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**Communication**

[*Comunicação*]

# ADAPT™ trocar use for laparoscopic procedures in equidea

[*Utilização do trocater Adapt™ para procedimentos laparoscópicos em equídeos*]

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Laparoscopic surgery is a procedure for abdominal cavity visualization, a tool for identification of various disorders, primarily affecting the digestive and genitourinary tract, important in the treatment as a minimally invasive surgery (Freeman, 1999; Merini, 2012). In medicine we have a great therapeutic and diagnostic routine and an increasingly application in animals (Robinson and Stiegmann, 2004).

The laparoscopic approach in equidae can occur in several ways, presenting traditional techniques (Mcgee, *et al*., 2006; Nóbrega, 2011). Access techniques have some adaptations and the materials used are in constant development (Silva, *et al*, 2000). Instrumental access to video-assisted access, as EndoType™ and Exel™ already have their description in animals. The first is widely used in horses (Caron, 2012; Nóbrega *et al*., 2011).

Adapt™ is an acrylic instrumental that features secure input access characteristics, allowing entry through the layers of the abdominal wall (muscle and peritoneum) dissecting these and maintaining tissue integrity, routinely used in medicine, but not yet tested in veterinary medicine. Thus, with the increasing use of laparoscopy applied to equidae the aim of this study is to describe the use of the Adapt™ trocar laparoscopic approach in this animal family.

Eight of the patients in this study were experimental animals from the project approved by the Animal ethics committee (FCAV/UNESP -Protocol 03291/14). The remaining animals were routine patients from the Veterinary Hospital, needing the procedure for diagnostic purposes, with owner's consent. Fifteen equidae were submitted to clinical routine laparoscopic procedures, following all the precepts of ethics and animal welfare, with full client consent. Four were donkeys, six horses and five mares. The procedures were performed on standing position, under sedation and local anesthesia. The access was performed on the right flank in six animals, and on the left flank in eight animals.

Aseptic preparation of the flankregion accessed was performed using a trocar model Adapt™ Seal Ports (Teleflex Medical Introduces Taut™, USA) in all procedures. It presents an obturator with a semi-blunt tip, with a small curvature and diameter changes according to the model. Our study used exclusively 12 mm trocar diameter.

Initially we made a small 15 mm skin incision for the trocar tip insertion (Figure1A). This was inserted into the wound, performing 180º clockwise and counterclockwise movements to reach the abdominal cavity, through the subcutaneous muscle layers and peritoneum. After this step, the obturator was removed and the optical trocar inserted to confirm access to the abdominal cavity (Figure1B).

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After laparoscopy acess, the procedures were performed, in most cases exploratory laparoscopy (nine animals) and reproductive biopsies of uterine tube (6 animals). In most cases, 10 mm rigid optic were used, including a nephroscope with working channel (Figure 1C), but in the others 5 to 7mm optics were used, including a 12 mm flexible endoscope (Figure 1D). In the end, the trocar was removed, also using the 180º clockwise and counterclockwise movements. The suture of superficial layers of muscle and the skin was performed with nylon no. 0 in Sultan and Wolf standard, respectively.

