

Laparoscopic ovariectomy in rabbits

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Abstract

A comparative evaluation of three different techniques of laparoscopic ovariectomy was carried out in 33 healthy female in rabbits, which included resection and removal of ovary after clip application, electrocautery of the ovary, then resection, and pulling ovary outside abdomen, ligation by silk, then ovary was removed. The ovaries and associated structures were better visualized by laparoscopy and all three techniques were carried out perfectly. All rabbits after operation were healthy and they were monitored for one month after operation. However, 3 of them died after operation, two of them died due to bleeding and the other of them died due to unknown causes. General anesthesia by using ketamine-xylazine i.m., was suitable for this technique, and the anesthesia provided good analgesia and good muscle relaxation. CO₂ was used to establish pneumoperitoneum. In conclusion, resection and removal of the ovaries after clip application technique was found superior to the other two techniques.

Keywords: Laparoscopy, Ovariectomy, Rabbit, Pneumoperitoneum, Xylazine, Ketamine.

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إزالة المبايض بالجراحة المنظارية في الأرانب

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فرع الجراحة البيطرية وعلم تناسل الحيوان، كلية الطب البيطري، جامعة الموصل، الموصل، العراق

الخلاصة

تم مقارنة ثلاث طرق مختلفة لاستئصال المبايض بطريقة الجراحة المنظارية في الارانب. استخدم 33 ارنب محلي سليم حيث تم تقسيم الحيوانات الى ثلاثة مجاميع ضمت المجموعة الواحدة احدى عشر ارنبا. في المجموعة الاولى تم استئصال المبايض بعد وضع الكلبسات، في المجموعة الثانية تم ازالة المبايض بعد ايقاف النزف بالكي الحراري، أما المجموعة الثالثة فقد تم سحب المبايض خارج الجسم عقد الاوعية الدموية ومن ثم استئصال المبايض. تم اجراء العمليات تحت تأثير التخدير العام باستخدام مزيج الكيتامين والزلازين كما تم استخدام غاز ثاني اوكسيد الكربون لإحداث الاسترواح البطني. كما تم مراقبة الحيوانات ولمدة شهر بعد العملية. أثبتت النتائج إمكانية إجراء عملية الاستئصال بالطرق الثلاثة أنفة الذكر بنجاح حيث امكن مشاهدة المبايض وجميع الأعضاء القريبة منه. جميع الأرانب كانت سليمة بعد العملية باستثناء 3 حيوانات اثنان منهم نفقوا بسبب النزيف بعد العملية والثالث نفق بسبب لم يتم التوصل اليه كما ثبت ان طريقة ازالة المبايض بعد وضع الكلبسات انها الطريقة الأفضل.

Introduction

In recent years laparoscopic surgery has become so widespread as to be one of the most popular methods among surgeons. With the introduction of improved

instrumentation, insufflation, and light source equipment, operative laparoscopy has been re-energized as a tool for veterinary surgery. Laparoscopic techniques are generally accepted as being less invasive than the equivalent open techniques (1-2). Laparoscope is a new procedure that has

been called (minimal invasive surgical technique) with very low disadvantage, and it can be done under local or general anesthesia, and it has better cosmetic effect, less pain pre and post operation with a lesser time to stay in hospital. An operative technique for ovariectomy was described more than 100 years ago (3). Ovariectomy is performed to eliminate the negative effects that cyclic estrous behavior had on performance, prevention of estrous, prevention of pregnancy, permitting exogenous hormonal manipulation of the estrous cycle and removal of pathologic ovaries. Rabbit is a useful laboratory animal for many physiological studies. Laparoscopic ovariectomy (LO) have been done very successfully in human as well as in large animals like mare (4-5), but there is no reference to laboratory animals. The purpose of the present study was to apply a standardized method of laparoscopic ovariectomy in rabbits with suitable site for doing with the best method and record any complication which might accompany LO.

Materials and methods

The study was conducted in 22 experimental female local rabbits divided in 3 groups of 11 animals each to compare 3 different techniques. Resection and removal of the ovary after clip application (group I), electrocautery of the ovary in the abdomen then resection ovary (Group II). Ovary pulled outside abdomen ligation by silk than ovary removal (Group III). The standard equipments and instruments (Karl Storz, GnbH, Germany) were used in this study.

The telescope and operating instrument were sterilized in closed formalin vaporizer chamber for at least 24 hours before the surgical procedure. All animals were starved by withholding food and water for 24 hours and 12 hours, respectively.

