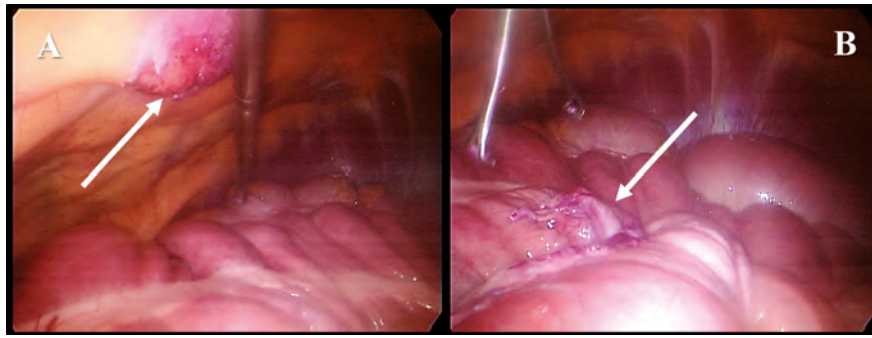
using xylazine hydrochloride<sup>1</sup> (0.8 mg/kg, IM). Following a 15-min interval, anesthesia was induced using guaifenesin<sup>2</sup> (100 mg/kg, IV) and ketamine chloride<sup>3</sup> (1 mg/kg, IV) and maintained using halothane<sup>4</sup> vaporized in oxygen (100%), to 2 CAM, following tracheal intubation. The abdomens was ventrally clipped and aseptically prepared for surgery. Local anesthetic was injected on the desired laparoscopic portal sites, using 4 mL of lidocaine hydrochloride<sup>5</sup>.

Patient was placed under supine simple position, without head-down tilt. Two 12-mm trocars were used for abdominal access of a 10-mm, 30° angled laparoscope and a 10-mm atraumatic laparoscopic Babcock forceps. The first port was inserted through the umbilical scar using the open mini-laparotomy technique, which was used for the insertion of the laparoscope. Subsequently, the pneumoperitoneum with sterilized CO<sub>2</sub> was created, using intraperitoneal pressure of 8 mmHg and 5 L/min of insufflation flow rate. The second trocar was introduced in the midline, 10 cm caudally to the first port, under laparoscopic assistance.

During general laparoscopic inspection, broad fibrous bands were observed on the ventral mesogastric area, connecting a segment of the duodenum to the ventral abdominal wall (Figure 1A). Adhesiolysis was then performed employing a slight and gentle traction of the adhesion bands proximally to the abdominal wall, using the atraumatic Babcock forceps (Figure 1B). Extreme care was taken not to traumatize the intestinal loop and its mesenteric vessels. No intestinal petechial or bleeding were noted following adhesiolysis (Figure 2). The intestinal loop was finally rinsed using sodium heparin in normal saline (5 IU/mL), in order to prevent adhesion recurrence.



**Figure 1.** (A) Laparoscopic view of fibrous adhesions involving the abdominal wall (ab) and a loop of the duodenum (du). (B) Blunt adhesiolysis being carried out with a 10-mm atraumatic Babcock forceps.



**Figure 2.** (A) Laparoscopic view of the abdominal wall (arrow) following adhesiolysis. (B) Duodenum (arrow) free from adhesion bands following blunt dissection. No bleeding was noted.

The pneumoperitoneum was completely drained and the trocars sequentially withdrawn from the abdominal wall. The synthesis of the muscular layer was carried out using an interrupted cross mattress pattern, followed by synthesis of the skin with an interrupted cushion pattern.

The overall surgical time was 58 min. The patient recovered with no complications of anesthesia. In the early postoperative period, the surgical recovery was considered excellent, as only mild pain ( $< 30$ ) was diagnosed using the visual analogue scale (VAS) for pain assessment (ranging from 0, no pain, to 100, worst pain possible). The patient received flunixin meglumine<sup>7</sup> (1.1 mg/kg), ceftiofur<sup>8</sup> (2.2 mg/kg) and benzilpenicillin<sup>9</sup> (40,000 IU) on the surgery day. The antibiotics were continued for 6 days of coverage.

No adhesion recurrence was noted during the following 15 days after the procedure during the ultrasound scanning. Furthermore, the surgical wounds healed completely, with no complications at any time point.