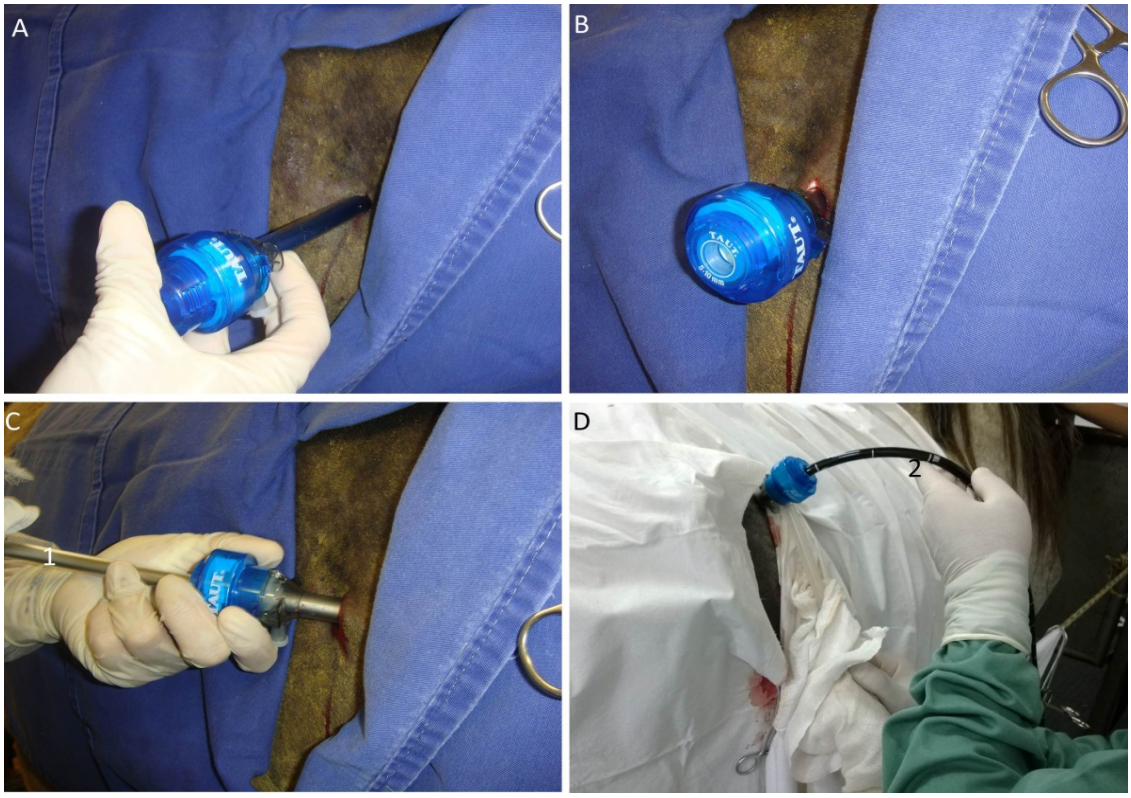


Figure 1. Adapt™ trocar type use in a laparoscopic procedure; a) Set cannula and trocar tip shutter semi-blunt with special angulation for dissection of the muscle layers; b) insertion of the trocar; c) trocar without the obturator for optical insertion and visualization of the abdominal cavity; use of 10 mm rigid optic (1); d) Flexible endoscopy of 12 mm (2).

The wound was monitored daily after the procedure, observing possible complications, using ointment and repellent and removing the skin suture after seven days.

There was no difficulty to establish the blind surgical access, once there were no traumas in bowels and major vessels. The equipment was efficient for the dissection of subcutaneous, muscular and peritoneal layers, with no significant bleeding in these layers. A mule patient presented parietal peritoneum deviation; it represents 6.6% of patients undergoing laparoscopic procedure.

No leak of $CO_2$ by the trocar access was observed, even when the smaller diameter endoscopes (5 and 7mm) or the flexible one were used, because the trocar has a valve which allows access of surgical instruments ranging in diameter from 5 to 12mm.

After trocar removal, there was no significant bleeding. In some cases (40%), small subcutaneous emphysema of approximately 10 to 15cm was observed after surgery, with no ther serious complications, and all patients showed good healing of the surgical wound.

The uses of access instruments are in constant study, considering that for animal use, especially for equidae, these types of surveys still have limited options for safe, convenient and routine access to materials by employees. The access for laparoscopic surgical procedures in equidae can occur by right or left flank, the ventral midline, depending on the organ to be accessed and/or viewed. The NOTES (Natural Orificie Transluminal Endoscopic Surgery) method was also recently described and employed in these patients (Mcgee *et al*., 2006; Nóbrega, 2011).

Regarding access techniques we can cite the closed or "Veress", which works in order to decrease the risk of accidents during the penetration of the trocar with the prior infusion of $CO_2$ into the peritoneal cavity, previously forming pneumoperitoneum. This technique is perfomed using a special needle, moving away bowels to the abdominal wall, providing a broad view to the operator. However, there is a great risk of bowel laceration during Veress needle input (Silva *et al*., 2000).

