

## LAPAROSCOPIC LIVER RESECTION IN THE GOAT

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### ABSTRACT

The aim of this study is to evaluate application of laparoscopy in veterinary surgery and assess the feasibility safety of laparoscopic hepatectomy using thermal energy to control the bleeding after the partial hepatoctomy in the goats. liver enzymes and blood counts were drawn pre and postoperatively with recorded Rectal temperature, respiratory rate and pulse rate and record the time of returning to eat and drink post operation. The abdominal cavity was inflated by the introduction of co2 gas . The result showed that the laparoscopic partial hepatectomy can be easily done in goats without any complications. The mean time of the procedures was 45 minutes (range 40 to 60 min) . The physical parameters were measured preoperatively 1<sup>st</sup>, 2<sup>rd</sup>, and 3<sup>th</sup> days postoperatively ,showed no significant increase in respiratory rate , plus rat and temperature .The Hematological parameters Hb, PCV and Biochemical tests AST,ALT,LDH, Showed no significant increase in number at day1,2,3 after the surgery From the results of this study, it was concluded that the laparoscopic partial hepatectomy can be easily done in goats without any complications.

### INTRODUCTION

The Laparoscopy surgery which is called keyhole surgery is a new type of surgery that decreases the size of incision used by surgeon. It also causes less pain and speed recovery , in addition to reduced risk of adhesion and postoperative wound complication ( 1 ) .Laparoscopy has been in vogue in the surgical practice for nearly two decades now( 2 ). Laparoscopic surgery is widely used for diagnosis and treatment for abdominal and thoracic procedures (3). The use of laparoscopy in veterinary medicine is limited, but surgical application of laparoscopic method is still developing and the procedures have been performed and evaluated in the veterinary literature( 4). Laparoscopic approach to the liver resection was first reported by (5) .

A lot of studies have shown that laparoscopic liver resection for malignant tumor is not only feasible but also safe (6). The first successful laparoscopic anatomical hepatic resection was reported by(7) who performed a left lateral segmentectomy in patient with benign adenoma of liver. A lot of studies have shown that laparoscopic liver resection is not only feasible but also safe . For safe laparoscopic hepatoectomy it is important to have all the necessary equipment (8).

## MATEIALS AND METHODS

Four healthy adult animals from both genders aged 9 months to 1 year and weight ranged 25-35 kg by use heavy weight balance al-wazzan were used in this study. The animals were housed in animal farm, college of veterinary medicine, university of Basrah.

### Laparoscopic Surgery

A review of the laparoscopic apparatus was reported by a complete laparoscopic apparatus supplied by Δ-line. Allgaier instrument company (GmbH-Germany ) were used in this study . The apparatus consisted of the following parts ( Fig. 1). Laparoscopic trolley, Light cable and light source ,CO<sub>2</sub> insufflators ( laparoflater ) ,Laparoscopic camera control system and camera ,Monitor ,Video recordMono polar electrocute,in addition accessory instruments used in the present study. include, verses needle scissors , trochar and canula , telescope, Clips, Clip applicator, Artery forceps,

- \* KEPROMEK SUPER INJ.<sup>®</sup> made by KEPRO B.V. – Holland
- \* Rafoxanide 3% made by ALSHARK - Syria



**Fig.1** : Shows the laparoscopic system which used in the experiment; a- Monitor. b- CO<sub>2</sub> insufflators. c- DVD recorder. d-Video lapro laparoscope. CO<sub>2</sub>

### Electro Cutter :-

It is an electrical device used to stop bleeding inside the abdominal cavity and during skin opening (Fig. 2 ) (Allgaier instrument GmbH Company , Germany).

