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Evaluation of two-port laparoscopic ovariectomy in queen cats

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Two-port laparoscopic ovariectomy was performed on eight healthy female cats. The anaesthesia was induced with midazolam and ketamine, and maintained with isoflurane. During the surgical procedure, the abdominal cavity was insufflated with CO_2 and pressure of 8-10 mmHg was maintained, a 5 mm trocar-cannula assembly was inserted cranial to the umbilicus for insertion of telescope. A second 3 mm port was inserted caudal to umbilicus. Firstly one of the ovaries was grasped with the help of 2.5 mm Kelly's forceps and pulled toward abdominal wall and fixed by transabdominal suture, and the ovarian pedicle and utero-tubal junction was cauterized and resected. The same procedure was followed for the other ovary. Once both ovaries were free, the transabdominal suspension suture was released and the ovaries were exteriorised from the abdomen. The incision site was sutured routinely. Intraoperative subcutaneous emphysema was observed in 2 cases, but no complication was recorded postoperatively. The two-port laparoscopic ovariectomy was found minimally invasive, safe, cosmetic and required less postoperative care.

Keywords: *Cats, Laparoscopic ovariectomy*

The neutering is removing the source of the hormones that regulate reproduction and indicate the anatomical and behavioural characteristics that set males and females apart (McKenzie, 2010). For all non-breeding cats, spaying is recommended for prevention of unwanted pregnancy, especially in queens that are let outdoors. Surgical sterilization is an irreversible technique (David, 2010; Kirsan *et al.*, 2013); routinely used procedures in queen cats are traditional midline ovariohysterectomy, lateral flank ovariohysterectomy, ovariectomy, laparoscopic ovariohysterectomy and ovariectomy. If the neutering is carried out at the age of six months, the risk of developing mammary carcinoma is reduced by 91%, and if it is carried out before the cat is one year old, the risk is reduced by 86% in comparison to intact cats (Overley *et al.*, 2005).

LapOVE is a new and efficient alternative to traditional (open) ovariectomy. Complications are significantly less and self-limiting (Katic and Dupre, 2017). For minimal surgical trauma in laparoscopy, the number and diameter of port can be reduced (Leggett *et al.*, 2000; Ghezzi *et al.*, 2004); and such approaches may include single-port or double-port laparoscopy (Ate *et al.*, 2007). Two-port laparoscopic ovariectomy was found more safe and easy to perform, required less number of incisions than triple-port and less surgical duration than single-port technique (Salvi *et al.*, 2023). Keeping these in view the present study was conducted to evaluate two-port laparoscopy for ovariectomy in queen cats.

Materials and Methods

Eight healthy adult client owned queen cats of different breed, age and body weight presented for elective sterilization were used in the study. Only apparently healthy queens were chosen and those exhibiting signs of oestrus or found pregnant on ultrasonography were excluded from the study.

The queen cats were kept off-feed for 10 hr and water was withheld for 8 hr prior to anaesthesia. The surgical site at ventral abdomen from xiphoid to pelvic region was aseptically prepared for surgery by clipping of hairs, scrubbing with savlon and applying antiseptic solution (5% povidone iodine). The urinary bladder was evacuated preoperatively by applying pressure at pelvic region to improve abdominal space. The anaesthesia was induced by intramuscular administration of midazolam (0.03 mg/kg body wt) and ketamine HCl (15 mg/kg body wt), and maintained by isoflurane (1.5-3%) with oxygen.

The cats were restrained in Trendelenburg position and a nick incision was made cranial to the umbilicus. Ventral abdomen (linea alba) was pulled upward during insertion of the Veress needle and trocars into abdominal cavity to avoid trauma to the visceral organs. 'Hanging drop' test was used for confirmation of entry of Veress needle into the abdominal cavity. Once the abdominal cavity was insufflated with CO_2 and 8-10 mmHg pressure was achieved, the Veress needle was removed and a 5 mm sharp-round trocar-cannula assembly (Karl Storz endoscope) was inserted. The umbilical port was used to insert a laparoscopic 30° (29 cm, Karl Storz endoscope) lens camera into the abdominal cavity. The second incision was made on the midline caudal to the umbilicus, and a 3 mm trocar canula was inserted. The laparoscope was used to visualize and guide the entrance of the trocar into the abdominal cavity and to keep the tip of the trocar away from the

