INTRACORPOREAL KNOT TYING TECHNIQUE FOR OVARIAN PEDICLE LIGATION IN DOGS – A CLINICAL STUDY

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Received : 18.06.2017
Accepted : 21.06.2017

Abstract

The present paper describes the technique of laparoscopic intracorporeal knot tying (surgeon's knot) for ovarian pedicle ligation in dogs subjected to ventral midline 3-port-laparoscopic ovariectomy. The technique of intracorporeal knot tying was studied in twelve female dogs presented to the surgery unit of the Teaching Veterinary Clinical Complex Pookode, for laparoscopic birth control. A ventral midline three port technique was employed. The ovary was anchored to the abdominal wall in an elevated position using suspension sutures, to facilitate ligation and resection. Two needle holders were introduced – one through the cranial and the other through the caudal instrumental ports for knot tying. A No. 1 braided silk suture of 12 cm length was used for applying intracorporeal flat surgeon's knot. The mean time from introduction of suture to placement of secured flat square knots on the left ovary was 17.857±5.2418 minutes and on the right ovary was 20.714±4.7157 minutes. It was found that the suture length of 12 cm was found suitable for easy manoeuvrability. Intracorporeal ligation ensures more haemostatic competency inspite of its complexity. It is believed that this procedure needs a long learning curve and if mastered, this technique is simple and cost effective.

Keywords : *Intracorporeal knot tying, ovarian pedicle, dog*

Laparoscopic surgery is a minimal invasive procedure providing maximum visibility, with decreased post-operative pain and discomfort. Sterilization by laparoscopic surgery provides guaranteed results with minimum stress and postsurgical complications.

Methods for haemostasis during ovariectomy include vascular staples, clips, sutures and coagulation. Vascular staples are costly, so also are vessel sealing devices, which are single use instruments and increase the surgical cost (Van Goethem, 2003). Considering the higher cost of these procedures intracorporeal ligation will be

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an ideal alternative for haemostasis during laparoscopic ovariectomy in dog. There are no standard procedures described in literature, on how to perform this simple technique. It is believed that this procedure needs a long learning curve (Pope and Knowles, 2012) and if mastered, this technique is simple and cost effective.

Laparoscopic ligatures are applied either intracorporeally or extracorporeally. Intracorporeal knots are made entirely within the abdomen by using an instrument tie technique to form flat knots- square or surgeon's knot. Intracorporeal flat square knots can withstand more distraction forces compared with intracorporeal slip-square knots (Goldenberg and Chatterjee, 2009). The present paper describes the technique of intracorporeal knot tying (surgeon's knot) for ovarian pedicle ligation in dogs subjected to ventral midline-3 port-laparoscopic ovariectomy.

Materials and methods

The technique of intracorporeal knot tying was studied in twelve female dogs presented to the surgery unit of the Teaching Veterinary Clinical Complex Pookode, for laparoscopic birth control. Animals weighed 9-18 kg and aged one to three years. Following general anaesthesia all dogs were positioned in dorsal recumbency, over a tiltable 'V' positioner. A ventral midline three port technique was employed. The sub-umbilical port was employed for the rigid telescope, while the pre-umbilical and caudal midline ports were used for the 5 mm laparoscopic surgical instruments. The surgeon and assistant stood on right side of the dog, and the V positioner was tilted to the same side for left ovariectomy (Figure 1). Likewise, the process was repeated for the other ovary. Following portal placements and quick examination of the abdominal organs using the telescope, the animal was tilted to the side opposite to that of the ovary to be removed. Ovarian bursa was identified and grasped with a grasping forceps and gently elevated towards the respective abdominal wall. A ½ circle cutting edge needle with a silk suture was passed through the abdominal wall around the ovary and out of the abdominal wall. The needle was removed and two ends of suture were held together outside the abdomen with a small clamp. The ovary was thus anchored to the abdominal wall in an elevated position using suspension sutures, to facilitate ligation and resection.

Two needle holders were introduced – one through the cranial and the other through the caudal instrumental ports. A No. 1 braided silk suture of 12 cm length was used for ligation. For left ovary ligation, the suture was introduced through the caudal port. A window was created in the mesovarium by the blunt tip of the needle holder holding the suture, and the suture was placed through the window towards the cranial edge of the ovarian ligament (Figure 2). The edge of the suture was grasped using the cranial needle holder, so as to take it around the ovarian ligament (Figure 3). The suture was then exchanged to the caudal needle holder (Figure 4). Thereafter spyres were made around the cranial needle holder (Figure 5). The caudal end of the suture was then grasped by the cranial needle holder (Figure 6) and the suture end was pulled through the spyres to create the knot (Figure 7). The tails of the knot were then exchanged to the opposite needle holders (Figure 8) to pull and tighten the knot. The suture was held close to the knot to tighten the knot. The caudal tail of the suture was then held using the cranial needle holder and spyres were taken around the caudal needle holder (Figure 9). The cranial tail of the suture was then grasped by the caudal needle holder and pulled through the spyres to create the second knot (Figure 10). The tails of the knot were then exchanged to the opposite needle holders to pull and tighten the knot as described earlier. The caudal needle holder was replaced with an endoscissors and the tails of the suture were cut, and removed using the cranial needle holder. A needle holder, with another suture of same length, then replaced the endoscissors. The suture was then passed around the uterine end and taken through the window of the mesovarium, using the cranial needle holder (Figure 11). Ligature was then applied at the uterine end, as described earlier for the ovarian pedicle. Following removal of excess tails of the ligature, the ovary was resected by cutting the ovarian ligament and uterine end towards the

