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A surgical glove port technique for laparoscopic-assisted ovariohysterectomy for pyometra in the bitch

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ABSTRACT

The objective of the study was to describe the feasibility of a glove port technique for laparoscopic-assisted surgical treatment of canine pyometra. In this retrospective case series, a total of 10 female dogs (median age 7 years, range 5.5–10.5 years; median weight 37.0 kg, range 12.9–64.0 kg) with pyometra were included. A multiaccess port was created from a surgical glove attached to an Alexis wound retractor and placed in the ventral midline between the middle and caudal third of the distance between umbilicus and pubic rim. A vessel sealing device was used for transection of the ovarian pedicle. The port size was selected on the basis of maximum uterine diameter determined by ultrasound. Median incision length was 5.0 cm (range 3.1–7.7 cm) for a maximum uterine diameter of 4.0 cm (range 2.0–7.0 cm). Median surgical time was 57 minutes (range 48–65 minutes). No case had to be converted to open celiotomy. Complications included one case of minor, self-limiting splenic trauma by the endoscope. In eight dogs, the distended uterine horns endangered safe access to the ovarian pedicle, and the vessel sealing device was inserted through a second cannula placed periumbilically. Extension of the original incision was necessary to exteriorize organs in two dogs. All dogs recovered quickly and were discharged either on the day of surgery or 1 day thereafter. In conclusion, a surgical glove port technique in combination with an Alexis wound retractor is feasible for surgical laparoscopic treatment of canine pyometra up to a diameter of 7 cm.

1. Introduction

Pyometra is a common disease in sexually intact bitches, and it may be accompanied by cystic endometrial hyperplasia (CEH, [1]). A medical therapy with progesterone antagonists has become available for breeding dogs [2–4], but surgical removal of the ovaries and uterus (ovariohysterectomy, OVH) remains the mainstay of therapy. With the aim of contraception in healthy dogs, OVH is one of the most frequently performed surgical procedures in small animals. As in other areas of soft tissue surgery, minimal invasive techniques have been introduced for surgical contraception throughout the last decade [5]. In dogs, benefits of a laparoscopic approach include less surgical trauma and postoperative adhesions [6] combined with an improved view on intra-abdominal structures, less postoperative pain leading to a more rapid return to normal activity, and shorter hospitalization time [5,7–10]. To benefit from these advantages in bitches affected with uterine pathologies, laparoscopic approaches for canine pyometra have been developed using 4-portal [11] and 3-portal techniques [12].

To minimize surgical trauma and therefore, further improve the advantages of minimal invasive surgery for

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postoperative rehabilitation, the reduction of port size and number are key objectives in veterinary medicine [13–16]. Although laparoendoscopic single-site surgery (LESS) started by inserting several trocars through one skin incision [15], dedicated single-port multiaccess devices like SILS, R-Port, TriPort, or GelPort are currently being used [17–21]. Recently, a LESS approach for canine mucometra or pyometra was described using a SILS port [22]. Multiaccess ports in minimal invasive surgery have several advantages, as a shorter surgery duration compared to multiple port access systems [23], but also higher costs have to be taken into account [24]. To overcome the problems of expensive single-use material in laparoscopic surgery, human surgeons in less developed countries have pursued alternatives. The home-made surgical glove port as an alternative to commercially available single-port multiaccess devices was first described by Jeon et al. [25] and has been used repeatedly in human surgery [26–31]. The surgical glove port for laparoscopic OVH in healthy bitches has been developed recently (Dupré et al., unpublished data). The aim of our study was to assess the feasibility of this method for the surgical treatment of bitches suffering from uterine pathologies.

2. Material and methods

2.1. Case selection

Medical records of dogs presented with pyometra at the Division for Obstetrics, Gynecology and Andrology of Vetmeduni Vienna between October 2014 and October 2015 were reviewed. Diagnosis of pyometra was made on the basis of abdominal ultrasound revealing an enlarged, fluid-filled uterus. Ultrasound examination was also used to detect CEH (when irregular cystic elevations of the endometrial surface were apparent) and the presence of ovarian cysts (defined as multiple anechoic ovarian structures >8 mm in diameter) [32]. In three of the 10 bitches, additionally to the pyometra, CEH was diagnosed on ultrasound examination. Furthermore, in two of these three animals ovarian cysts were detected, which was concordant with a history of prolonged heat reported by the owners in both cases.