General anesthesia was induced by i.m injection of ketamine 50 mg/kg, with xylazine 15mg/kg b.w. When needed ketamine injection was repeated. Pneumoperitoneum was created in all rabbits by introducing the veress needle into the abdomen the and connecting to the electronic CO₂ laparoflator unit. A pre selected intra abdominal pressure of 6 mmHg was maintained for better visualization and manipulation in all rabbits during laparoscopic procedure. To achieve this pressure a CO₂ flow rate of 2.4 L/min was used. It provided adequate pneumopertoneum and satisfactory visualization and manipulation in all rabbits.

In group I, animal was controlled in dorsal recumbency, tail and hind limb lifted up while head came down, so bowel throughout site of incision for better visualization. A three stab incisions was made, the first one was made directly above the umbilical by holding the skin with tissue forceps and making 1 cm stab incision by scalpel for 6 mm- telescope trocar. A 5 mm -30 degree

oblique angle telescope was introduced through the trocar. The second stab incision was made at the right flank region caudal to costal arch 5 cm away from the dorsum of the lumbar vertebrae for the 6 mm instrument trocar which was introduced under telescope guidance. The third 11 mm trocar was fixed at the left flank region 5 cm away from the dorsum of lumbar vertebrae.

After fixing three cannulas the ovary was pulled by grasping forceps introduced through the second cannula. (Figure 1). The titanium endoclip was applied to the cranial ovarian attachment using 10-mm clip applicator introduced through a 11 mm cannula. A second clip was applied 0.5 cm away from the ovarian bursa. After the clip applications, the resection from the caudal attachment, cranial to the distal clip, close to bursa and cutting through the uterine horn, mesoovarium and cranial attachment, by using scissors introduced in the third and babcock forceps in the second cannula. The attachments were cut with scissors.

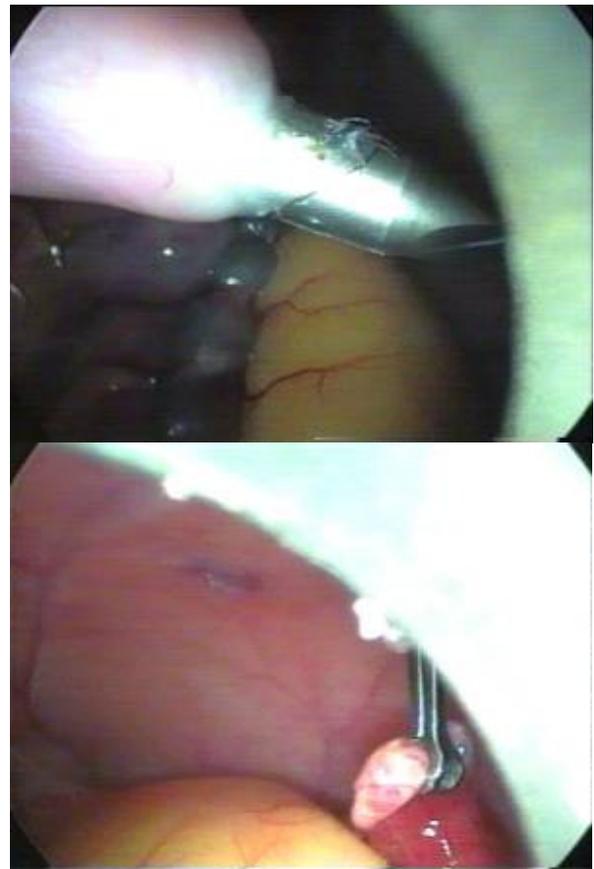


Figure 1: Handling of ovary after introducing cannula in abdominal cavity.

After complete resection of the ovary, it was grasped by a traumatic grasping forceps introduced through the 11

mm cannula and the ovary was extracted out. The other ovary was also removed in the same fashion through the other flank (Figure 2).