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viscera. The grasping forceps was inserted through the second port and the ovarian pedicle was grasped and gently elevated towards the abdominal wall. A transabdominal silk suture with a needle was placed at the level of the proper ovarian ligament and temporarily held outside the abdomen using an artery forceps. The ovarian vasculature, suspensory ligament and proper ovarian ligament at utero-ovarian junction were progressively cauterised with a 2.5 mm bipolar electrocoagulation forceps and resected by 2.5 mm scissors. After releasing the transabdominal suspension suture, the ovary was exteriorised from the abdomen with the forceps. The other ovary was exteriorised in a similar way. After removal of both ovaries, the cannula was withdrawn, and pressure was carefully applied to each side of the abdominal wall to facilitate the escape of CO_2 gas from the abdominal cavity. Both the portal sites were then closed with a single silk suture.

Postoperatively, antiseptic dressing was done regularly. Inj. ceftriaxone (25 mg/kg body wt) and inj. meloxicam (0.2 mg/kg body wt) were administered intramuscularly for 5 days and 3 days, respectively. The skin sutures were removed after 7 days in all cats.

Results and Discussion

In the present study the mean±SE laparoscopic incision length was 1.17±0.03 cm. Bakhtiari *et al*. (2014) have reported 1.59±0.18 cm incision length in two-port laparoscopic ovariectomy in cats. Shariati *et al*. (2014) and Culp *et al*. (2009) also reported smaller incisional length in laparoscopic technique of elective sterilization in dogs. The smaller incisional length may decrease the chances of incisional hernia.

The mean±SE of total surgical time recorded from the Veress needle insertion to closure of surgical incision was 30.66±0.49 min. Similarly, Sakals *et al*. (2018) have reported surgical duration of 27.76±6.6 min in laparoscopic assisted ovariectomy with electrocautery and with ligation 33.26±8.2 min in cats. The use of bipolar electro-cautery in laparoscopic procedure also helped to decrease the duration of surgery as compared to ligation by suture in conventional method (Watts, 2018). Sharma *et al.* (2023), however, recorded longer surgical duration for laparoscopic ovariectomy (88.16±5.38 min; range 75-107 min). Greater surgical time was also reported by several others in laparoscopic approach of spaying as compared to traditional spaying in cats (Gauthier *et al*., 2015; Tavares *et al*., 2016 d) and dogs (Davidson *et al*., 2004; Culp *et al*., 2009). Sharma *et al.* (2024) have recorded significantly longer surgical time in laparoscopic ovariohysterectomy as compared to laparoscopic ovariectomy in dogs. Bakhtiari *et al.* (2014) reported mean surgical time 20.7 min in conventional ovariectomy and 11.9 min in laparoscopic ovariectomy in cats. The mean time for resection of right and left ovary was 5.06±0.23 min and 5.38±0.21 min, respectively. Similarly, Kim *et al*. (2011) did not find any significant variation between the time duration of left and right ovary resection in single portal laparoscopic ovariectomy in cats, while Van Nimwegen and Kirpensteijn (2007) have reported easy approach to left ovary as compared to right ovary with no significant difference in the mean duration for searching of ovaries.

In this study all the cats were restrained in 10° Trendelenburg position to reduce the iatrogenic trauma and for proper exposure of ovaries due to displacement of visceral organs in gravity (Van Nimwegen and Kirpensteijn, 2007; Alves *et al*., 2010). In contrast Kim *et al*. (2011) have positioned the cats in true lateral recumbency without Trendelenburg position, and reported easy exposure of ovaries. The bipolar electro-coagulation forceps was used in this study to cauterize the blood vessels and ovarian ligaments that was considered superior to monopolar and laser electro-coagulation (Van Goethem *et al*., 2003; Van Nimwegen and Kirpensteijn, 2007; Kim *et al*., 2011), and titanium clip and suture ligation (Schiochet *et al*., 2009) because of shorter duration of surgery and lower chances of intra-operative haemorrhage in cats.

