

## Laparoscopic nephrectomy in Iraqi cat

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(Received August 18, 2013; Accepted November 6, 2013)

### Abstract

The aim of this study was to standardize laparoscopic nephrectomy and to study its effects on body status and survival possibility on 8 healthy domestic cats from both sexes. Their age were ranged between 1-2 years. The laparoscopic nephrectomy was easy and feasible by using laparoscopy thermocautery tool. The right kidney was removed in all animals. Time consuming, success of operation and post-operative complications were dependent to support this study. The obtained results of the current study showed short time consuming  $30 \pm 1.6$  min. Procedures were successfully done with mild complications. Laparoscopic thermocautery indicated as an efficient tool for cutting and controlling bleeding at the same time. In conclusion, the use of thermocautery for laparoscopic nephrectomy in cats was feasible and exhibited efficient tools for cutting and securing vessels of the kidney, but the tool had a drawback by producing smoke with in abdominal cavity that partially obscuring the laparoscopic vision.

**Keywords:** Nephrectomy; Laparoscopy; Cat; Thermocautery

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### استئصال الكلية بالجراحة المنظارية في القط العراقي

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### الخلاصة

هدفت الدراسة الحالية اعتماد طريقة كمعيار للاستئصال الكلى بالجراحة المنظارية ومتابعة تأثيرها على الحالة العامة للحيوان. اجريت الدراسة على الكلية لثمانية قطط سليمة ومن كلا الجنسين تراوحت اعمارها 1-2 سنة. تم استئصال الكلية بشكل سلس ويسر باستخدام اداة الكي الحراري المنظارية. تم ازالة الكلية اليمنى في جميع الحيوانات و اعتمد الوقت المستهلك لاتمام العملية وتجاهها والمضاعفات الناجمة من جراح العملية كمعايير لدعم وتقييم هذه الدراسة. اظهرت النتائج المستحصلة من اجراء العملية استغراق العملية  $30 \pm 1.6$  دقيقة وقد تم اجراء العملية بشكل سلس وبنجاح ولم تسجل حالة موت او اي مضاعفات بعد العملية لاي حيوان من الحيوانات المعاملة. تبين من هذه الدراسة ان استخدام اداة الكي الحراري كان كافيا لاحداث قطع الاوعية الدموية للكلى وايقاف النزف في ان واحد. نستنتج ان استخدام أدوات الكي الحراري كان مناسباً وأمنة لاستئصال الكلية في القطط حيث تم قطع الاوعية الدموية للكلى بشكل سليم ومن دون نزف. ولكن هذه الطريقة لا تخلو من بعض العيوب ومنها تجمع الدخان بشكل كثيف في التجويف البطني الامر الذي تحجب معه الرؤية.

### Introduction

Kidney diseases are very common in cats and for this reason, they sometimes tend to be considered as almost normal in older felines. It is therefore essential for the veterinarian to know the major renal diseases encountered in the cat, including some of the newer high-profile ones (1). Laparoscopic surgery seems to have considerable

advantages over open surgery, such as decreased blood loss, decreased postoperative pain and less morbidity as well as shorter hospital stay less post-operative complications including hernias, wound infections, as well as promote better cosmesis with the promise of potentially "scarless" surgery (2). However, laparoscopy requires special skills using unfamiliar devices and there is a limited pool of urologist trained in laparoscopy (3). Laparoscopic

radical nephrectomy (LRN) are established procedures for the management of solid renal tumors suspicious for malignancy (4). The application of laparoscopic urological surgery has evolved since the first description of the laparoscopic nephrectomy, trocar access, pneumoperitoneum, and patient positioning reflect aspects unique to laparoscopy that may present specific challenges to the urologist (5). Very successful techniques associated with low complications and conversion rates in the hands of the most experienced as Ovariectomy, ovariohysterectomy, cryptorchidectomy, gastropexy, abdominal organ biopsy, feeding tube placement and cystotomy are carried out with laparoscopic tools (6-8). Recently, a new laparoscopic thermocautery was designed by (9) and was used for many purposes as laparoscopic ovariectomy in donkeys, splenectomy in dogs (10) and nephrectomy in dogs (11). Current study aimed to evaluate the efficacy of newly designed thermo cautery for performance more secure laparoscopies nephrectomy in cats.

### **Material and methods**

The current study was performed on eight adult cats of both sexes. The study approved by Collage of the Veterinary Medicine, University of Mosul. Complete laparoscopies system of KARL STORZ was used in addition to laparoscopic thermocautery which was designed by (9). Animals were given general anesthesia to perform the surgical intervention. Routine preparations were carried out. Co<sub>2</sub> was delivered smoothly into the abdominal cavity in flow rate about 4 L/min. Three ports were suggested to perform operation and applied in a triangular fashion (Fig. 1). The first port (10mm) was on the umbilicus used to establish pneumoperitoneum and introducing the telescope, the 2<sup>nd</sup> port (5mm) applied on the right flank for introducing the laparoscopic instruments, while the 3<sup>rd</sup> port (10mm) on the left flank for introducing the thermocautery. Abdomen was explored and the kidney was peeled, fatty tissue and capsule were liberated from the kidney to expose the renal artery and vein. Thermocautery tool (Fig. 2) introduced in to abdominal cavity via 10 mm port. The renal artery, vein and ureter were circumferentially mobilized together by thermocautery loop (Fig. 3). Numerous pulsation for about 5 seconds were given to produce adequate coagulation of the renal artery and vein, then the power was given continuously for about 3 seconds to sever the renal vessels without any hemorrhage, the kidney was completely free it was grasped by tissue grasper and pulled outside the abdomen through the 3<sup>rd</sup> port with little extension of the port incision to facilitate sliding of the kidney outside. Exploration was done to check for any possible internal bleeding, after that deflation of pneumoperitoneum was performed, ports incisions closed routinely by non-absorbable sutures. All operative animals were examined 4

