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EXPERIMENTAL LAPAROSCOPY AND INSTRUMENTATION IN DOGS

(With 9 Figures)

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إستخدام منظار البطن الجراحى و الأدوات المساعدة فى الكلاب

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أجريت هذه الدراسة التجريبية على إستخدام المنظار فى خمس كلاب لإستكشاف الأعضاء الداخلية و اخذ عينات من هذه الأعضاء و كذلك لعمل بعض العمليات الجراحية. قبل استخدام المنظار يجب ملىء التجويف البطنى بغاز ثانى اكسيد الكربون بواسطة ابرة خاصة و جهاز نفخ اوتوماتيكى. تم وصف طريقة استخدام المنظار مع مراعاة تطهيره و كذلك الأدوات المساعدة بواسطة محلول سايدكس. الأدوات المساعدة للمنظار ضرورية فى عملية نفخ البطن و التعامل مع الأعضاء الداخلية و اخذ العينات و اخيراً فى اجراء العمليات الجراحية.

SUMMARY

In the present study, experimental laparoscopy was performed in 5 dogs for visualization of the internal organs, biopsy and certain surgical procedures. Before laparoscopy, the abdominal cavity was insufflated using verres needle which was connected with an automatic insufflator and CO_2 gas flow tank. Laparoscopic technique in the experimental dogs was described with postoperative disinfection of the laparoscope and the accessory units using Cidax solution. Accessory instruments were required for insufflation, manipulation of the internal organs, tissue biopsy and surgical operation.

Key words: *Laparoscopy, dogs.*

INTRODUCTION

Laparoscopy is utilized for studying the reproductive function in dogs. The ovary could be completely viewed to determine onset of follicle development and ovulation (Wildt, Levinson and Seager, 1977).

A simplified technique for laparoscopic gastropexy was compared to belt-loop gastropexy in adult male dogs. It was concluded that laparoscopic gastropexy provides a minimally invasive alteration to open abdominal prophylactic gastropexy in dogs (Wilson, Henderson, Montagomery, Kincaid, Wright and Hanson, 1996).

A technique for laparoscopic intrauterine insemination in bitches was described by Silva, Onclin, Snap and Verstegen (1995). After insufflation of the internal cavity a laparoscope was inserted at the midline and about 1 cm behind the umbilicus. An 18-gauge catheter was used to puncture the uterus in the midline between 3rd and 5th mammary glands.

Disinfection procedures for laparoscopes and some patient care instrument were made using a glutaraldehyde for 20 minutes (Rutala, Clontz, Weber, and Hoffman, 1991). Laparoscopic sterilization of the bitch and queen by uterine horn occlusion was performed. Laparoscopic sterilization offers a rapid and safe alternative to ovariohysterectomy and because of its minor invasive nature, could be performed in young prepubertal animals (Wildt and Lawler, 1985).

A laparoscope was almost invariably a rigid endoscope. It was introduced into the peritoneal cavity through a cannula which had been passed through the abdominal wall. The goal of this form of endoscopic surgery was for the surgeon to diagnose and treat various intra-abdominal disorders without the need for larger disabling laparotomy. Laparoscopy allowed visualization of the viscera for the purpose of diagnosis, biopsy or certain surgical procedures (Harrison and Wildt, 1980).

A single puncture technique for laparoscopic cholecystotomy was developed in 100 phantom tests with pig gall bladders and was later evaluated in 12 animal experiments. No complications were observed (Mentges, Buess, Melzer, Gutt and Becker, 1991).

The advantages of laparoscopy in sows and gilts had been compared to those of laparotomy, the intervention took only 20 minutes, the abdominal cavity had no contact with the external world, the whole abdominal cavity was accessible, the risk of surgical shock was lower and it was not necessary to make multiple suturation (Ratky and Wekerle, 1988).