Another technique is the open or Hasson one, which consists of a small laparotomy to make a safer introduction of the first trocar access. Modifications of the open technique, which makes only a small skin incision, were worked using instrumental access that makes a blunt separation of the muscular and peritoneum layers (Caron, 2012). Modern laparoscopic access was recently described in this species, mentioning a single portal (LESS - Laparoendoscopic Single-Site Surgery), including multiportals (TriPort, QuadPort, Uni-X and R-Port) and access equipment to the surgeon's hand (Hand-port). Regarding LESS access, they minimize the risks of bleeding, organ perforation, infection, tissue adhesions and hernias, but the surgeon needs to have a greater ability to perform procedures due to the proximity of the tweezers and the use of special tweezers and optic (Olweny *et al*., 2012).

The Adapt™ trocar is an option that has not been experimentally proved in equidae, but in comparison to instruments usually tested in these patients, as the trocar EndoType model, the Adapt™ presented safety advantages, minimizing the access wound and reducing the force required for insertion of the cannula (Vilos *et al*., 2007). As controlled cannula access, EndoType allows a reduction of risk of complications during the input and allows a safe $CO_2$ inflation environment (Nóbrega, 2011). Even though it does not allow an assisted video input, because of the shutter material color, and allowing for the entry of a 5mm endoscope, Adapt ™ brought the inbound security benefits, with no laceration of bowels.

Instead of metal or plastic blades, with cutting edges, the tip of the Adapt™ dissects the tissue in an asymmetrical standard while maintaining the integrity of the muscle. Studies in humans showed that the Adapt™ results in fewer defects when compared to trocars with blade, also having advantage over trocars with a conical obturator (Munro and Tarnay, 2003).

Laparoscopic potential complications are similar to any abdominal operation, such as anesthetic complications, infection and bleeding. Vascular or visceral injuries can occur during pneumoperitoneum establishment, trocar introduction or during dissection. Regardless of the trocar model used, when the laparoscopic procedure occurs through the flank, care should be taken not to puncture the circumflex iliac artery, avoiding laceration of the vessel (Hendrickson, 2009).

The deviation of parietal peritoneum was a complication observed in the use of Adapt™, but with low occurrence. The introduction of short or conical tip trocar can cause this type of complication, especially in larger or obese equidae, as observed in a study conducted by Silva *et al* (2002). Therefore, the use of longer trocars is recommended and the 10 mmAdapt™ and 10 cm sheath length used in this study proved effectiveness in 93.4% of the procedures.

Leakage of $CO_2$ through the portals mainly occur because of equipment wear, in many cases it has been necessary to use reducers for smaller diameter instruments (Freeman, 1999). The portal has such a versatile use of 5 to 12 mm instruments, with no loss of pneumoperitoneum.

The trocar model Adapt™ Seal Ports was efficient on laparoscopy approach in equidae, presenting safe access and instrumental versatility use.