In this study, there was no need to enlarge the portal incision in laparoscopic ovariectomy, which was an advantage of ovariectomy over ovariohysterectomy. Davidson *et al.* (2004) have considered the importance of incision enlargement for complete removal of organ. Malm *et al*. (2004) have also reported enlargement of incision in two patients out of 15 animals during laparoscopic

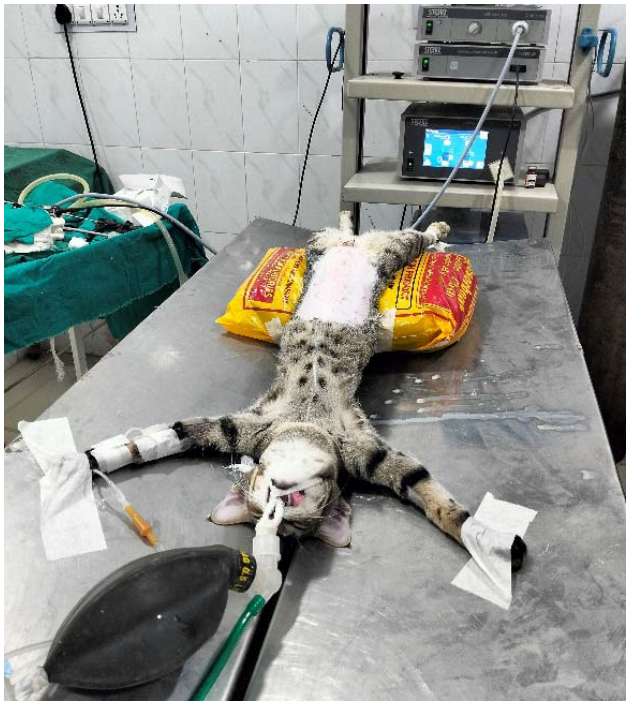

Fig. 1: Trendelenburg position of cat.

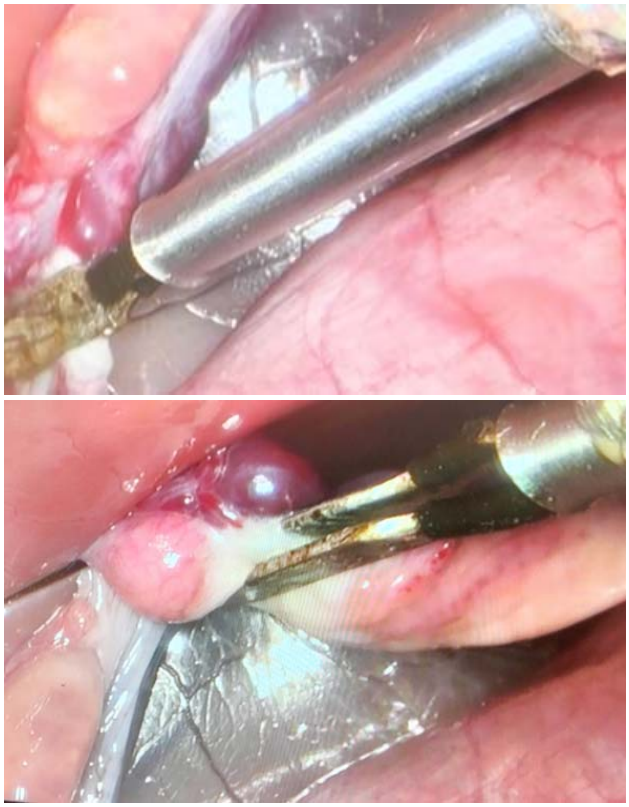

Fig. 2: Cauterization of ovarian pedicle and utero-tubal junction.

ovariohysterectomy in dogs, and Tavares *et al.* (2016) have reported conversion from laparoscopy to laparotomy in one case.

Intra-operative complication, subcutaneous emphysema at the time of CO_2 insufflation, was recorded in three cats, which resolved within 24 hr postoperatively without any medication. Subcutaneous emphysema due to leakage of CO_2 at around trocar site was also reported in past studies (Schiochet*et al*., 2009; Lawall *et al*., 2016; Tavares *et al*., 2016). Lawall *et al.* (2016) observed subcutaneous emphysema in seven out of 15 cats, but it resolved within 24 hr after surgery. In the present study, haemorrhage and trauma due to trans-abdominal needle was not recorded in any case, and no complication was recorded postoperatively. Bakhtiari *et al*. (2014) also did not report any complication during and after the laparoscopic surgery in cats.

From this study, it was concluded that two-port laparoscopic method of ovariectomy was minimally invasive, safe, more cosmetic and required less postoperative care.

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