Material
&
Methods
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The present study was conducted on patients who were admitted in department of Surgery at M.L.B. Medical College, Jhansi in the last sixteen months.

We included all possible cases in our study, of different non acute abdominal conditions e.g. subacute intestinal obstruction (SAIO), adhesions, Koch's abdomen, Liver cirrhosis, Endometriosis, chronic PID, chronic pancreatitis, abdominal malignancies, gall bladder carcinoma, gastric carcinoma, colorectal carcinoma etc.

The patients were assessed prior to diagnostic laparoscopy by detailed history including age, sex, occupation, socioeconomic status, total duration of illness, any treatment received was taken.

Investigations: Following investigations were performed
1. Hemogram – Hb, TLC, DLC, ESR etc.
2. Urine examination – Urine routine and microscopic examination
3. Blood Sugar
4. Blood Urea
5. Serum Creatinine
6. PT/PC
7. Liver Function Test
8. Serum electrolytes – S.Sodium, S.Potassium
9. ECG especially in patients above 50 years
10. Plain X-ray abdomen AP view with both domes of diaphragm
11. X-ray chest – PA view in patients having abnormal sounds on auscultation of chest
12. Special investigation: USG, Barium meal etc.

A physical examination to assess the general condition, P/R, BP, temperature, pallor, icterus, edema, cyanosis and clubbing. Important points in physical examination included search for any significant lymphadenopathy, hepatosplenomegaly, ascites, presence of any other
abdominal lump, oedema of limbs, pain if any (its site and radiation), with systemic examination to rule out any cardiac or respiratory abnormality or any CNS pathology were carried out.

The patients found fit, were subjected to diagnostic laparoscopy in the department and the findings were noted. The results were compared with various currently available investigative procedures like USG, abdomen X-ray studies or FNAC to find out diagnostic laparoscopy an effective method for diagnosing non-acute abdominal conditions in Indian setup.

The role of laparoscopy was evaluated as following :

- To diagnose the cause of non-acute abdominal conditions in these patients.
- To compare the merits and demerits of laparoscopy along with Ultrasonography, C.T. Scan and conventional laparotomy.

Methods

Technique of laparoscopy

Preparation of patient

The patient is fully investigated for liver functions and bleeding diathesis. Important investigations include a complete blood count, platelet count, prothrombin time, X-ray chest and EKG. If massive ascites is present the fluid is aspirated a day prior to the procedure so as to prevent shock due to a sudden release of intra-abdominal pressure.

The patient should be fasted for 12 hours before the procedure. Not only does this lessen the risk of vomiting and aspiration during the technique, but it also allows a general anesthesia to be given, should this become necessary for the management of complications.

The prothrombin time must be checked and if abdominal, suitable therapy must be advised. A prolongation of upto 10 seconds in the
patient can be accepted, but beyond 10 seconds the risk of hemorrhage is considered to be great. However, if the patient is more than 3 seconds prolonged, a liver biopsy cannot be performed at the time of laparoscopy. The abdominal wall should be shaved if the patient is unusually hirsute.

Usually the laparoscopic procedures are done under GA but local or epidural anesthesia can be given.

Ryle’s tube should be put to decompress stomach and Foley’s catheter to evacuate bladder as these organs may be damaged during procedure.

**Position**

Position of patient depends on the area of abdominal cavity to be examined. For upper abdominal cavity usual supine position is good. Examination of pelvic cavity is done in Trendelenburg’s (head end 30° low) position; for spleen supine, head end up with right-sided tilt. These positions displace the other organs like small bowel, transverse colon etc.

**Site of Incision**

The anterior wall is cleaned with Savlon, Alcohol, and Betadine. After sterile draping the site of incision is decided. Usually in patients with an intact abdomen linea alba just superior to umbilicus is the puncture site of choice. It may be 2-3 cm below or above umbilicus. In patients with suspected adhesions and scars of previous surgery left hypochondrium is the site of choice. The areas overlying solid abdominal viscera, masses, old scars and abdominal wall veins should be avoided.

An adequate incision of 1 to 1.5 cm is made through the skin, subcutaneous tissue and anterior fascia.

