

# A REVIEW OF GYNAECOLOGICAL LAPAROSCOPY

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## INTRODUCTION

Laparoscopy is the ability to see inside the abdominal cavity via stainless steel tube containing a series of optic lenses.

Historically the first laparoscopy was performed by H.C Jacobaeus in 1910 in Stockholm he used a direct technique not creating a Pneumoperitoneum<sup>1</sup>.

Pneumoperitoneum prior to laparoscopy was introduced by Orndoff in Chicago about a decade later (1920). In an attempt to reduce the injuries to adjacent structures while creating a pneumoperitoneum, Verress from Budapest introduced the retractable needle which retracts the sharp edge on entering the peritoneal cavity<sup>2</sup>.

In its early history, laparoscopy was entirely diagnostic, until 1959 when Raoul Palmer in Paris and Hans Frangenheim in Konstanz pioneered the operative techniques. Hans Frangenheim wrote the first textbook on operative laparoscopy, the book was titled "De Laparoskopie und die culdoskopie in der Gynaecologie"<sup>3</sup>. The followership of these pioneers was such that centres of excellence emerged in this new operative technique. Two of these centres were Clemont – Ferrand located in France and Kiel in Germany, headed by Prof. Maurice Bruhat and Prof. Kurt Semm respectively. Prof. Kurt Semm a trained engineer was involved in the development of much of the original instrumentation.

One of the 1<sup>st</sup> major achievements of laparoscopy was in 1967 when Patrick Steptoe wrote the first English monologue on this technique and this was closely followed with the help of Prof. Robert Edward of Cambridge resulted in the birth of Louise Brown in 1979. This was the first recorded successful IVF birth.

Now over 80% of gynaecological surgeries can be performed by laparoscopy. It is worthy of note to acknowledge Harry Reich of Kingston as the first person to perform a laparoscopic hysterectomy<sup>4</sup>.

## INDICATION

Gynaecological procedures that can be performed laparoscopically can be:

- Investigational
- Diagnostic
- Therapeutic
- Evaluation

### Investigational

- Infertility
- Missing intrauterine contraceptive device (IUCD)

### Diagnostic

- Infertility
- Pelvic inflammatory diseases

- Unruptured ectopic pregnancy (early tubal pregnancy)
- Small pelvic masses
- Congenital anomalies of the genital tract
- Small haemoperitoneum
- Endometriosis (pelvic endometriosis)
- Distinguishing asymptomatic pedunculated fibroids and ovarian tumour.

### Therapeutic

- Tubal sterilization – Commonest therapeutic indication.
- Ovum retrieval during in-vitro fertilization.
- Division of pelvic adhesions, including salpingo-ovariolysis.
- Ovarian cyst aspiration and excision, including dermoids.
- Gamete intrafallopian transfer.
- Division of uterosacral ligaments for the relief of dysmenorrhoea.
- Division of bowel adhesions (enterolysis).
- Laparoscopic uterine nerve ablation and presacral neurectomy.
- Electrodiathermy or laser drills to polycystic ovaries ('pepper potting').
- Ventrosuspension of uterus.
- Myomectomy and myolysis.
- Salpingotomy or salpingectomy for unruptured tubal pregnancy.
- Tubal surgery-(Salpingostomy, fimbrioplasty and reanastomosis.
- Cul – de – sac dissection for dense fibrotic endometriosis.
- Excision or laser vapourisation of endometriosis.
- Oophorectomy.
- Pelvic and Para – aortic lymphadenectomy and pelvic sidewall dissection.
- Repair of uterine, bladder or bowel perforation.
- Laparoscopic hysterectomy and vaginally assisted hysterectomy.
- Segmental excision of large bowel endometriosis.
- Aquadissection and drainage of tubo – ovarian abscess.
- Laparoscopic colposuspension and enterocele repair.
- Uterine repair, ureteronephrostomy.
- Sacrocolpopexy, McCall culdoplasty, Muschowicz pelvic floor repair.

### Evaluation

- Assessment of abdomino-pelvic region after operational procedure.
- Infertility (Evaluation of internal pelvis).
- Undiagnosed pelvic pain.

**CONTRAINDICATIONS**

These can be absolute or relative (Gordon and Magos 1989).

**Absolute**

1. Mechanical and paralytic ileus.
2. Large abdominal mass
3. Generalised peritonitis.
4. Irreducible external hernia.
5. Cardiac failure.
6. Recent myocardial infarction.
7. Cardiac conduction defects.
8. Respiratory failure.
9. Severe obstructive airways disease.
10. Shock.

**Relative.**

1. Multiple abdominal incisions.
2. Abdominal wall sepsis.
3. Gross obesity.
4. Hiatus hernia.
5. Ischaemic heart disease.
6. Blood dyscrasias and coagulopathies.