weeks post operatively. Time consuming, success of operation and post-operative complications were dependent to support this study.



Figure 1: Show Ports for inserting of instruments in laparoscopic nephrectomy.



Figure 2: Laparoscopic thermocautery tool (9). 1. Thermal wire; 2. the two movable arms (length, 7 cm) for holding of thermal wire; 3. outer body (metallic tube with an outer diameter 10 mm); 4. rubber valve to prevent gas escape; 5. internal movable part. 6. on/off switch; 7. source of continuous electrical current (12V, 12 A).

### **Results**

Laparoscopic total nephrectomy was done safely and successfully with no serious intraoperative and post-operative complications in experimental cats. Operations were performed through suggestion approaches of three ports application. First through the umbilicus, second the

right flank and the last through left flank, this approach were suitable for accomplishing all the operations. The cats were showed normal activity alert to surrounded fitting with other cats, normal urination and defecation. Most of the cat took 2-5 days to restore full activity. All treated animals were survive after operation without complications. Kidney parenchymal tissue and urethral tissue still intact with laparoscopic nephrectomy which was performed by thermocautery tool.

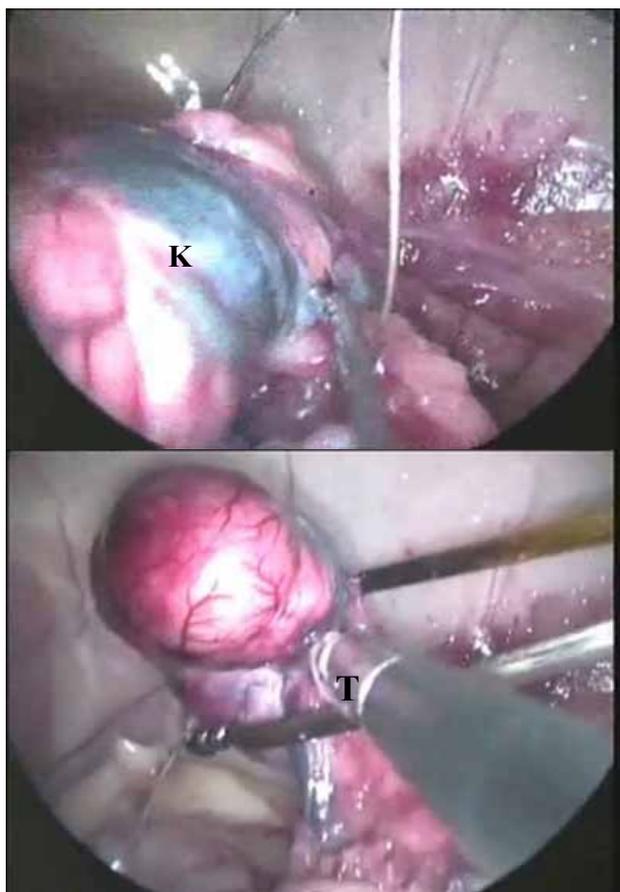


Figure 3: Cat kidney (K) circumscribed by the Laparoscopic (T) thermocautery tool.

### Discussion

Laparoscopic nephrectomy is the safest method by using several techniques as titanium clips but the protocol of cost still the most drawback of this technique (12). The laparoscopic nephrectomy have beneficial advantages over the open approach of nephrectomy as less time consuming, fast recovery (13) and mini complications and excellent cosmetic outcomes in this study (14), and less post-operative pain (15). The using newly laparoscopies

thermocautery tool decrease blood loss and faster recovery less time. The application of newly laparoscopies thermocautery tool was approved more efficiency to control bleeding and coagulation during nephrectomy in the domestic cat. The coagulation of blood vessels occurs due to increased tissue temperature so this operation done with less bleeding and short term outcome this agree with (11 and 16). But the major drawback to it was smoke accumulated within the abdominal cavity that partial obscure vision. So multiple evacuation of abdomen from the smoke was demanded which agree with (17). As compared with classic open surgery, laparoscopic nephrectomy has the same therapeutic effectiveness but with shorter hospital stay time, lesser postoperative pain, and more esthetic results (13). Insufflation with Carbon dioxide can be safely used in rabbit (18) and other animals (19) in dogs with limited effect on physical status and blood gas analysis (20) In conclusion, the using of thermocautery for laparoscopic nephrectomy in cats was feasible and exhibited efficient tools for cutting securing vessels of the kidney but this tool has a drawback as is an accumulation of smoke in the abdominal cavity that partially obscure the vision.

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