Laparoscopic direction of renal biopsy sampling was evaluated in 37 dogs and on cats suspected of having renal disease. Excessive pericapsular

haemorrhage and severe haematouria developed in one dog (Grauer, Twedt and Mero, 1983). Moriconi, Meo, Bellezza, Bellucci and Di-Meo (1989) described a successful technique for sterilization of dogs and cats using laparoscopy.

Laparoscopic intrauterine insemination of electroejaculated spermatozoa was used to study embryo development in cats inseminated before and after ovulation. The results indicated that laparoscopic deposition of electroejaculated spermatozoa in utero, after ovulation, resulted in a relatively high pregnancy rate (Howard, Barone, Donoghue and Wildt, 1992).

Development of laparoscopic stapling devices and growing experience with a new method made resective and reconstructive operations on the digestive system accessible to laparoscopy. Laparoscopic gastro-jejunostomies was performed in animals for gastric stenosis due to inoperable carcinoma of the pancreas (Brune and Schoenleben, 1992).

MATERIALS and METHODS

The experimental work was carried out on 5 mongrel dogs of both sexes (two males and three pregnant females) at the Surgery Department, Faculty of Veterinary Medicine, Alexandria University. Their weight was 15-25 kgs. The animals were fasted for 24 hours before laparoscopy. The control of the animals during the operation was performed using xylazine HCl (Rompun) in a dose of 1 mg/kg b.wt. intravenously and thiopentone sodium 5% in a dose of 15 mg/kg b.wt. intravenously. The abdomen was then prepared for aseptic surgery by clipping, shaving, washing and disinfection with betadine antiseptic solution.

For insertion of the laparoscopic instruments and visualization of pelvic cavity contents (reproductive organs, colon, bladder), the animal was lied in a supine and head-down position at an angle of approximately 30° (Trendelenburg position). For visualization of the abdominal organs (liver, gall bladder, stomach, spleen) the surgical table was readjusted to a flat 180° plane.

- Xylazine HCl (Rompun, Bayer, Germany)
- Thiopentone sodium (Wien, Australia)
- Betadine (Bovidine iodine, Nile Co., A.R.E.).

Pneumoperitoneum:

For routine laparoscopy, the abdominal cavity was insufflated to create an intra-abdominal space, in order to manipulate the instruments and

visualize the visceral structures. A one cm incision was made on the upper or lower folds of the umbilicus and the abdominal wall was lifted upwards. The verres needle was directed through the midline incision. The sheath of this insufflation needle contains a blunt obturator which retracted over the sharp point after the tip had entered the peritoneal space. The hub of the needle was connected with an automatic insufflator and gas flow tank. The automatic insufflators recorded the external tank pressure, the internal tank volume, intra-abdominal pressure and CO_2 volume consumed (Fig. 1, 2).

Laparoscopic technique:

After obtaining a proper pneumoperitoneum a 1-2 cm midline incision was made in the skin cranial to the umbilicus. The trocar-cannula unit was inserted with a steady twisting motion of the hand and wrist. The cannula had specially designed sheath with one way valves that allowed various instruments to be introduced into the peritoneal cavity without loss of peritoneum (Fig. 3).

The size of the laparoscope used in dog was 10 mm in diameter and the laparoscopic cannula must correspond in size to the type of the laparoscope used (Fig. 4). The laparoscope was inserted into the anterior end of the cannula, and the flexible light cable was then attached to the sleeve of the laparoscope (Fig. 5). Two small skin incisions at the ventral abdominal wall and parallel to the midline were made for introducing the two accessory cannulae through which operating instruments could be inserted directly into the area visualized (Fig. 6).

RESULTS

In dog the most aspect of the urinary bladder, spleen, liver, gall bladder and pancreas were readily observed. Jejunum, lower colon and ventral surface of the stomach were visualized when accessory forceps for manipulation was used.

Biopsy specimens of the internal organs could be readily obtained by laparoscopy for obtaining tissue samples. Two techniques had been used for biopsy, the first involved the use of biopsy needle and the second involved the use of a grasping biopsy forceps. Certain internal surgical procedures were performed such as ovarian cyst, sterilization of dogs, gastropexy, and cholecystotomy.

