Laparoscopic single-port ovariectomy and gastropexy in dogs

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Summary

In this study single-port percutaneous laparoscopic gastropexy in dogs using barbed suture material in combination with ovariectomy is described. A single port preventive gastropexy was performed in 6 female German shepherds in combination with ovariectomy using a laparoscope. Surgery time, intraoperative, postoperative and follow up complications were recorded. In this study median surgery time in clinical cases was 73 minutes (range 66–79). The only difficulty reported was visualization of a proper site for gastropexy on the stomach. No complications and/or episodes of gastric volvulus were detected at a 3-month minimum follow-up. The proposed technique provides an effective and minimally invasive approach to ovariectomy and preventive gastropexy in dogs.

Keywords: dog, gastropexy, laparoscopy, ovariectomy, single-port access

Laparoskopische Single-Port Ovarektomie und Gastropexie beim Hund

In dieser Studie wird eine neue Methode zur perkutanen Single-Port laparoskopischen Gastropexie mit Drahtfaden bei gleichzeitiger Ovarektomie beim Hund beschrieben. Eine vorbeugende Gastropexie wurde in Kombination mit einer laparoskopischen Ovarektomie über den gleichen Zugang bei 6 deutschen Schäferhündinnen durchgeführt. Die Operationszeit sowie die Komplikationen während und nach dem Eingriff sowie in der Folgezeit wurden genau festgehalten. Die Operationszeit betrug im Median 73 Minuten (66–79). Die einzige Schwierigkeit lag in der ungenügenden Übersicht des Operationsfeldes während der Magenfixierung. Innerhalb einer Beobachtungszeit von mindestens 3 Monaten nach dem Eingriff traten keine Komplikationen auf. Die von uns vorgeschlagene Methode ermöglicht einen genauen und minimal invasiven Zugang zur gleichzeitig durchgeführten Ovarektomie und vorbeugenden Gastropexie beim Hund.

Schlüsselwörter: Hund, Gastropexie, Laparoskopie, Ovarektomie, Single-Port Zugang

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Introduction

Laparoscopic ovariectomy and preventive gastropexy in dogs are becoming common procedures worldwide (Hardi et al., 1996; Rawling et al., 2001; Sanchez-Margallo et al., 2007; Mathon et al., 2009; Mayhew und Brown, 2009; Rivier et al., 2011; Manassero et al., 2012; Runge und Mayhew, 2013; Spah et al., 2013). Single-port ovariectomy in dogs has been already reported (Manassero et al. 2012; Duprè et al. 2009; Case et al. 2011; Runge und Mayhew 2013) and, more recently, a single-port preventive gastropexy has also been described (Duprè et al. 2009). The need for knot-tying stands as a major obstacle to a more widespread use of total laparoscopic techniques. Barbed suture materials have recently become available and their use has been described for incisional gastropexy in dogs (Arbaugh et al., 2013; Runge und Mayhew, 2013; Spah et al., 2013). Advantageously, such materials allow the surgeon to dispense with knots altogether to secure the leading and trailing ends of the suture. Nevertheless, using curved needles for suturing still requires multiple-port placement and/or dedicated instrumentation (Runge und Mayhew 2013; Spah et al. 2013). Single-port technique is a suitable alternative but their advantages might be offset by the technical demands associated with instrument crossing and the use of bent or articulating instrumentation, which undoubtedly requires considerable manual dexterity (Runge und Mayhew, 2013). The aim of this study is to describe a new technique for percutaneous laparoscopic gastropexy in dogs using resorbable barbed suture material in combination with a single-port access ovariectomy.

Material and Methods

Animals

A single-port ovariectomy and percutaneous gastropexy were performed on 6 female German shepherds (age 1–3 years, weight 26±5 kg).

Anaesthetic protocol

Dogs were sedated with acepromazine (0.05 mg/kg intramuscularly) and induced with propofol (up to 10 mg/kg intravenously) to effect. Anaesthesia was maintained with isoflurane in oxygen.

Preparation of suture material

Commercially available resorbable barbed 2-0 suture material is supplied with a long (44 mm) straight needle and a shorter skin needle. A 20 G 1" needle was gently broken at the hub level. A 2-0, 12"-long barbed suture was cut free from its needle and then inserted through the back of previously prepared hypodermic needle. The needle shaft was then gently flattened with pliers to fix the suture inside.