**Pneumoperitoneum**

Pneumoperitoneum needle (Veress needle) is inserted through the dissected area down to the level of fascia. The direction of needle should be parallel to abdominal wall and towards pelvis to avoid bowel
and major vascular injury. Abdominal wall should be elevated anteriorly by assistant. Steady pressure is applied to the needle so that the tip perforates the fascia and parietal peritoneum with a sound of "PLOP". A syringe filled with saline is attached to Veress needle and first aspirated to make sure that the needle has not entered a blood vessel or the lumen of the intestine. Then saline is pushed gently. If the needle is in the peritoneal cavity the saline-air level will go down with gravity. Now insufflation of CO₂ is started. In local anesthesia NO₂ may be used due to its analgesic action as CO₂ causes some peritoneal irritation.

The insufflation should be done slowly to avoid reflex vagal stimulation due to sudden stretching of peritoneum. The volume of CO₂ required for an adequate pneumoperitoneum (12-14 mm Hg) is on an average about 2 to 3 liters. Patient is closely monitored. If the patient develops arrhythmia's during insufflation it is stopped till arrhythmia is corrected.

*Insertion of trocar and cannula*

Diagnostic laparoscopy usually is carried out with a 5 mm or 10 mm trocar placed at the umbilicus.

The cannula with its trocar is introduced through the incision into the free peritoneal space. The small stab incision is slightly enlarged to provide tight fit around the examining trocar. The trocar is introduced with a drilling - pressing motion (circular back and forth rotatory movements). A hissing noise through the hollow stylet indicates that the higher pressure zone has been entered. Once it is in peritoneal cavity the trocar is removed. The trumpet valve on cannula (sleeve) prevents CO₂ leakage. Telescope is then passed through the cannula.

A second trocar (5 mm for manipulation, biopsy suction coagulation cannula, etc) is introduced under visual control just lateral to rectus muscle, inferior to right costal margin. Finger indentation on anterior abdominal wall helps to decide this site.
Examination and operative maneuvers

Systemic exploration of all four quadrants of abdomen to confirm or exclude a diagnosis is must. Exploration is done carefully, very often the procedure is difficult because of the distended loops of bowel or adhesions.

In case of ascites, it is aspirated and sent for bacteriological culture and pathology.

1. Exploration with laparoscopy begins in the right lower quadrant. The caecum and appendix are examined. Small bowel from ileocecal junction to duodenojejunal flexure is carefully inspected loop by loop. Appendicitis, Meckel’s diverticulitis, tuberculosis of ileum, enteritis, bands, mesenteric lymph nodes are searched for.

2. If no pathology in small bowel inspection through laparoscope is found, pelvic examination in trendelenburg's position is done for any uterine, tubal and ovarian endometriosis, adhesions, cysts and tumors etc.


Paracolic gutters and pelvis can be better visualized with laparoscopy than laparotomy.

4. Supracolic compartment

(a) Liver: Note about size of the lobes, appearance of liver surface, colour, texture, nodularity and consistency. About 2/3rd of liver surface can be examined. Under surface of the diaphragm can be better visualized with laparoscopy than laparotomy.

(b) Gall bladder: Size, appearance, adhesions etc.

(c) Hepatoduodenal ligament, pylorus, proximal duodenum, anterior surface of stomach, both sides of falciform ligament.
(d) Parietal peritoneum: For dilated veins (portal hypertension), adhesions, small whitish nodules (1-3 mm) – take a biopsy, it may be metastatic carcinoma, tubercles, mesothelioma.

(e) Spleen: No biopsy should be tried.

(f) Pancreas: For pancreatitis.

(g) Root of mesocolon at the site of ligament of treitz: edema / hemorrhage discolouration indicate acute pancreatitis.

(h) Lesser sac: For gastric ulcer or pancreatitis.

**Biopsy**

Biopsy is taken through second cannula by a biopsy forcep, whenever indicated. Viewing through the laparoscope a guided “biopsy under direct vision” is taken. Before taking any biopsy from liver the site is palpated. If the lesion is cystic and bluish in appearance – no biopsy should be tried as it may be hemangioma or cavernous malformation leading to hemorrhage. Spleen should never be biopsied.

After taking biopsy the traumatized tissue is burnt with diathermy and direct inspection of the area is done to ensure that there is no further bleeding from the biopsy site.

**Termination of the procedure**

At the end, areas of manipulation are scanned once again to see for any evidence of injury. The abdomen is desufflated and incisions are closed with sutures (vicryl) / clips. Port site hernias are more common when fascial opening is more than 10 mm.