INSTRUMENTATION:

Light source:

The light source was separated from the laparoscope, and the most contemporary units used either a halide or xenon high intensity light bulbs. The power or light intensity of these machines varied from 100 W to 300 W. Light was transmitted from the source via a flexible light cord which was attached to the proximal portion of the laparoscope. Video camera was attached to the eyepiece of the laparoscope and one or more video monitors were then positioned in the operating room (Fig. 7).

Accessory instruments:

Laparoscopic instruments were inserted through the secondary cannula and used for grasping, dissection, retraction, coagulation, cutting, biopsy and ligation (Fig. 8). There were various specialized instruments designed for one specific use. These instruments were available in 5 mm diameter and 35 cm length, with the exception of the dip applicators which were available in 10 mm diameter (Fig. 9). Grasping forceps were basically designed as either non traumatic or traumatic for holding various tissues without injury.

Allis and Babcock clamps were used to grasp and retract tissues such as the colon, small intestine and stomach. Different kinds of cutting instruments (scissors) had been adapted for laparoscopic use. The jaws of the laparoscopic needle holders had been improved so that they could easily pick up and securely hold a straight or curved needle. Stapling device was used successfully for such applications as cholecystotomy, intestinal anastomosis and ligation of the blood vessels using titanium clips.

POSOPERATIVE CARE:

Following laparoscopic examination, the laparoscope and the accessory units were removed, rinsed in tape water and disinfected by soaking in fresh glutaraldehyde solution (Cidax, Johnson & Johnson, UK) for 15 minutes. The valve of the cannula was lifted open so that the insufflated gas could be evacuated. All the cannulas were removed, rinsed and disinfected with Cidax. A single suture was placed in the peritoneal layer and two to four sutures in the skin.

Following laparoscopy, the equipments were removed from the soaking solution, rinsed with tape or distilled water and dried with clean gauze sponges. Instrumentation was best protected by storing in a padded case.

DISCUSSION

Laparoscopy was used for visualization of the internal organs and for certain surgical procedures such as ovarian cyst, hernia, sterilization of dog and cholecystotomy. Wildt and Lawler (1985) used the laparoscope for sterilization of the bitch and queen by uterine horn occlusion.

After laparoscopic examination the laparoscope and the accessory units were removed, rinsed with tape water and disinfected by soaking in fresh glutaraldehyde solution (Cidax) for 15 minutes. These results are in agreement with Rutala et al. (1991) who advised to use the same disinfectant solution for 20 minutes.

The obtained results agreed with Harrison and Wildt (1980) who reported that the goal of the use of laparoscopy was for the surgeon to diagnose, biopsy and treat various intra-abdominal disorders without the use of larger more disabling laparotomy incisions.

The advantages of laparoscopy had been compared to those of laparotomy, the intervention takes only 20 minutes and the abdominal cavity had no contact with the external world. These results agreed with Ratky and Werkerle (1988), who added that the whole abdominal cavity was accessible, the risk of surgical shock was lower and it was not necessary to make multiple suturation when using laparoscopy. Silva et al. (1995) used a simple technique for laparoscopic intrauterine insemination in bitches. The laparoscope was inserted at the midline and about 1 cm behind the umbilicus.

Before laparoscopy, the abdominal cavity must be insufflated to create an intra-abdominal space, in order to manipulate instruments and visualize the visceral structures. The hub of the verres needle was connected with an automatic insufflators and gas flow tank. This is in agreement with Harrison and Wildt (1980).

Concerning instrumentation, the size of the laparoscope used in dogs was 10 mm in diameter and the laparoscopic cannula must correspond in size to the type of laparoscope used. Accessory instruments were required for insufflation of peritoneal cavity, manipulation of internal organs and obtaining tissue biopsy. The available instruments used for laparoscopy were grasping forceps, biopsy forceps, scissors, needle holder, verres needle, coagulators and clip applicators.