Ovariectomy

Dogs were positioned in dorsal recumbency and the abdomen surgically prepared. The laparoscopic tower was placed caudal to the patient. Using the open technique, a 15-mm bladeless trocar was inserted caudal to the umbilicus. A 0°, 10-mm, operating laparoscope was inserted through the reducer port to check intraperitoneal placement. The trocar was then connected to a laparoscopic insufflator, the abdomen slowly inflated to a pressure of 8 mmHg, and then thoroughly explored. A 5-mm laparoscopic babcock forceps was introduced and the dog rotated 60° to the right side for a better exposure of the left ovary, which was then grasped and lifted towards the abdominal wall. A 4 metric non-absorbable suture was inserted percutaneously by an assistant to anchor the ovary to the abdominal wall. The laparoscopic grasper was then replaced with laparoscopic scissors connected to an electrocautery unit. The mesovarium, salpinx and ovarian artery were cauterized, transected and checked for bleeding. The ovary was removed through or with the trocar, if too large. The animal was then rotated 60° on the left side and the laparoscopic tower moved on the right side of the patient. The ovary was grasped and transected as previously described.

Gastropexy

The gastropexy site was identified on the right side of the midline, just lateral to the rectus abdominis muscle, 2–5 cm caudal to the last rib, (Mayhew und Brown, 2009; Runge und Mayhew, 2013). To mark the site for gastropexy two hypodermic needles (G20 1", 40 mm) were inserted 5 cm apart one to each other in the abdominal wall in a cranio-lateral to caudo-medial direction on a straight line. The abdomen was explored and the two previously placed needles were deeply advanced under direct vision. A laparoscopic babcock forceps was inserted through the 5-mm laparoscope instrument channel. The surgeon performed the procedure with the laparoscope in his non-dominant hand and the instrument in the other hand. In case of difficult access to the stomach, the patient was placed in a reverse Trendelenburg position.

A portion of the stomach with few blood vessels close to the antrum was grasped with the babcock forceps and pulled towards the two preplaced transcutaneous needles. Tension on the gastric portion was checked. If tension was noted another site was chosen. The Babcock forceps was replaced with a 5 mm laparoscopic scissor. A partial-thickness incision was made through the muscular layer (approximately 5mm in length). The subcutaneous tissue between the two needles was then bluntly dissected trough a small (1cm) skin incision close to the cranial preplaced needle. The caudal skin edge close to the caudal needle was grasped with forceps and moved cranially towards the most caudal- needle. The 2-0 resorbable barbed suture was passed by the assistant through the subcutaneous skin defect and advanced through the abdominal wall. It was then grasped intrabdominally with the needle-holder under laparoscopic assistance and passed into the stomach wall at the most cranial portion of the prepared site for gastropexy. The suture was then passed from the inside of the abdomen to the outside, close to its entry point. The needle was retrieved by the assistant and passed through the welded loop of the barbed suture, which was thus locked. By pulling the suture out of the abdomen, the antrum was brought against the abdominal wall under direct vision. The needle-holder was replaced with a 5 mm, 45 cm scissors connected to a unipolar cautery unit. Cautery was applied four times on the abdominal wall, on the line joining the two percutaneous needles, and another four times on the stomach (Mathon et al., 2009). Scissors were removed and again replaced with the needle-holder.

The barbed suture was inserted percutaneously, grasped intrabdominally with the needle-holder, passed through the stomach wall, entering and exiting next to the cautery spots, and fed back through the abdominal wall. The suture was then continued, joining the two cauterised serosa on the stomach and on the abdominal wall, moving the skin defect at each bite so as to place it on the entry and exiting points of the suture needle. At the end the barbed suture was fixed to the abdominal wall with a long bite in the abdominal wall, exiting through the skin distal to the gastropexy site. The suture was cut flush to the skin and buried in the subcutaneous plane by elevating the skin. After a thorough exploration of the abdomen, the laparoscope was removed and the laparoscopic port was closed as previously described by the authors without placing a subcutaneous suture (Gandini und Giusto, 2014). Skin tissue adhesive was used to close the gastropexy site skin defect.

Postoperative care

Buprenorphine (0.01 mg/kg IV q6h) and Meloxicam (0.2 mg/kg IV SID) were administered for one day.