Fig. 2 - Electro Cutter



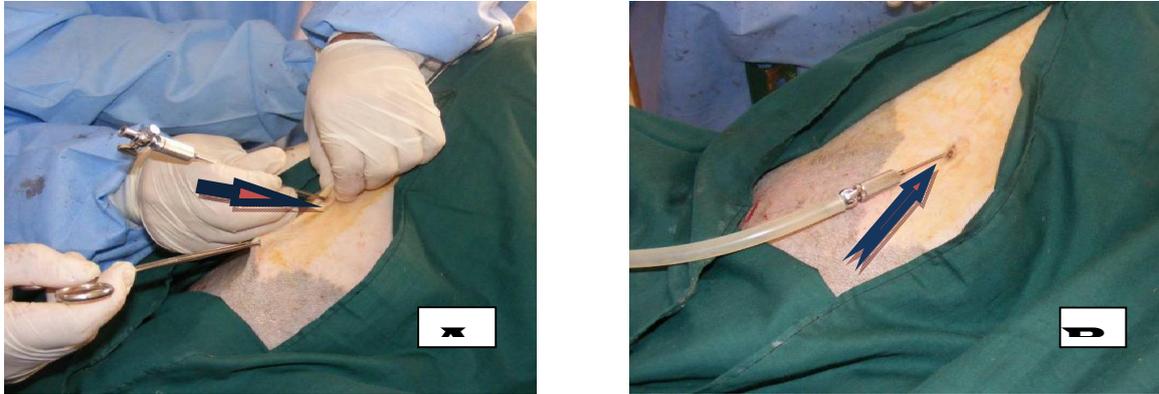
### THE METHODS

The animals of this study were prepared to surgery by fasting for 24 hours withheld of food and 12 hours of water before the operation, the area from the Xyphoid cartilage to pubic region and laterally as far as the flank (9) was prepared aseptically. The skin was scrubbed by bovidine – iodine 2.5%. Preoperative blood samples (zero time) were taken from the jugular vein for biochemical. The animals were put at a dorsal recumbency and covered with surgical drapes which fixed to the skin with towel clips.

### Surgical technique

The technique which performed in this experiment was followed the same technique which mentioned by (18) to explore abdominal cavity by small skin incision of 1 cm was created at the umbilicus region with surgical blade .Tip of mosquito forceps was introduced to clear the subcutaneous tissue and any remaining septa of skin. The abdominal wall was elevated to create space between the wall and the intra-abdominal contents by placing two towel clips one in each side of the incision and lifting, then the veress needle was inserted into the abdominal cavity at 90 degree of elevation angle for the establishment of pneumoperitoneum (Fig.3). Few drops of normal saline were added to assure that the veress needle was in the abdominal cavity before establishing the pneumoperitoneum. Insufflating tube was

connected to the veress needle, and the step cock opened, so, the abdominal wall was elevated. The key parameters of the insufflators included the pressure and the flow rate were fixed at 8-10 mm Hg and 3.5 L/min (CO<sub>2</sub>) carbon dioxide, respectively, after setting the insufflators, it was selected pressure.



**Fig. 3 : Shows the insertion of veress needle**

The veress needle was removed and the trocar-cannula size 10 mm was inserted into the abdominal cavity at the umbilical region with twisting and rotating motion(Fig. 4). The trocar was advanced without excessive force to prevent injury of the viscera.

The trocar was removed while the cannula still inside the abdominal cavity then the telescope was inserted through the cannula. The hose of the insufflators was connected to the cannula, and the abdominal viscera was checked well for the absence of bleeding by trocar or veress needle. The other two trocars were inserted under the vision by the same techniques described previously (Fig. 5). The epigastric trocar was 10mm, and the second port with 5mm in size .They were inserted laterally to the umbilicus (19). The surgeon was standing on the right side of the treated animal with the first assistant, the camera-man, caudally to the animal .



**Fig. 4: Shows the insertion of trocar-cannula into the abdominal cavity at the umbilical region**



**Fig.5 : Shows the insertion of the ports laterally left to the umbilicus.**

The abdominal cavity was explored for any obvious abnormalities. Dolphin nose dissecting forceps inserted to explore the liver and to remove any previous adhesions if found, then fixing and preparing it to partial hepatectomy Insertion of Kelly dissecting forceps, then were connected with laparoscopic electrocautery to withhold liver. The liver part which to remove was grasped by Dolphin nose dissecting forceps, then crush it on the line of resected part by Kelly dissecting forceps Multiple sparks of monopolar electrocautery(the pulsation for 5-7 seconds ) was applied until separation was performed and be sure no bleeding from the resected site. The resected part was removed, then telescope and other parts was removed. The abdominal ports incisions was closed routinely .