Laparoscopic-assisted OVH (LAOVH) using the glove port technique was offered when both the first and last author were present. Further inclusion criteria were that patients had to be clinically hemodynamic stable and had a maximal uterine diameter of 9 cm. The body condition score (BCS) of each patient was determined before surgery by the first author using a 9-integer unit BCS system [33].

2.2. Anesthesia

Premedication was performed with either methadon and midazolam (0.2 mg/kg and 0.2 mg/kg intravenous) or acepromazine and methadon (10 μg/kg and 0.2 mg/kg intravenous) before induction of anesthesia with propofol (3–6 mg/kg intravenous). Anesthesia was maintained with isoflurane in oxygen. Throughout surgery, crystalloid fluids were administered intravenous. Patients were ventilated with a tidal volume of 12 mL/kg, a maximal pressure of 15 cm H_2O, and a frequency of 14 breaths/min dependent on $EtCO_2$ (volume-controlled ventilation).

2.3. Preparation of the glove

A pair of powder-free sterile surgical gloves (size 6.5; Vasco OP Sensitiv, Braun, Melsungen, Germany) was prepared before the start of surgery. The tip of the right glove's middle finger was cut off with sterile scissors. From the remaining part of the finger, two pieces were cut to create two elastic rubber bands. Then, the tips of the other glove's index and little finger were cut alongside at a length of 5 mm. Two 5 mm cannulas (Valleylab, Covidien, Vienna, Austria) were introduced through these cuts, and each of the prepared elastic bands was used to hermetically connect the glove to the cannula (Fig. 1A–C).

2.4. Surgical technique

Surgery was performed by the same two laparoscopic surgeons in all cases. Dogs were placed in dorsal recumbency on a rotatable table (TT Endoscopic Positioner, Apexx Veterinary Equipment, Englewood, CO, USA), the bladder was evacuated and the ventral abdomen prepared aseptically. A skin incision was made on the ventral midline between the middle and caudal third of the distance between umbilicus and pubic brim. The linea alba was punctured, and a mini-celiotomy was performed. The size of the incisions was on the basis of maximal uterine diameter measured on the preoperative ultrasound examination. Depending on the latter, a matching small or medium-sized Alexis wound retractor (AWR; Applied Medical, Rancho Santa Margarita, CA, USA) was introduced into the abdomen by inserting the green ring intra-abdominal ensuring that no abdominal structures were entrapped between the retractor and the abdominal wall. The outer white ring was grasped by both surgeons, and edges were rolled inward until sufficient wound retraction was obtained (Fig. 2A). The previously prepared surgical glove, with the two cannulas in place, was slipped and secured over the outer ring, and tight adherence was ensured. Then, CO_2 was insufflated (Electronic CO_2-Endoflator, Karl Storz, Tuttlingen, Germany) to an abdominal pressure of 8 mm Hg (Fig. 2B). A 5 mm laparoscope (Hopkins II Optik 30°, Karl Storz) was inserted through the cranial cannula, and the intra-abdominal cavity was thoroughly inspected. The tabletop positioner was rotated 45° to the right side (Fig. 3). Grasping forceps (Clickline grasping forceps 4 × 2 teeth, Storz, Tuttlingen, Germany) were introduced through the caudal cannula of the glove, and the ovarian pedicle was grasped. A 10 mm vessel sealer/divider device (LigaSure Atlas, Valleylab; Covidien, Vienna, Austria) was used to progressively seal and transect the suspensory ligament, ovarian vessels, and ovarian pedicle. It was introduced through a 12-mm cannula inserted into a third finger of the prepared surgical glove for the first two cases. As uterine size prevented safe approach to the ovarian pedicle, the LigaSure was then introduced through a second 12 mm portal, which was placed either cranial or caudal to the umbilicus (cases