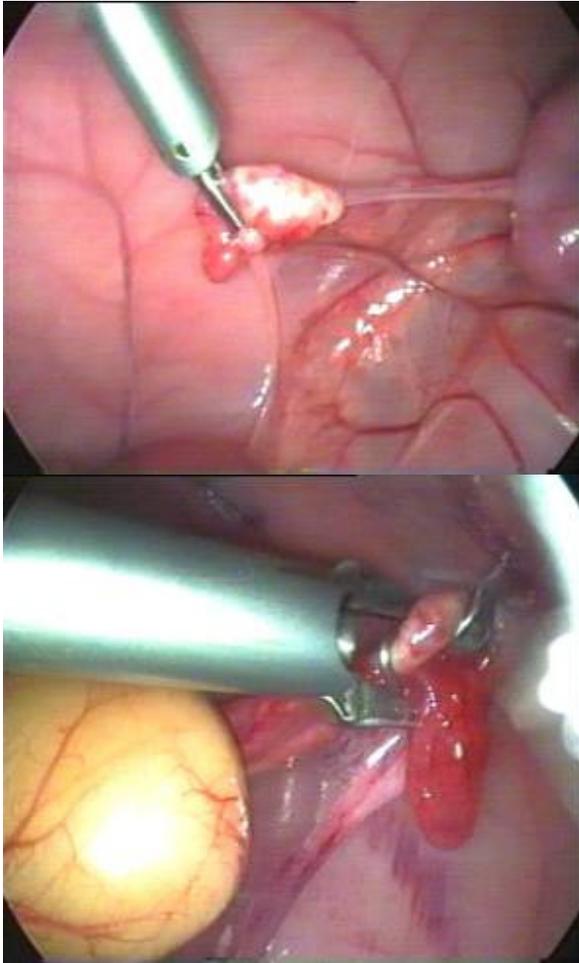


Figure 2: Laparoscopic-ovariectomy by clip application.

In group II, first trocar was introduced in the same manner as described in group I. The ovary was exposed from the bursa using babcock forceps. After exposing the ovary it was held with the help of grasper and cauterized using coagulation current by hooked electrocautery using 90 watt for coagulation than using 120 watt for cutting the ovary. The resection ovary was extracted out through 11 mm cannula by a traumatic grasping forceps. The same procedure was done in the second ovary (Figure 3).

In group III, after exposing the ovary as described before in group I and II, a traumatic grasping forceps was introduced to hold the end of fallopian tube near the base of the ovary, then pulling the ovary out side the body by the grasping forceps, through an 11 mm cannula, ligate the

ovary by silk No.3-0 (trans fixation ligation to prevent the slipping of suture material), cut the ovary by scissors (Figure 4).

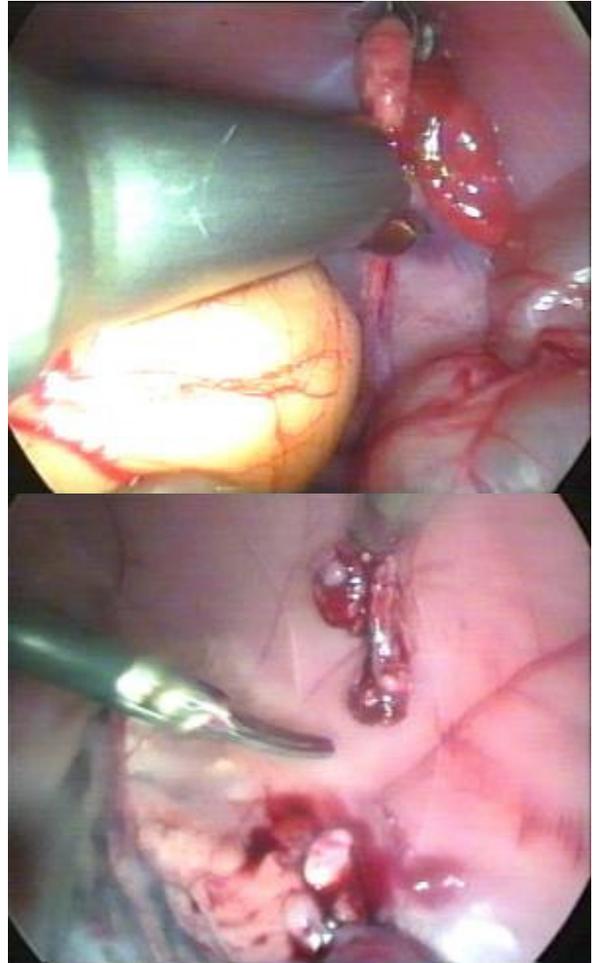


Figure 3: Laparoscopic ovariectomy after cauterization with electrocautery.

The skin incisions were closed with a single interrupted suture using silk No 0. Gentamycine in dose of 20 mg/kg i.m for 3 days was given to all animals. Skin suture was removed on the 7th postoperative day. All animals were maintained for one month. The three procedure were evaluated based on the techniques, and clinical examinations.