ovary, away from the ligature. The scissors was replaced by a grasper, to hold the ovary and remove it through the cranial port. Standing on the left side of the dog and tilting the patient to the same side, the procedure was repeated as described earlier, for the right ovary too.

Results and discussion

The mean time from introduction of suture to placement of secured flat surgeon's knots on the left ovary was 17.857±5.2418 minutes and on the right ovary was 20.714 ± 4.7157 minutes. The mean time taken for laparoscopic ovariectomy was 76.929 ±8.9463 minutes. Intracorporeal ligation for laparoscopic ovariectomy was effective and safe. Valocky *et al.* (1999) performed ovariectomy by modified endosuturing technique and the mean time taken for the procedure was 70 minutes. Right ovary ligation required more time compared to left ovary. It was found that the suture length of 12 cm was found suitable for easy manoeuvrability. An important factor is the length of the introduced suture material. It should neither be too short nor too long (Too long would make suturing extremely difficult). Aryazand *et al*. (2015) opined that a suture not longer than 15 cm would make handling and maneuverability easier. Croce and Olmi (2000) suggested an ideal length of a suture for intracorporeal performance of a separate stitch as 10 cm. Use of suspension sutures for holding ovarian bursa provided safe removal

Intracorporeal knot tying technique for left ovariectomy

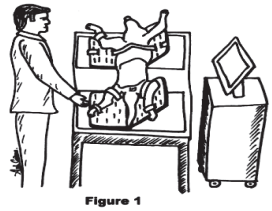


Figure 1

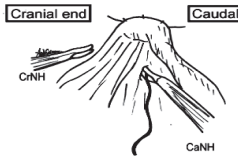
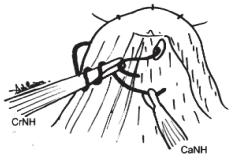


Figure 2

Figure 3

Figure 4

Figure 5



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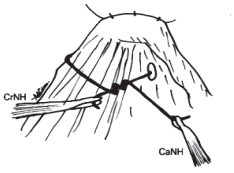

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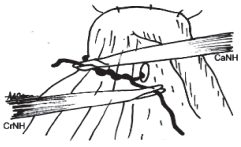

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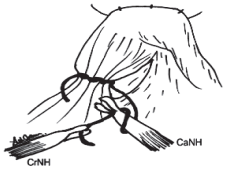

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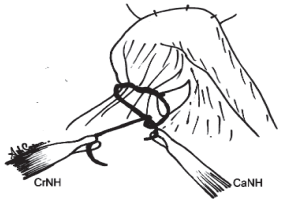

Figure 10

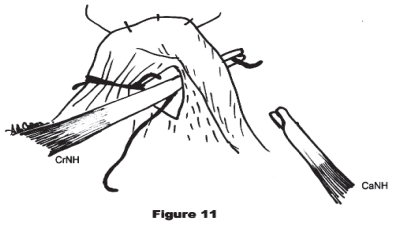

Figure 11

CrNH- Cranial Needle Holder
CaNH- Caudal Needle Holder

of ovary from the abdomen. Shirodkar *et al*. (2008) in their work had mentioned that two cases in which laparoscopic endolooping was performed, it lacked the perfection and minor bleeding was controlled by electrocoagulation. In our study where in we applied flat square knots, each ligature applied provided satisfactory haemostasis and none of the cases had any complications. Intracorporeal ligation ensures more haemostatic competency inspite of its complexity. Croce and Olmi (2000) observed that special threads, metal clips, or clips made from re-absorbable material did not substitute traditional sutures or ligations in every situation. Moreover, high cost of the materials specifically created for laparoscopy, led to greater preference for "simple" sutures performed with "ordinary" threads, the cost of which was definitely lower.

Conclusion

From the present study it could be concluded that the intracorporeal knot tying technique described was safe and effective for ovarian pedicle ligation in dogs undergoing laparoscopic ovariectomy through a ventral midline three portal approach. The transabdominal suspension suture anchored the ovary, in an elevated position, to the abdominal wall and facilitated ligation and resection. The suture length of 12 cm was found ideal for hazzle-free ovarian pedicle ligation. This knot tying technique may need a long learning curve to master; and if mastered it would be simple and cost effective for intracorporeal ligation of ovarian pedicle in dogs undergoing laparoscopic ovariectomy.

Acknowledgements

The authors would like to acknowledge the effort of Ashish Cristopher for preparing the drawings.

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