LAPAROSCOPY IN SMALL ANIMAL PRACTICE

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Laparoscopy, popularly known as keyhole surgery and video assisted surgery is a valuable diagnostic and therapeutic tool in human clinical medicine. Laparoscopic surgery (scar less surgery) is now considered a better alternative to open surgery. Laparoscopy is one of the emerging techniques in small animal practice.

Optical principles of laparoscopy

A laparoscope is almost invariably a rigid endoscope. A laparoscope is simply a long slender tube with an eye piece at an end through which one can view objects. The choice of an endoscope is based on many factors. The medium sized endoscopes 2.5 to 5mm in diameter is ideal for pets.

Illumination

Illumination is very important in endoscope. Fiber optic light guide is most modern and useful method of illumination. A glass fiber has a core of approximately 25 to 50 micrometers diameter and a cladding of 2 to 3 micrometers thickness. Light falling on the end of the core within a certain angle is reflected initially and travels through the fiber to its terminus, leaving the fiber at the same angle. This phenomenon occurs in spite of any bending or twisting of the fiber. A flexible 6 mm fiber optic light transmitting cable is generally advocated for dogs and other pets to provide more light transmission and hence, better internal illumination

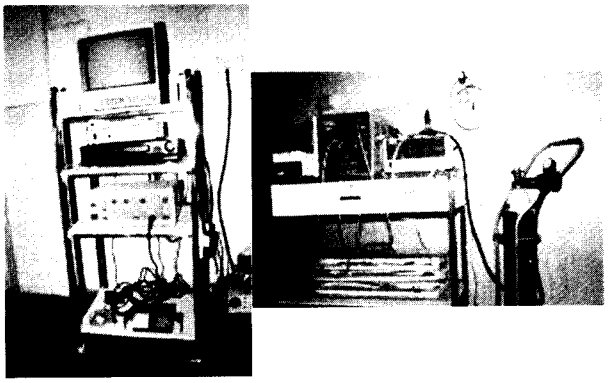
Instrumentation

1 Telescope

The Hopkins rod lens system gives better light transmission, outstanding resolution, contrast, wider viewing angles and provides finer details over the entire field of view. A 0 degree direction of vision provides the operator with a 'normal' field of view and has proven most useful. Forward oblique telescope 30° provides wider view and large area by rotating the telescope on its long axis. Laparoscopes for use in the dog ranges from 2.7 to 10mm in diameter. However, a 5mm diameter telescope is suitable for most cases but one of 2.7mm may be required for toy breeds of dogs, cats and birds. Regarding the trocar and cannula the pyramidal tip is preferred because it facilitates easier abdominal wall penetration. The trocar and cannula assembly should be separate for each size of telescope. The diameter of the cannula is 1mm more than the telescope diameter. Cannula has valve system to prevent escape of gas from the abdomen. A Verres needle 120mm in length and equipped with an on-off luer –lock adaptor is an important instrument for creating pneumoperitonium.

Equipment:

Co_2-endoflator, Halogen/Xenon light source, Fiber optic Light cable,
Suction and irrigation pump and Unipolar / Bipolar Cautery & Coagulator



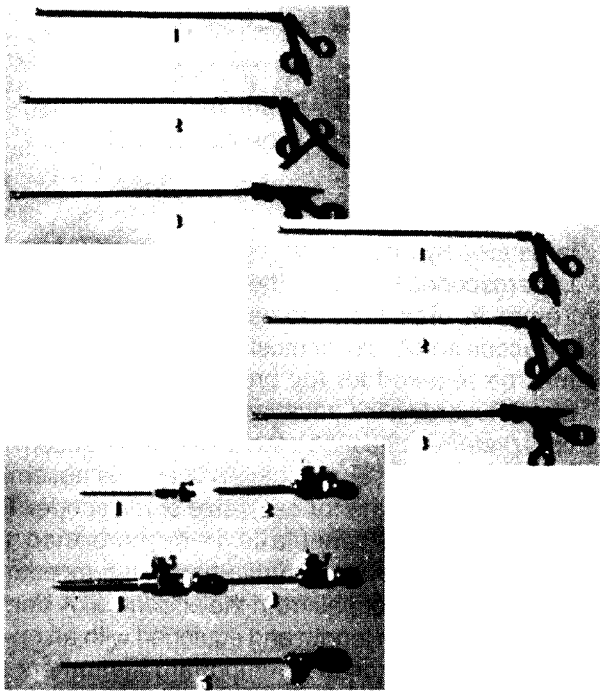
Equipment for laparoscopy

The Standard set in Veterinary Diagnostic Laparoscopy

1.Verres needle 2.Trocars 3.Telescope forward-oblique 4. Palpation probe 5. Biopsy forceps 6.Bowel grasper 7.Biopsy punch forceps 8. Dissecting cannula 9. Inflation bulb 10. Storing system –Formalin vapourisor.

Instruments for other Laparoscopic surgeries:

Scissors (rotation), Clip applicator.



Instruments for laparoscopy

Animal preparation

Dogs should be fasted for 12 to 24 hours and water should be withheld on the morning of the procedure. The urinary bladder, stomach and colon ideally should be empty. Inadvertent puncture of the urinary bladder is possible by the trocar or Verres needle if it is full especially in very small dogs and cats.

Anaesthesia and restraint

Laparoscopy in the dog is performed with the animal in a surgical plane of anaesthesia. Inhalaltion anaesthesia may be preferred if available. The animal is placed on the table in dorsal recumbency or either left or right lateral recumbency. A table that can be tilted to shift abdominal viscera is recommended, since this can enhance visualization in certain cases.