## RESULTS

A total of 4 goats under went successful segmental liver resection, and observed normal clinical evolution without any sign of complication or death due to resection and were in good general health and clinical condition.The animal resumed oral food intake immediately after surgery with normal augmentation of body weight. Understanding of the anatomy and patience are very important for success of technique. previous experience showed the laparoscopic surgery was decreases the size of incision1cm (figure 6) in addition to less pain, shorter recovery time and reduced risk of adhesion and postoperative wound complication. Operations were performed under general anesthesia by intramuscular administration of Xylazine at a dose of 0.1 mg / kg B.W. and Ketamine at a dose of 11mg /kg B.W.without complication occurred.

The intra-abdominal cavity was pumped with CO<sub>2</sub> was used successfully at the pressure of 8-10 mm/Hg and 3.5 L/min. The pneumoperitoneum was enough to have clear vision and good manipulation of laparoscopic surgery.

The physical parameters showed no significant increase in respiratory rate, plus rat and temperature Table-1.

Biochemical parameters in plasma Show no significant change in alanine amino transferase (ALT) , aspartate amino transferas (AST) and lactate dehydrogenase at different time, Serum was extracted from blood sample collected without anticoagulant and freezed until analysis time for (ALT, AST ,LDH), Gross anatomy of the liver after laparoscopic showed good healing with faultless restoration process,no adhesions in edges at the site of operation .

The Hematological parameters showed no significant increase in Hb,PCV number at day1,2,3 after the surgery Table 3 .From the results of this study, it was concluded that the laparoscopic partial hepatectomy surgery was successfully done in goats without adverse effect on the animal's health. The result also showed that the laparoscopic partial hepatectomy can be easily done in goats without any complications.



**figure 6: size of incision of laparoscopic surgery**

**Table-1; show no significant change in all physiological Parameters .The respiratory rate ,plus rate and temperature were within normal rate at different time**

Parameters	Before Operation	Immediately after operation	Day 1 P.O.	Day2 P.O.	Day3 P.O.
Pulse Rate (beats/min)	79.75±3.35	84.75±3.038	81.5±3.97	79.00±3.34	79.00±2.415
Rectal Temperature(°F)	39.15±0.25	38.67±0.64	38.9±0.14	38.75±0.386	38.8±0.16
Respiration Rate beats/min	29.25±1.109	33.25± 2.35	33.25±0.85	32.5±0.64	29.5±0.64

**Table- 2 . Show no significant change in all Biochemical parameters in plasma which include AST,ALT,LDH at different time**

Parameters	Before Operation	Immediately after Operation	Day 1 p.o.	Day2 p.o	Day3 P.O.	Normal value
ALT	33.25±2.28	22.0±0.899	37.35±1.52	37.375±1.052	34.55±0.83	15.3-52.3
AST	129.39±1.3552	143.25±2.3071	163.55±1.2237	160.55±1.3	155.45±2.04	66.5-230
LDH	99.25±3.11	82.375±0.925	122.45±3.18	134.5±4.379	127.125±2.217	78.5-265.3

**Table- 3: Show no significant change in all parameters in blood which include ( Hb , P.C.V) at different time**

Parameters	Before Operation	Day 1 p.o.	Day2 p.o	Day3 P.O.	Normal value
HB	9.125±0.66	8.68±0.47	9.00±0.71	9.00±0.63	P>0.05
P.C.V	26.5±1.8	26.25±1.38	26.35±1.61	26.35±1.61	P>0.05

## DISCUSSION

In this study it was noticed that partial hepatoctomy by laparoscopic is feasible and not difficult, these opinion similar to (8),The inject able anesthesia is the method of choice for maintaining anesthesia for prolonged procedure .It was successfully done in goats, in this study no complication occurred as regurgitation delayed recovery and bloat .These results agree with (10) . The respiratory rates, pulse rate, temperature recorded along the operation are significant changes before and after operation. This was recorded also by (11). In his study, he completed partial laparoscopic cholecystectomy in goats .Concerning normal physiological parameters, only the temperature had decreased temporarily after operation and then returned to normal.