## DISCUSSION

Intraperitoneal adhesions may involve any intestinal segment. Although intestinal anastomosis or enterotomy sites are the main adhesiogenic sites, the whole intestine can be affected [4]. In the current case report, the primary cause was not determined preoperatively since patient had never undergone abdominal surgical procedures. It is believed that an acute inflammation of the intestinal loop involved may have resulted in the formation of adhesions. The formation of adhesions without prior surgical trauma is common in women with uterine inflammatory or degenerative diseases, such as endometriosis [2]. In the current clinical case, the heparin solution diluted in normal

saline was effective in preventing the formation of new adhesions following adhesiolysis, as shown during the ultrasonography [1,4,8].

Laparoscopic approach was efficient for the accomplishment of adhesiolysis in a short surgical time. Although Metzenbaum scissors, monopolar dissectors, bipolar coagulation forceps, lasers and ultrasonic shears have been both indicated and used for adhesiolysis in human patients and animals, gentle traction of the adhesion bands using an atraumatic Babcock forceps was effective in both handling the intestinal loop and performing adhesiolysis. This kind of meticulous approach minimizes the formation of new adhesions and the trauma to peritoneal surfaces compared to open surgery. In addition, the contact of intraperitoneal surfaces with foreign bodies is reduced and the tissues are maintained in a closely physiologic humidity and atmosphere-free environment [3]. In the current case report, there was no recurrence of adhesions, no considerable painful and excellent postoperative recovery. Such facts highlight the suitability of the laparoscopic approach in the equine surgical routine.

## SOURCES AND MANUFACTURERS

<sup>1</sup>Rompun® Bayer. SP, Brazil.

<sup>2</sup>Guaifenesin®, Henrifarma. SP, Brazil.

<sup>3</sup>Dopalen®, Vetbrands. SP, Brazil.

<sup>4</sup>Halothane®, Cristalia. SP, Brazil.

<sup>5</sup>Lidovet®, Bravet, RJ, Brazil.

<sup>6</sup>Xcel® Ethicon, SP, Brazil.

<sup>7</sup>Banamine® Injection, Schering-Plough. SP, Brazil.

<sup>8</sup>Bioxell, Vallé. MG, Brazil.

<sup>9</sup>Benzapen®, Teuto. SP, Brazil.

**Declaration of interest.** The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

#### REFERENCES

- 1 **Hillyer M.H. & Wright C.J. 1997.** Peritonitis in the horse. *Equine Veterinary Education.* 9(3): 136-142.
- 2 **Howard F.M. 2011.** Surgical treatment of endometriosis. *Obstetrics and Gynecology Clinics of North America.* 38(4): 677-686.
- 3 **Kavic S.M. & Kavic S.M. 2002.** Adhesions and adhesiolysis: the role of laparoscopy. *Journal of the Society of Laparoendoscopic Surgeons.* 6(2): 99-109.
- 4 **Kelmer G. 2009.** Update on recent advances in equine abdominal surgery. *The Veterinary Clinics, Equine Practice.* 25(2): 271-282.
- 5 **Leira P.A.T., Martins P., Dércoli T.E., Furini T.F. & Berlingieri M.A. 2012.** Adesiólise peritoneal trans-cirúrgica seguida de lavagem peritoneal e infusão de solução de carboximetilcelulose 1% (SCMC 1%) através de tubo de silicone implantado na cavidade abdominal. In: *XIII Conferência Anual da ABRAVEQ - 2012.* (Campinas, Brazil). p.984.
- 6 **Li M.Z., Lian L., Xiao L., Wu W., He Y. & Song X. 2012.** Laparoscopic versus open adhesiolysis in patients with adhesive small bowel obstruction: a systematic review and meta-analysis. *American Journal of Surgery.* 204(5): 779-786.
- 7 **Pagliosa G.M. & Alves G.E.S. 2004.** Fatores predisponentes das complicações incisionais de laparotomias medianas em equinos. *Ciência Rural.* 34(5): 1655-1659.
- 8 **Parsak C.K., Satar S., Akcam T., Satar D. & Sunguret I. 2007.** Effectiveness of treatment to prevent adhesions after abdominal surgery: an experimental evaluation in rats. *Advances in Therapy.* 24(4): 796-802.