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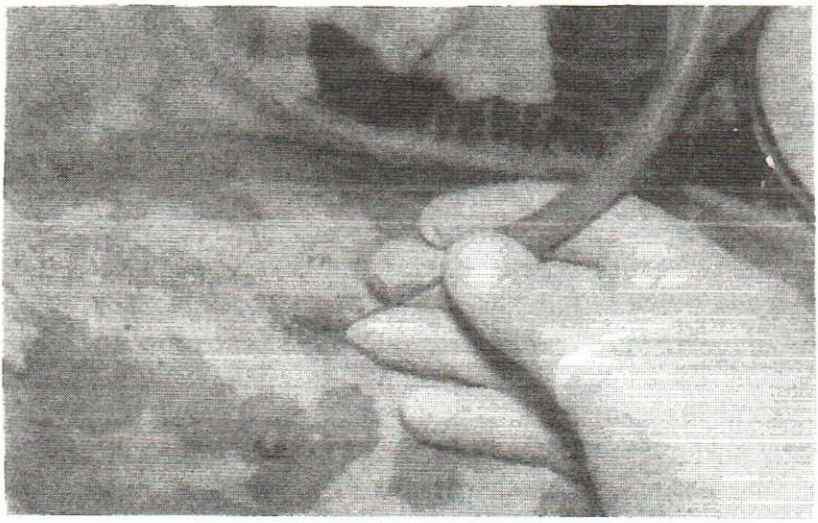

Fig. 1: Shows the use of Verres needle for insufflation.

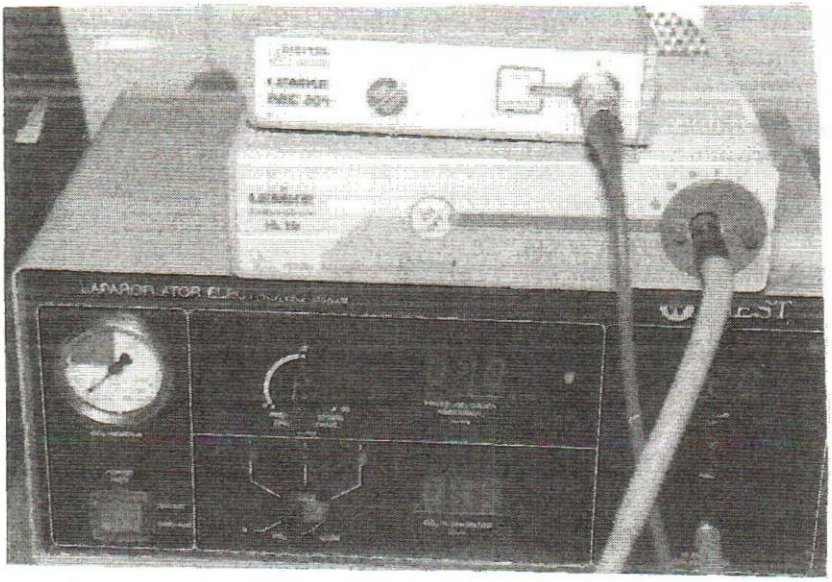

Fig. 2: Shows the automatic insufflator.