**INSTRUMENTS USED DURING PROCEDURE ARE:**

(A) Insufflation and optical equipment

1. **A Veress Needle**: Used for the initial creation of the pneumoperitoneum.

2. **Cannula**: It is a tube of fixed internal diameter through which instruments are introduced into peritoneal cavity. Internal
diameter may be [5-6 mm (small) or 10-12 mm (larger)]. There is some sort of valve mechanism (trumpet) to prevent inadvertent escape of CO₂. These may be with or without a lockable side port for CO₂ insufflation.

(3) **Trocars**: The trocar passes through the cannula centre providing a sharp point to facilitate passage of trocar (and cannula assembly) through the abdominal wall.

(4) **Laparoscope**: 0° view and 10 mm diameter, with 5 mm light guide cable 20°-40° angled laparoscopes may be needed during adhesiolysis.

(5) **Video System**: It comprises of camera – attached over the laparoscope eye piece single CCD chip 530 lines with PAL – B/G and 150 W.

(6) **Light Source**: High intensity (175 W) light source – Xenon automatic.

(7) **Television Monitor**: High resolution monitor 14” resolution > 600 lines of horizontal resolution PAL – B/G.

(8) **Insufflator**: The insufflator is the machine, which pumps the gas into the peritoneal cavity at a precise pressure and rate (30 ml/minute). CO₂ is the gas of choice for insufflation. Initially 1 - 1.2 L/minute and in high flow 15 L/minute is given under vision with auto heating and capable of blow back with bacterial filter (0.3 micron). For laparoscopic surgery the intraperitoneal pressure is between 12 – 15 mm Hg, which represents a volume of 2.5 – 4 litres in the relaxed peritoneal cavity.

**B) Hand instruments**

(a) **Coagulating instruments**: Probe

(1) Diathermy Hook (with or without irrigation part)

(2) Diathermy spatula

(3) Diathermy bulb/button probe for deep contact or spray with monopolar.
(b) Scissors
(c) Holding forceps – graspers for bowel
(d) Dissecting instruments
(e) Suction / irrigation devices
(f) Trucut biopsy needle
(g) Two 5 mm manipulator ports in flanks.

STERILIZATION OF INSTRUMENTS

Guidelines by the Association of Operating Room Nurses in the USA are:

1. Meticulous care should be taken in mechanically cleansing all parts of laparoscopic equipment.
2. Either high level disinfection / sterilization is an accepting method of preparing instruments.
3. Chemical germicides capable of killing all micro-organism (Glutaraldehyde).
4. Aseptic technique should be used in transferring the disinfected / sterilized endoscopic and other instruments to the sterile surgical field.
5. In the presence of increased risk of infection because of compromised immune systems sterilization is required and not only high level disinfection.

No admission to the described protocol necessary to deal with HIV or Hepatitis B contaminated instruments.

HIGH LEVEL DISINFECTION

1. Ethylene oxide gas – It produces sterile instruments only after 10 hours of exposure. It can cause instrument damage. It is not feasible in high turnover setups.
2. Glutaraldehyde (Cidex solution) – It is most popular agent for laparoscopic / endoscopic instruments. 20 minutes incubation in 20% solution is required. Solution once prepared is
accepted for maximum of 14 days. Well suited for high turnover setup. Disadvantages of glutaraldehyde are – contact dermatitis, rhinitis, asthma, eye irritation. So thorough wash with normal saline is must before use of instruments.
Working Proforma

TOPIC: The Role of Diagnostic Laparoscopy
in Non-Acute Abdominal Conditions

Patient Name:

Age / Sex:

Ward / Bed:

Address:

Date of Admission:

Date of Discharge:

Date of Diagnostic Laparoscopy:

Pre-laparoscopic Diagnosis:

Post-laparoscopic Diagnosis:

Operative time:

Complications:

  Preoperative:

  Postoperative:

Any / Specific investigations:

  X-ray abdomen, USG, FNAC, Biopsy

Presenting Complaints:
Aims of Study

The following are the aims of the study:

1. To ascertain the role of laparoscopy as a diagnostic tool in non acute abdominal conditions in a developing country like India.

2. To compare the efficacy of laparoscopy in diagnosing non-acute abdominal conditions with other available non-invasive methods like USG, abdominal X-ray studies.

3. To obtain tissue for histopathological diagnosis and compare the accuracy of laparoscopy assisted biopsy with FNAC (blind or USG guided).