Procedure

In performing laparoscopy, the selection of a midline, right or left lateral abdominal approach depends on the organs to be examined or manipulated. The area is clipped, surgically scrubbed, disinfected and draped. Establishment of pneumoperitoneum is done with one hand simultaneously inserting the Verres needle through the abdominal wall while the other grasp the skin. Generally the needle is inserted in the lower right abdominal quadrant. Than the gas hose from the laparoflator is attached to the Luer-lock and a moderate pneumoperitoneum is established using a flow-rate of approximately 1 litre per minute to a final intra abdominal pressure of approximately 10 to 15 mm Hg. The required insufflation volume depends on the body size. The insufflation volume advocated for laparoscopy of the dogs range from 0.5 -2 lts.

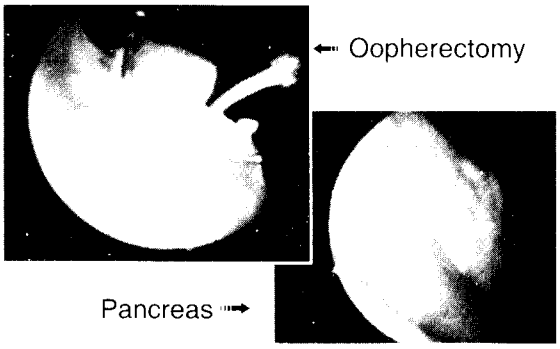
Respirations and capillary perfusion should be closely monitored, since over distension can lead to cardiopulmonary compromise

Midline technique

After obtaining sufficient pneumoperitoneum a 1 to 2 cm midline incision is made in the skin 2 to 4 cm cranial to the umbilicus. The trocar and cannula is held at 30 degree to the longitudinal plane of the animal and inserted through the incision into the abdominal cavity. The trocar is removed and the gas hose from Verres needle is attached to the cannula. The laparoscope is inserted through the cannula into the abdomen. Additional trocars are introduced which acts as additionai ports for instruments. These trocars are inserted through incisions made lateral to the midline depending on the organs to be manipulated. Additional trocars and instruments should be introduced always under telescope guidance.

Lateral abdominal approach

Skin incision is made on the lateral abdominal wall at a variable distance caudal to the ribs. A typical entry site is 3 to 4 cm caudal to the last rib halfway between the ventral midline and the lumbar vertebral transverse processes. The exact position of the puncture site depends on the organ of interest and the size and bodily condition of the animal.



Examination of viscera

The laparoscope may be warmed before insertion to prevent moisture condensation on the distal lens. This can be done by inserting the laparoscope tip in warm sterile saline or holding it in the palm for several minutes. Fogging or contamination of the distal lens is cleaned by touching the tip gentiy against internal organs. Occasionally the laparoscope is withdrawn for cleaning. The operator should begin viewing as soon as the laparoscope is placed within the cannula. Viscera immediately underlying the puncture site are inspected to identify the trauma or haemorrhage resulting from trocar insertion. The entire abdomen should then be systematically examined to detect any abnormalities. A blunt probe (even Verres needle) may be used to manipulate organs or retract omentum to improve visualization.

Termination of examination and Post-operative care

To obviate the possibility of post operative pain, it is important to evacuate the gas. This is accomplised by depressing the trumpet valve and allowing the Co_2 to escape in the cannula. Deflation can be facilitated by gentle massage of the ventral abdominal surface. The instruments are removed, rinsed in tap water and returned to the germicidal soaking solution. Generally a single suture for the peritoneal layer and 2 or 3 sutures for the skin are placed. The need to administer antibiotic depends on the measure of sterility maintained during laparoscopic examination.

Complications

Complications during laparoscopy can be minimized by cautious attention to proper technique. The following complications can occur during and after laparoscopy.

1. Puncture of hollow organs during establishment of pneumoperitoneum.
2. Occurrence of gas embolization after placement of verres needle within a major vessel, spleen or vascular tumour.
3. Subcutaneous or body wall emphysema due to improper verres needle placement.
4. Cardiopulmonary compromise due to excessive pneumoperitoneum.
5. Trocar puncture of visceral organs due to faulty technique.
6. Inadvertent puncture of vessels or structures due to biopsy needle.
7. Excessive haemorrhage from the biopsy site.

Indications for Laparoscopy in dogs and cats include:

1. Direct visual examination of the various abdominal structures including the peritoneum, diaphragm, liver, gall bladder, kidney, spleen, pancreas, ovaries, urinary bladder, stomach and intestines.
2. Diagnosis of early pregnancy or ectopic pregnancy.
3. Biopsy under direct visual control to obtain samples for histopathological diagnosis and other laboratory tests.
4. Surgical breakdown of adhesions
5. Aspiration of bile from the gall bladder.
6. Injection of positive contrast agent into the gall bladder or spleen (for contrast radiography).
7. Bilateral oopherectomy, uterine horn ligation or occlusion or ovarian coagulation in the female.
8. Vas deferens occlusion in the male.

Contraindications

The important contraindications for laparoscopy are peritonitis, extensive intra abdominal adhesions due to previous surgery, advanced cardiac disease, coagulopathy, profound ascites and abdominal herniation (diaphragmatic or inguinal).

Conclusions

Laparoscopy is a very useful tool for direct observation of the organs and the lesions, taking sufficient quantity of biopsy sample from the actual lesion and also to perform minor and certain major operative procedures in pet animals. Before attempting laparoscopy in patients laparoscopic technique has to be learnt thoroughly by the way of undergoing training, observation, practice on endotrainers and assisting laparoscopist. ❑

NEW VETERINARY UNIVERSITY LANUNCHED IN PUNJAB

The College of Veterinary & Animal Sciences, Ludhiana has been upgraded to the status of independent university and named Guru Angad Dev Veterinary & Animal Sciences University with head quarters at Ludhiana.