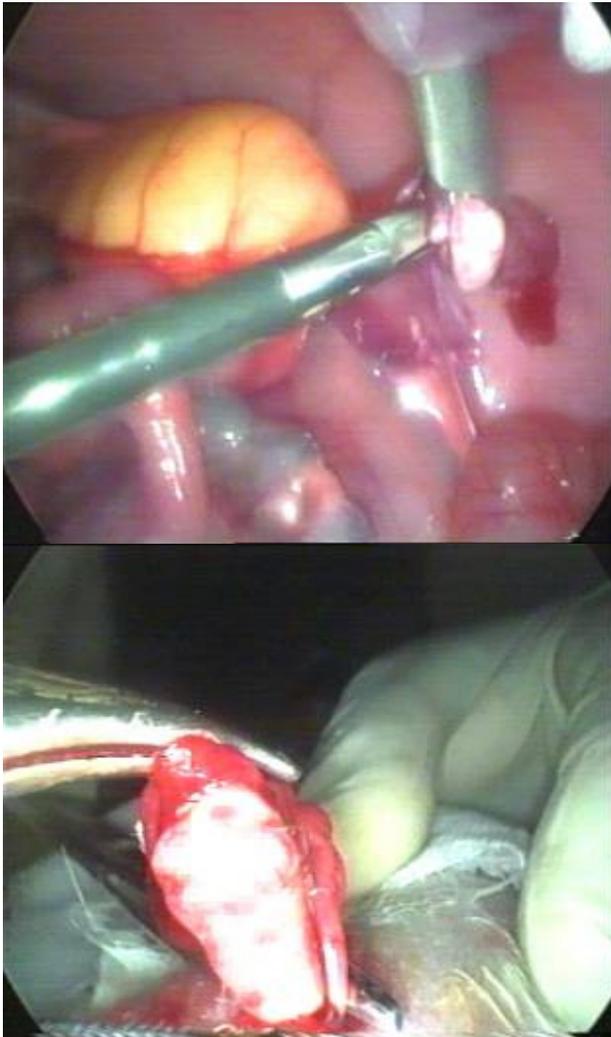


Figure 4: Laparoscopic ovarioectomy after handling ovary out side abdomen.

Results

The mean surgery time for LO; was 36 minute range (range, 29-42 minutes) in method 1, and 32 minutes (range 26-38 minutes) in the method 2 and 26 minute (range 20-29) in method 3, there were no significant differences between the methods. Anesthesia was performed successfully in the laparoscopic ovarioectomy by i.m. using a mixture of ketamine in a dose of 50 mg/kg and xylazine in a dose of 15 mg/kg that gave good and effective anesthesia with good muscle relaxation and minimum side effects.

All three methods used proofed to be safe and can be done for ovarioectomy in rabbits. Dorsal recumbency with keeping the head down was suitable for doing this

technique safely. To perform ovarioectomy three trocars (two 6 mm, one 11mm) were used. Approach through making 3 stap incision, the first one over the umbilical in a ventro median approach and the second one on the right flank and the third one on the left flank in a diameter of 1 cm for each incision is enough for doing this procedure successfully. A 5 mm 30 degree oblique angle telescope was found to be suitable for visualization and to perform surgical procedures. Better visualization and manipulation of the ovary and associated structures were also possible due to proper fasting and emptying of colon prior to surgery. The monopolar coagulation current was 60 Watt, whereas cutting current used for resection and removal of the ovary in group 2 was 90 Watt.

There were no major intra-operative complications encountered in any of the rabbits except for accidental electrocautery of a small portion of peritoneum in 2 rabbits.

Discussion

Ovarioectomy is done in several animal as well as in human as treatment for several affection (3,6). Laparoscopic ovarioectomy as a new procedure has been done in human as well as in mares (7-9). We found laparoscopic ovarioectomy can be done in rabbits either for treatment or for different physiological study. To perform laparoscopic ovarioectomy three trocars were used; the same procedure was done in dogs (10). Theiele et al. (10) performed ovarioectomy in dogs with an intra-abdominal pressure of 10 mm Hg. In the present study, a 6 mm/Hg and in a flow rate 2.4 l/min found to be suitable for rabbits. In the present study, a 5 mm 30 degree oblique angle telescope was found ideal for visualization and to perform surgical procedures as also observed by previous workers (11). Better visualization and manipulation of the ovary and associated structures were also possible due to proper fasting and emptying of the colon (12). The Monopolar coagulation was 60 Watts, whereas cutting used for resection and removal of the ovary in group II was 105 Watts was used. Application of cutting current and simultaneous cutting was found to be satisfactory to separate the tissues (3). There were no major complications observed in any methods used except accidental electrocautery of small portion of peritoneum in 2 rabbits. Petersion and Behruman (13) reported damage, perforation of internal organs and bleeding during trocar insertion and damage to the peritoneal wall during cautery in laparoscopic procedures. The peritoneal wall damage could have been avoided by careful application of cautery.

Xylazine –ketamine mixture can be successfully used for LO in rabbit, it provided good analgesia as well as good muscle relaxation. This agrees with several study using ketamine-xylazine as anesthetic drug in different animal species such as chickens (14), turkeys (15), cats (16), dogs

(17), calves (18), ponies (19), horses (20), sheep (21) and rabbits (22- 23), as well as general anesthetic drug for laparoscopic cholecystectomy in dogs (24), but it seem that there is no references about using this mixture in laparoscopic study in rabbits. Carbon dioxide can be safely used for pneumoperitoneum in rabbits this is similar to finding in man and other animals (25-26).

In conclusion, the second technique of LO by electrocautery was considered to be superior since it was easier to handle and control the hemorrhage after resection the ovaries.

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