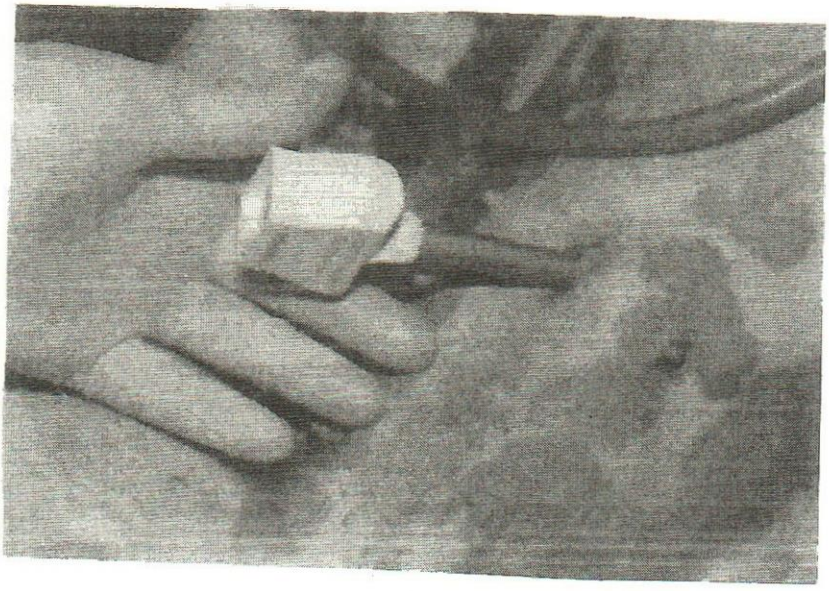

Fig. 3: Shows the laparoscopic cannula inserted in the abdominal cavity.

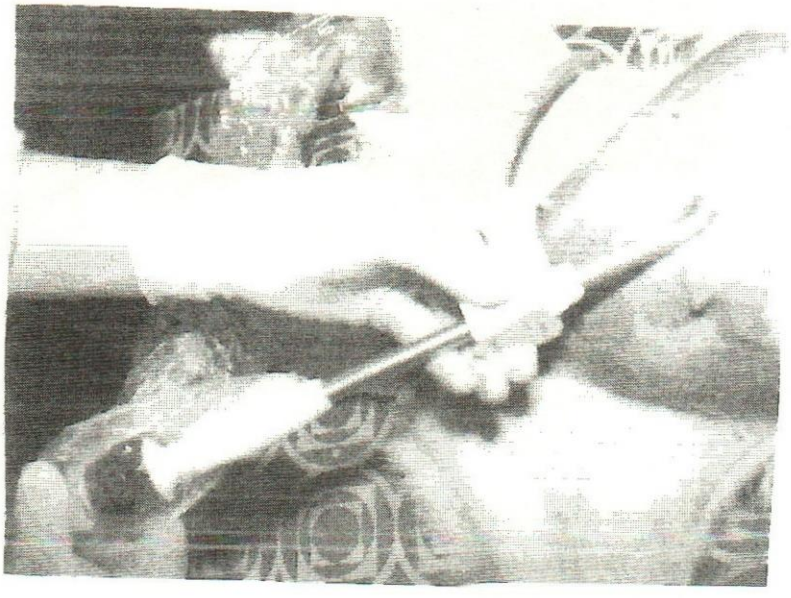

Fig. 4: Shows the laparoscope inserted into the anterior end of the cannula

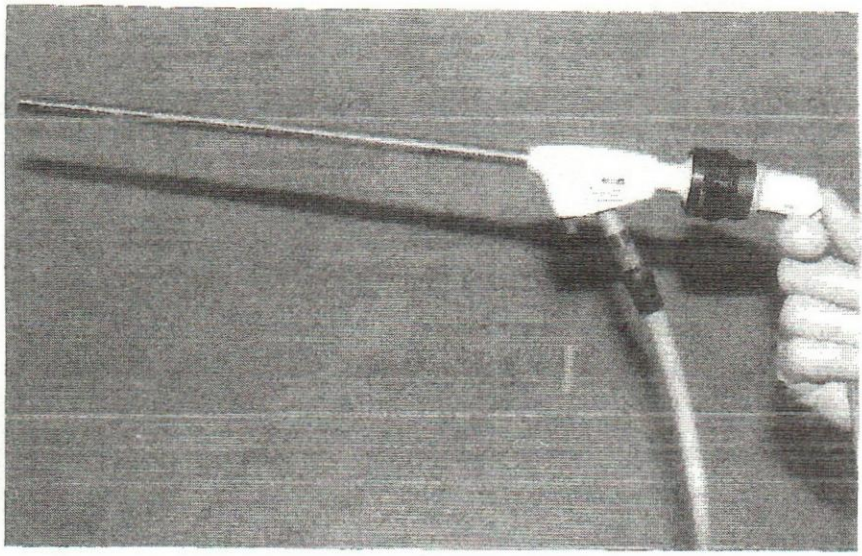

Fig. 5: Shows the video camera attached to the eyepiece of the laparoscope.

