METHODS OF LAPAROSCOPIC STERILIZATION OF BITCHES

METODY LAPAROSKOPICKEJ STERILIZÁCIE U SÚK

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ABSTRACT: At present the question of sterilisation of bitches with the aim of inducing permanent sterility is paid much attention. So far preferred techniques have required surgical intervention per laparoscopy. In this submitted study we focused on using laparoscopy at sterilisation of bitches in three ways: by creating mechanical occlusion of oviducts using endo-stapler technique (n = 3), by formingoviducal occlusion by electrocoagulation with the aid of endo-coagulator (n = 3), by performing ovariotomy using modified endo-suture technique (n = 2). At the interventions effectiveness, complications and difficulty were observed. The effect of laparoscopic intervention on reproductive apparatus and condition of the patient was observed as well. Patients (n = 8) of German shepherd breed aged 2–7 years were included in the evaluation. Interventions were performed with the aid of two MLW Germany laparoscopic units with 180 degree angle and 0.5–1 cm working diameter. Electrocoagulation was carried out with Eltom, Chirana Slovakia, equipment. Occlusions of oviducts were performed with endo-stapler titanium clip applicator. Ovariotomy was carried out with the aid of extracorporal Orsilon technique with non-traumatic units. We have found that it is possible to make a permanent occlusion of oviducts by placing one or two clips on the left or right oviduct concerned. The intervention lasted 20–30 minutes. By using electro-coagulation of oviduct 1–2 occlusions were made on each oviduct. The occlusion of oviducts by endo-coagulation took 10 minutes. At ovariotomy two ligatures were applied cranially to the ovary and a single ligature caudally from the same ovary. The ovary was removed with endoclip. The whole endoprocessure in both ovaries took 70 minutes. In comparison with similar laparoscopic interventions the above described techniques have certain advantages. The result of abdominal cavity perforation is just small wounds which require 2 deep and 2 superficial sutures at the most. As the interventions are relatively simple, they can be performed on older patients as well. Small laparoscopic incisions contribute to a considerable decrease of postoperative pain in surgical wound.

female dog; laparoscopy; sterilisation; endoscopic surgical technique; ovary; oviduct

INTRODUCTION

Laparoscopy is one of the few techniques tested first on humans and later adjusted to the needs of veterinary medicine. One of the most interesting applications of laparoscopy in the management of reproduction is doubtless sterilisation. In human medicine, the uterine tube sterilisation is routinely used (Gomel, 1977). Daniel and Herbert (1984) described the salpingostomy technique using CO₂ laser through a laparoscope.

Only in 1985 did Wildt and Fowler describe the laparoscopic sterilisation of bitches by bipolar high-frequency coagulation of a salpinx. Sterilisation of bitches by the salpinx interruption, however, does not eliminate accompanying signs of oestrus (attractiveness of female to males, sanguineous vaginal discharge). For this reason, some owners prefer ovarioectomy or ovariohysterectomy. Ovarioctomy in female dogs by a laparoscope was first described by Thiele et al. (1993). Videocamera with a monitor was used for simplification and better making. The extracorporeal Roeder’s knots and the system ethi-endoscope (Ethicon) were used for ligatures. It was not possible to perform a surgical intervention successfully only in one of 62 female dogs due to synchias in the umbilical area.

Development of a laparoscopic surgery in gynecology of women has enabled operations with a laparoscope on adnexa (Semm, 1979; Semm and Mettler, 1980) as well as treatment of extraterine pregnancy (Shapiro and Adler, 1973; Witke and Kuhn, 1992). These interventions were carried out by direct visualisation using a laparoscope, which limited possibilities of a surgeon and his team. The use of videotechnology has widened a dispasion of possibilities of laparoscopic techniques because also other members of the operation team are involved in the operation process. This has made it possible to perform also complicated surgical interventions with a laparoscope such as the first laparoscopic per vaginam assisted hysterectomy (Reich et al., 1989). Semm (1991) performed the first pelviscopic hysterectomy. Within a short time, these techniques, causing relatively only little trauma, have gained a great recognition among the professional personnel and popularity among the patients (Padial and Stolongo, 1992).

The first laparoscopic ovariohysterectomy in a bitch was carried out by von Siegel et al. (1994). The operation did not last more than 60 minutes.

The aim of this research is to discuss three different methods of spaying:
- mechanical occlusion of oviducts with endostaples,
- forcing occlusion of oviducts with electrocoagulation,
- ovarioctomy by using endosuture technique.