Operative data

For each case, surgery time, need for conversion and intraoperative complications, including those requiring conversion to an open surgery, were recorded.

Follow up

A minimum follow up of 3 months was required in all cases. Follow up information on the short and long term surgical outcome was obtained by phone interviews to the owners at 7, 30, 90 days post surgery, respectively. Skin wound healing, the gastroenteric clinical signs including regurgitation, and the general behaviour of the animal were investigated. In one case, ultrasonography was performed at 3 months.

Results

Operative data

All dogs recovered uneventfully. Procedures were performed as planned and no intraoperative complications occurred. Median surgery time was 73 minutes (range 66–79).

Outcome

Dogs were discharged from the clinic the day after surgery. They were allowed to eat and drink 6 hours after surgery. Gastroenteric clinical signs such as nausea, vomiting were not observed. Dogs were allowed to return to their usual diet within 5 days. No post operative complications were reported at 3-month follow-up. Adhesion between the antrum and the abdominal wall was investigated by abdominal ultrasound in one case only.

Discussion

It is the authors opinion that the combination of the single-port, single-instrument gastropexy and ovariectomy is a safe and effective procedure in dogs. Surgical times were comparable to those required for multi-port techniques (Runge und Mayhew, 2013; Spah et al., 2013) and the combined use of a traditional port and operating laparoscope was effective and relatively straightforward. Because extraction of the ovaries from the abdomen can be difficult using a small trocar, we opted for a 15-mm bladeless trocar. Compared to commercially available SILS devices, a 15-mm trocar needs a smaller incision which, however, is large enough for an easy removal of the ovaries or of other specimens in large dogs. In small dogs, in dogs with small ovaries, or if preventive gastropexy is performed alone, a 10-mm trocar is sufficient. The key advantages of the proposed technique are related to suture manipulation. The straight, flat-hilted shape of the needle allows for suture placement with only one instrument. This, combined with the advantageous features of the barbed sutures makes suturing much more easy. The only technical difficulty encountered in this study was related to the accurate identification of the gastropexy site. In some dogs, the attachment of the omentum was the only gastric anatomical structure visible, while the stomach was covered by the liver. Poor viewing in this case was determined by the position of the laparoscope. A reverse Trendelenburg position was used to solve the problem of gastric visualization, providing a better exposure of the stomach wall and antrum. Curiously, although the laparoscope was positioned exactly as reported by other authors (Rawling et al., 2001; Rivier et al., 2011; Spah et al., 2013), difficulties related to stomach exposure had seemingly escaped mention. The gastropexy was on the right side, 60–90° in respect to the linea alba, as used by Monnet (2003) and Mayhew and Brown (2009). Unlike the report by Runge and Mayhew (2013), access to both ovaries was unproblematic and gastropexy was performed through the retroumbilical port.

In the present case series, skin incisions were small (cm), and there was no need for subcutaneous sutures. This is in contrast with the data reported by Mathon (2009). The technique used to perform the gastropexy was based on the experience acquired by the authors in a pilot study on 5 canine cadavers. A partial thickness incision on the peritoneum and abdominal musculature was made, instead of just cauterizing the serosa. The procedure was successfully done with curved laparoscopic scissors; however, in an effort to increase time-efficiency and make the whole procedure more manageable to novice laparoscopists, the authors decided to use the technique described by Mathon (2009), which involved cauterization of the peritoneum and gastric serosa. Proficiency in the use of an operating laparoscope is all that is needed in terms of technical skills to complete the procedure.

Difficulties encountered in the present case series, included the simultaneous handling of instrument and laparoscope and the identification of the gastropexy site on the stomach wall. These were the most time-consuming steps, and also those in which a learning phase was more necessary. The risk of intraluminal placement of suture material could not be excluded. Intentional (Mathon et al,. 2009; Mayhew und Brown, 2009) and unintentional (Spah et al., 2013) placement of full thickness bites in the stomach wall during laparoscopic preventive gastropexy has been reported, and the effects were negligible in both cases.

We can therefore conclude that our technique provides an effective and minimally invasive approach to ovariectomy and preventive gastropexy in dogs. Further studies with a larger number of cases are necessary to highlight possible complications of the described technique.

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