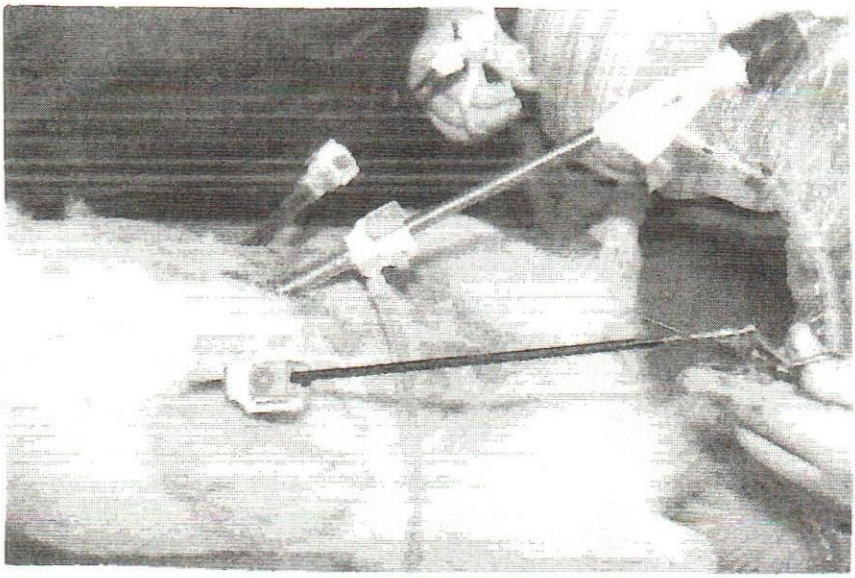

Fig. 6: Shows the accessory instruments which are inserted through the secondary cannula.

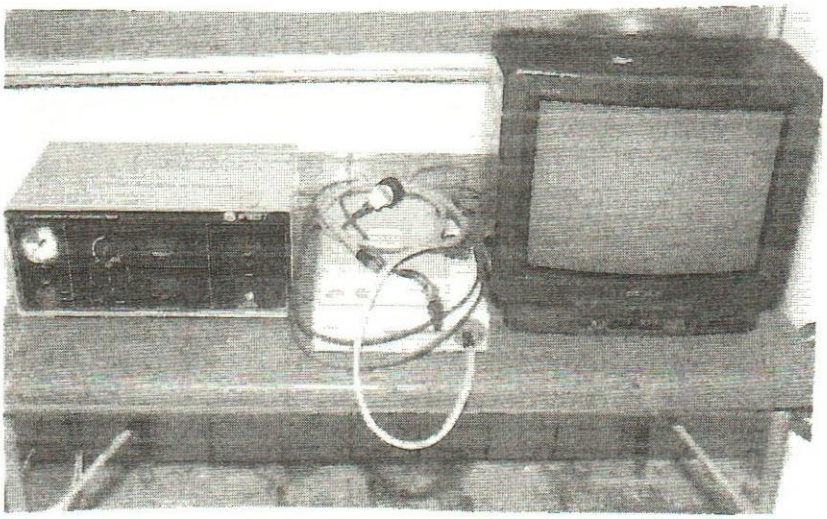

Fig. 7: Shows insufflator, light source and video monitor.