During those procedures that were mentioned above, we followed the effect, complications and difficulties which accompanied the surgical manipulations. We also observed the influence upon the reproductive apparatus, and the health condition of the patients after treating them with laparoscope.

MATERIAL AND METHODS

Animals

For mechanical occlusion of oviducts we operated 3 bitches, for occlusion of oviducts by electrocoagulation 3 bitches were operated, and for ovarioctomy procedure we operated 2 bitches. The age of the patients was between 2–7 years, bitches were German Shepherd breed. The animals were kept in clinical kennels and received on commercial food and were given water ad libitum. The weight of bitches ranged from 35 to 40 kg. All the bitches were in the stage of anestrus.

Optic equipment and accessories

Two laparoscope units consisting of laparoscope MLW Germany, 180 degrees, 1 cm in diameter, source of light, manual insufflator with regulator and T shaped pressure gauge connected to CO₂ tank container. For endocoeagulation we used electrosurgery unit, Eltom Chirana Slovakia.

Invasive and surgical instruments

For pneumoperitoneum we used Veress needle. For insertion of laparoscope we used a set of trocars and cannulas in the range of 0.5–1.5 cm with safety protection for the sharp tip. For manipulation with internal organs we used rigid metal probe. For grasping and fixation of internal organs and different parts of various instruments, we used endo peak forceps. For cutting and/or coagulation of soft tissue, we used endo scissors. For occlusion of oviducts we used titanium clip and its applicator (endo-stapler). For internal suturing we used the extra corporal Orsilon technique with non-traumatic units and adapter for tightening the internal surgical knot, plus specially devised internal needle holder.

Anesthesia and preoperative preparation of the patients

Within all the animals, the same material and substances were used. Food was withheld for 24 hours and water for 6 hrs. before operation. We used tranquiliser: 15 mg diazepam i.m. (Apaurin, Lékiva Praha) pro toto, 15 minutes before introducing anesthesia. For sedation we used xylazin 2 mg/kg b.w. i.m. (Rometar, Spofa Praha) and after 10 min. neuroleptic analgetic ketamin 10 mg/kg b.w. i.m. (Narkamon, Spofa Praha) was injected. The animals were fixed in a recumbent position with the head down and total body plane laid between 30–40 degrees in relation to the ground. The surface between the pubic bone and 4 cm cranially to the umbilicus was shaved and scrubbed including 10 cm to each side.
Formation of pneumoperitoneum

Puncture of abdominal cavity with Veress needle located 2 cm cranially to pelvic bone and 2 cm laterally on each side (according to the convenience of surgeon) of linea alba. To confirm an intact bladder we aspirate with syringes through the Veress needle. If urine is present, the Veress needle is reintroduced. The Veress needle must penetrate through all the abdominal wall layers to control subcutis, muscle or subperitoneal dislocation. The volume of insufflated CO₂ ranged from 20 to 30 mm Hg, which represented in dependence on the tightness of the system initial consumption as large as 2.0 l.

Mechanical occlusion of oviducts

Laparoscopic trocar and cannula were penetrated 1 cm behind the umbilicus, and a second trocar was inserted for titanium clips applicator Endo clip II ML Auto Suture, USA (endo stapler) 0.5 cm in diameter, 6–10 cm behind the umbilicus and 2–3 cm laterally from specificudder unit. A third trocar and cannula for endo pean were introduced contralaterally. After confirmation of accurate location, and fixation with endo pean, the site of occlusion was grasped with the jaws of applicator, and the endo stapler released onto the oviduct, and the procedure was repeated 0.5 cm away from the former, on the same oviduct.

Oclusion of oviducts by coagulation

Laparoscope and cannula were inserted using the same procedure described in the former chapter „mechanical occlusion of oviducts“*. After identification of oviduct, it is fixed by the jaws of endo pean. Electrocoagulation was carried out with unipolar electrocauterizing unit (Chiratome 170, Chirana, Slovak Republic) and coagulation level was set to grade 2. After controlling the location of endo pean, coagulation is performed for a few seconds (2–3) until complete occlusion is achieved. This procedure requires a very delicate manipulation with care in order to prevent touching other organs with the endo pean, which may cause permanent damage to them.