The pneumoperitom was successfully in all goats undergoing laparoscopic surgery for partial hepatoctomy ,with minimal complication such as the ones,at the beginng of the experiment.

The flow rate of co2 at 3.5 litter /min, these are electronically equipped to monitor maintenance and control of a constant intra abdominal pressure 12 mm/Hg, by carbon dioxide that agree with (1), (12), (11).However ,carbon dioxide because of its high solubility is rapidly absorbed across the body cavity lining and it is transported in the level of lung and produces a state of hypercarbia if pulmonary ventilation occur in laparoscopic technique ,but in open allless direct entry by open technique ,without any manipulation with (Pneumoperitoneum) and insufflators ,without complication, the abdominal cavity under the direct vision this agrees with (14).Goats were observed daily to record any complication, most of the goats practical their normal activity after recovery from anesthesia, that is similar to the result recorded by (14). No pain after laparoscopic technique is observed, that agrees with (11). But some studies have recorded pain due to manipulation and pressure diaphragmatic muscles fiber because of high insufflation's, this agrees with (15).

The physiological parameters included rectal temperature, respiratory rate, and pulse rate. These parameters were observed before the operation and daily measured for 3 days after operation.There was no significant difference.

A closure of skin in laparoscopic surgery for partial hepatoctomy occurred the hernia in 10mm due to muscle abdominal wall. That agrees with (16). The results of biochemical test showed no significant difference in the main values between the different days .in ALT, AST and LDH. At the same time we did not find any

significant changes in serum protein.(17), (11). , it is a new technique used in surgery which decreases size of necessary incision of the operation with less pain and rapid recovery and may be performed with sedation or in some cases with local anesthesia

### استئصال جزء من الكبد بالجراحة المنظارية في المعز

عبد الباري عباس ساهي الفارس ، جنان عبد العزيز بناي، رنا خلف عبد الصمد  
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#### الخلاصة

هدفت هذه الدراسة الى تقييم تطبيق استخدام الجراحة المنظارية بالطب البيطري كطريقة آمنة وفعالة في استئصال جزء من الكبد باستخدام الطاقة الحرارية للسيطرة على النزف . تم فحص أنزيمات الكبد وصور الدم قبل وبعد العمل الجراحي مع تسجيل درجات الحرارة ومعدل التنفس والنبض وعوده الحيوان الى الاكل والشرب. تم استخدام أربعة حيوانات من كلا الجنسين بأعمار متفاوتة. استخدم غاز ثاني اوكسيد الكربون لأحداث الاسترواح البطني. الوقت المستغرق للعملية ٤٥ دقيقة كمعدل (٤٠-٦٠). جرت متابعة التغيرات السريرية خلال الايام الثلاثة الاولى بعد اجراء العملية، والتي تضمنت سرعة القلب والتنفس ودرجة الحرارة ، لوحظ عدم وجود فرق معنوي. لم تسجل فروقات معنوية في المعايير التي تم الحصول عليها من تحليل الصورة الدموية إلى  $PCV$ ,  $HB$  إضافة إلى عدم وجود فروقات معنوية مهمة للتحليل الإنزيمي التي تضمنت  $ALT$ ,  $LHD$ ,  $AST$  قد تم قياسها بالفترات قبل العملية و ١، ٢، ٣ يوم بعد العملية الجراحية . نستنتج من خلال هذه الدراسة بأن اجراء عملية الإستئصال الجزئي للكبد باستخدام الجراحة المنظارية كان أكثر سهولة واماناً في المعز, أثبتت النتائج عدم وجود أي مضاعفات ناتجة من الجراحة المنظارية .

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