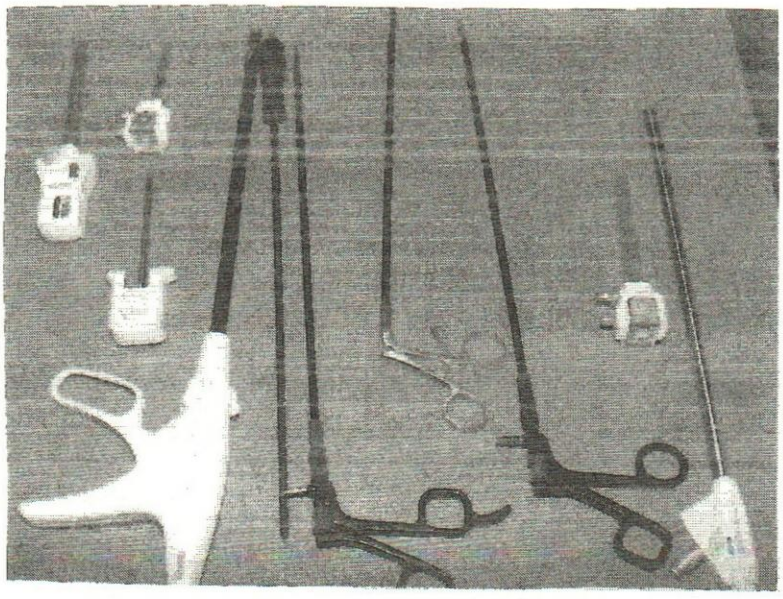

Fig. 8: Shows some accessory instruments.

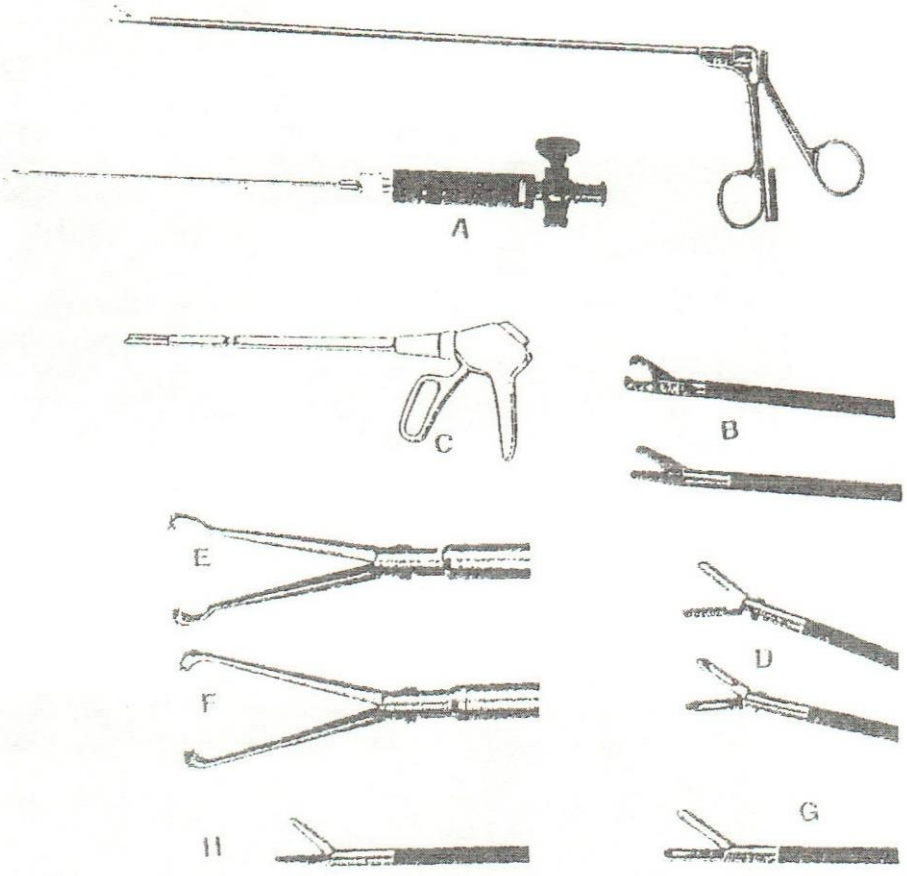

Fig. (9): The laparoscopic accessory instruments.

A. Verres needle
B. Scissors
C. Clips appliers
D. Grasping foreceps
E. Babcock clamp
F. Allis clamp
G. Biopsy forceps
H. Needle holder