Ovariectomy by laparoscopic technique

Trocar for laparoscopic cannula is located 1 cm behind the umbilicus. Two additional trocars with adjacent cannulas in diameter of 10 mm are located 5 cm behind the umbilicus 6–8 cm laterally to each side of linea alba. Ligamentum proprium is held with endo pean, and using manipulative movements of pushing and pulling proximally, tension appears on the ligamentum latum uteri, causing its flattening. The lig. latum uteri is then sutured by using endo needle and atraumatic Orsilon 1 A unit (Spořa, Czech Republic). The suture is made cranioderally (in relation to ovary) around ligamentum suspensorium ovarii. The endo needle is then inserted through the cannula and circling the lig. suspensorium, creating a loop around it, and is led out through the same cannula where an outer surgical knot is made. The knot is led inside along the cannula, under a specially designed endo ligature adapter, and tightened on the desired location. Using this technique we suture the ovarian artery and vein. Coagulation of those vessels was also performed successfully. With the second suture we used the same technique, but the location was caudally to the ovary, through and around lig. proprium. Using endo scissors and endo coagulation simultaneously, we separate between ligamentum suspensorium ovarii caudally to the suture, and ligamentum ovarii proprium cranially to the knot. The tissue remnants which are composed of bursa ovarica, part of ligamentum suspensorium ovarii and part of ligamentum ovarii proprium, are cleared through the working cannula. The procedures are repeated contralaterally. Before drawing back the laparoscope and its accessories, it is necessary to check for blood leaks from the stumps.

End of laparoscopic surgery and postoperative care

After observation of the place of surgery and its surroundings, the instruments are collected, and through the working channel of laparoscope the CO₂ which created the pneumoperitoneum is released, the cannulas are removed and internal plus external sutures are performed. Incisions with 1.5 cm in diameter were sutured with two deep and two superficial ligatures. We used a single wide spectrum long acting parenteral antibiotic injection (Antipen, Werfli-Chemie, Austria or Clamoxyl, Smith Kline Beecham, UK).

RESULTS

In spaying by using laparoscopy, we used two different methods for occlusion of oviducts (Tab. I, II) and a single ovariectomy technique (Tab. III).

During the procedure of mechanical occlusion using endostapler technique, 1–2 staples were applied to each oviduct in each of the three bitches. The procedure had only one single complication; the clip slipped from the site of application. The released clip was drawn out, and replaced. The whole procedure lasted 30 min (Tab. I). In one case, bleeding, which appeared after the cannula was removed from the abdominal wall, was treated with suture. In each of the 3 bitches clips were placed on both oviducts and their fixity was checked mechanically with endo pean.

By using coagulation of oviducts in three bitches, 1–2 occlusions were performed on each oviduct. During the procedure, bleeding appeared on abdominal wall in the peritoneal cavity, during the insertion of cannula for adjacent endo pean. This complication does not put at risk either the patient or the surgical progress/prognosis. The bleeding was treated at the end of the su-
I. Mechanical occlusion of oviducts: endo-stapler technique

<table>
<thead>
<tr>
<th>No. of bitches</th>
<th>No. of clips used on oviducts</th>
<th>Complication during surgery</th>
<th>Duration of occlusion (min)</th>
<th>Duration of surgery (min)</th>
<th>Complication after surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>left</td>
<td>right</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1</td>
<td>+</td>
<td>++</td>
<td>replacing one clip</td>
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<tr>
<td>2</td>
<td>+</td>
<td>+</td>
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<tr>
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<td>++</td>
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</table>

II. Occlusion of oviducts: endo-coagulation

<table>
<thead>
<tr>
<th>No. of bitches</th>
<th>No. of coagulations in oviduct</th>
<th>Complication during surgery</th>
<th>Duration of occlusion (min)</th>
<th>Duration of surgery (min)</th>
<th>Complication after surgery</th>
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<td>++</td>
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III. Ovariectomy by using modified endo-suture technique

<table>
<thead>
<tr>
<th>No. of bitches</th>
<th>Number of ligatures on oviduct</th>
<th>Complication during surgery</th>
<th>Duration of occlusion (min)</th>
<th>Duration of surgery (min)</th>
<th>Complication after surgery</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>left</td>
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<tr>
<td></td>
<td>caudal</td>
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<td>caudal</td>
<td>cranial</td>
<td>left oviduct</td>
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<td>7</td>
<td>++</td>
<td>+</td>
<td>++</td>
<td>+</td>
<td>25</td>
</tr>
<tr>
<td>8</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>30</td>
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Surgery, after emptying the gas from the abdominal cavity, which produced pneumoperitoneum, necessary for easy access to the internal organs. The occlusion of oviducts by endo coagulation took 10 minutes, and the whole surgery 25 min (Tab. II). In each of the three bitches, electrocoagulation was performed on each oviduct and damage to the tissue was visually checked.