**RESUMO**

*O objetivo deste trabalho é descrever o uso do trocater modelo Adapt™ no acesso laparoscópico em animais da família dos equídeos. O procedimento cirúrgico foi realizado em 15 equídeos (quatro jumentas, seis cavalos e cinco éguas), com peso médio de 320kg (290kg e 450kg, pesos máximo e mínimo, respectivamente). Os pacientes foram mantidos em posição quadrupedal, sob sedação e bloqueio local. Primeiramente, realizou-se o preparo asséptico, e o acesso foi feito pelo flanco direito ou pelo esquerdo, dependendo da estrutura a ser visualizada. Em todos os procedimentos, foi utilizado o trocater modelo Seal Adapt™ Ports (Teleflex Medical Introduces Taut™, USA), com diâmetro de 12mm. Inicialmente se fez uma incisão de pele de aproximadamente 15mm para inserção da ponta do trocater. Este foi inserido na ferida cirúrgica, realizando-se movimentos de 180º em sentido horário e anti-horário, até atingir a cavidade abdominal. Após esta etapa, o obturador do trocater foi retirado, e a ótica inserida para confirmar o acesso à cavidade abdominal. A síntese das camadas superficiais da muscular foi realizada com fio* nylon *nº 0, em um padrão Sultan, e posteriormente a dermorrafia, também com* nylon *nº 0, no padrão de Wolf. O equipamento apresentou eficiência nos procedimentos de dissecação das camadas subcutânea, musculares e peritônio, não ocorrendo significativa hemorragia nessas camadas. Em um paciente muar, ocorreu afastamento do peritônio parietal, e em alguns casos (40%) ocorreu pequeno enfisema subcutâneo no pós-cirúrgico. Todos os pacientes apresentaram boa cicatrização da ferida cirúrgica. O trocater modelo Adapt™ mostrou-se eficiente na abordagem laparoscópica em equinos, apresentando segurança em se estabelecer o acesso e versatilidade no emprego de diversos instrumentais.*

*Palavras-chave: instrumentais, acesso videocirúrgico, laparoscopia, equinos, muares*

## REFERENCES

CARON, J.P. Equine laparoscopy: equipment and basic principles. *Vetlarn.com Compend. Contin. Educ. Vet.,* v.34, p.E1-7, 2012.

FREEMAN, L.J. Operating room setup, equipament and instrumentation. In: FREEMAN, L.J. (Ed.) *Veterinary endosurgery*. St. Louis: Mosby, 1999. p.3-23.

HENDRICKSON, D.A. Complications of laparoscopic surgery. *Vet. Clin. North Am. Equine Pract.*, v.24, p.557-571, 2009.

MCGEE, M.F.; ROSEN, M.J.; MARKS, J. A primer on natural orifice transluminal endoscopic surgery: building a new paradigm. *Surg. Innov.*, v.13, p.86-93, 2006.

MERINI, L.P. *Cirurgia endoscópica transluminal por orifícios naturais (NOTES) híbrida transvaginal em éguas*. 2012. 83f. Dissertação (Mestrado) – Faculdade de Veterinária, Universidade Federal do Rio Grande do Sul, Porto alegre, RS.

MUNRO, M.G.; TARNAY, C.M. *Comparative evaluation of laparoscopic access systems: a study of entry force, intraperitoneal pressure and incisional characteristics with a novel bladeless design ("ADAPt") and a composite dilating system ("VersaStep").* Los Angeles: University of California, 2003.

NÓBREGA, F.S.; BECK, C.A.C.; FERREIRA, M.P. *et al*. Videolaparoscopia topográfica de equinos em estação com três diferentes massas corpóreas. *Arq. Bras. Med. Vet. Zootec.,* v.63, p.873-880, 2011.

OLWENY, E.O.; MIR, S.A.; BEST, S.L.; PARK, S.K.; DONNALLY, C.; CADEDDU, J.A. TRACY, C.R. Importance of cosmesis to patients undergoing renal surgery: a comparision of Laparoendoscopic Single-Site (LESS), laparoscopic and open surgery. *BJU Int.*, v.110, p.268-272, 2012.

ROBINSON, T.N.; STIEGMANN, G.V. Minimally invasive surgery. *Endoscopy,* v.36, p.48-51, 2004.

SILVA, L.C.L.C.; FERREIRA, M.A.; BACCARIN, R.Y.A.; FERNANDES, W.R. Aplicação clínica da laparoscopia em equinos. *Rev. Educ. Contin.,* v.3, p.12-20, 2000.

SILVA, L.C.L.C.; STOPIGLIA, A.J.; FANTONI, D.T. Técnica de biópsia hepática em equino por laparoscopia. *Ciênc. Rural*, v.32, p.459-462, 2002.

VILOS, G.A.; TERNAMIAN, A.; DEMPSTER, J.; LABERGE, P.Y. Laparoscopic entry: a review of techniques, technologies, and coplications. *JOCG*, v.29, p.433-447, 2007.