Ovariectomy by using modified endo-suture technique was carried out successfully on two bitches. Two ligatures were applied cranially to the ovary, and a single ligature caudally from the same ovary. The ovary was removed with endoscissors. This procedure is repeated on the other ovary as well. The most important critical step in this stage, which has a direct effect on the patient's life, is making sure the ovarian artery was either ligated with the cranial ligature to the ovary or a separate ligature specific to this artery should be done. However, bleeding appeared at the site of right incision in both cases. It did not require any treatment. The whole endoprocedure in both ovaries took 70 min. (Tab. III).

DISCUSSION

At present, the question of bitch sterilisation to induce permanent sterility is getting in the limelight. Up to now preferred methods have required a surgical intervention per laparoscopy. The methods of sterilisation were elaborated and they have been widely used in the human gynecology (Gomel, 1977; Daniell and Herbert, 1984). The endo-stapler technique used to form permanent occlusions of the biliary duct and corresponding blood canal was adapted for formation of salpinx occlusions. It has been found that the permanent occlusion of salpinx can be formed by putting one or two clips on the salpinx concerned. The intervention itself lasted from 20 to 30 minutes. However, it is possible to shorten this time by gaining skill. The great advantage appears to be the fact that disposable applicator is available, with a clip cartridge that can last for several operations. Working canals of the 0.5 cm diameter are necessary at salpinx occlusion by coagulation, however, an electrocauter is also necessary. Demand for extreme caution at coagulation alone not to cause burning of other organs is a disadvantage. The present electrocauter are protected by several circuits and so the work with them, under observing the conditions given by the producer, is comfortable and relatively fast, 10–15 minutes. The presented methods have certain advantages in comparison with similar laparotomy intervention. They require a shorter time interval. Only small wounds requiring at maximum two deep and two superficial sutures are the result of the abdominal cavity perforation. As the intervention is relatively simple, it may be carried out also in dogs of older age categories. The advantages of minimally invasive surgery performed laparoscopically are apparent. Therefore, there is still greater interest in them. They can be applied in veterinary gynecology of bitches at ovariectomy, even at ovariohysterectomy. Small laparoscopic incisions lead to a significant decrease in postoperative
pain. Direct measurements of the pressure in operated wounds have confirmed this fact (Emmermann, 1992). So it is true that the smaller the incision, the less the pain. The laparoscopic procedure may lead in female dogs to fast postoperative normalisation of their health status. This is an advantage, above all, in obese animals and in those with bad wound healing. The owner’s postoperative care of the patient is much easier then (Thiele et al., 1993). Not only ovarioectomy but also ovariohysterectomy may be performed safely with adequate equipament of the laparoscopic unit (von Siegl, 1994). This possibility is given by relatively good accessibility of all the tissues in question by endo-instruments per laparoscopiam. At present, the stapler technique endo GIA is very topical. Its only disadvantage, however, is its high price, but its using ensures for a surgeon maximum comfort at the intervention.

The use of laparoscopic techniques has its contraindications such as advanced endometritis, progressive stages of cysts or tumours and suspicion of extended intra-abdominal adhesions. Using the laparoscopic methods at ovarioectomy and especially ovariohysterectomy remains a domain of specialised clinics due to high prices of endoscopic unit, special endo-instruments and video-technique. As these interventions are relatively long, there is a probability of the failure of cardiovascular circulation, or lung collapse, especially due to Trendelenburg’s position and necessity of pneumoperitoneum (Windberg et al., 1993). The inhalation anaesthesia with assisted breathing through Elvent-unit with ensuring internal homeostasis by solutions appears to be optimal. Further development in veterinary gynecology will show the importance of ovariohysterectomy per laparoscopiam.

CONCLUSION

Technical parameters of the endoscopic optic systems have underwent considerable quantitative development. Therefore today, laparoscopes provide an authentic panoramic picture of the cavity observed. In addition, there is a possibility of some enlargement, which makes visualisation more precise and the picture clearer. At using the laparoscopic techniques the tissue impairment does not occur. Since the surgeon can see details of the organ surfaces (structures about 1.0 mm and less), he can avoid the blood vessels and so prevent unnecessary bleeding. A great advantage of laparoscopy is an immediate possibility of recording on videosystems, compact disk or photographic film. That is why laparoscopic techniques have been adopted not only in human medicine but also in veterinary medicine.

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