Many of these contraindications are due to the fact that intraperitoneal gases under pressure are likely to aggravate anaesthetic risks associated with severe respiratory and cardiac disease, due to the effects on acid-base balance, myocardial contractility, venous return and blood pressure

In general gynaecological practice, such contraindication are rare, but abdominal distension secondary to bowel obstruction is an absolute contraindication because of the dangers of bowel trauma and perforation which are likely to exacerbate the condition and can be fatal. Patients should also be haemodynamically stable and clinical shock is therefore a contraindication and the surgeon should preferably perform an immediate laparotomy to stem the haemorrhage rather than subjecting the patient to the further delay implicit in setting up for laparoscopic surgery.

Relative contraindications depend rather on the experience of the laparoscopic surgeon and the anaesthetist. Previous abdominal scars require special skill in the direction of introducing instruments and employing special techniques, such as the Z introduction of Semm, whereby a 5-mm trocar is inserted proximal to the penetration and penetrate of a thin translucent sheet of peritoneum is selected visually, thus avoiding adherent bowel or omentum (Semm & O'Neill-Freys 1989). A safer technique to obtain pneumoperitoneum in a patient with previous mid-line scars is to insert the insufflation needle in Palmer's point, which is situated at the left costal margin in the mid-clavicular line which is an area where adhesions rarely occur.

**TECHNIQUE**

The patient is put in dorsal lithotomy position usually under general endotracheal anaesthesia. Local anaesthesia is also possible, but may require more operator experience. The patient is draped, the bladder emptied and uterus curetted. An intrauterine manipulator is inserted (a cannula and forceps fixed to the cervix) to help in the visualisation of the pelvic organs and dye can be injected through the cannula to test the patency of the tube (tubal "fill" and "spill"). This is contraindicated in pregnancy.

The table is tilted to encourage the intestine to fall away from the pelvis – Trendelenburg position. A Pneumoperitoneum is created by inserting a spring-loaded needle, such as Veress needle designed to minimize risk of visceral perforation, into the peritoneal cavity via a sub umbilical incision through the skin, fat and rectus sheath. This however, increases the chance of the peritoneal tenting from the end of the needle especially in obese women producing surgical emphysema of the anterior abdominal wall hindering further attempts at producing a pneumoperitoneum. Alternatively a vertical incision within the umbilicus is employed which is after all, the scar resulting from the sloughing of the umbilical cord and therefore overlies the area where skin, deep fascia and parietal peritoneum meet. The Veress needle is inserted initially almost at right angles and advanced carefully through the layers of the abdominal wall feeling each layer as it is penetrated for about 1cm before angling forward towards the anterior pelvis. Proper placement of the needle is checked by disappearance of a hanging drop from the needle hub with elevation of the diaphragm (respiration) or injection of 10ml of saline and observation of its passage without resistance. The gas line is then connected flowing at 1 Liter per minute with careful monitoring of gas pressure and volume and insufflation is done with CO<sub>2</sub> or NO. Between 2–4 litres of gas is required. A trocar and cannula large enough to accommodate the endoscope is blindly forced through the abdominal wall, which should by now be elevated from the viscera. The abdominal wall is grasped for counter traction and the trocar is directed towards the hollow of the pelvis. The trocar is withdrawn manually and the valve is opened. A hiss of escaping gas ensures that the instrument is in the peritoneal cavity. The lighted telescope is passed through the cannula slowly and visualization of pelvic organs confirm that the peritoneal cavity has been entered. Gas maybe added intermittently to maintain a good pneumo peritoneum.

In operative laparoscopy a second incision may be necessary for introduction of trocar and cannula at the pubic hairline. A probe or other surgical instruments is passed through the second cannula.

On completion of the procedure, haemostasis is secured, the gas is released from the peritoneal cavity and the instruments are withdrawn. The small skin incisions are closed with a clip or a suture.

**COMPLICATIONS**

Modern laparoscopy is essentially a safe procedure and serious complications are rare. They are essentially surgical and anaesthetic complications.

**Surgical Complications**

1. Haemorrhage
2. Sepsis – very rare and almost always the result of unnoticed bowel injury.
3. Perforation of viscus.
4. Retroperitoneal vascular injury – most catastrophic.
5. Coagulation burns of the viscus. Risk is increased by a poor pneumo peritoneum.
6. Vulval oedema – usually self-limiting.
7. Surgical emphysema of the anterior abdominal wall resulting from insufflation of the abdominal wall.
8. Bowel burns during fulguration are also serious complications of laparoscopy.

9. Increased risk of dysfunctional uterine bleeding.
10. Pelvic pain.
11. Dysmenorrhoea.
12. Port-site metastasis:- tumour cells may be redistributed to port-site during laparoscopic surgery either from contaminated instruments or indirectly via insufflation gas. This may be decreased by gasless laparoscopy or helium insufflation. This suggests that the development of port-site metastasis depends not only on the physical redistribution of tumour cells but also on the specific gas used, possibly because of influences on local metabolic or immune factors acting at the wound site. Gasless laparoscopy has been associated however with less renal subcapsular tumour growth.

#### Anaesthetic Complications

- Pulmonary embolism.
- Myocardial infarction.
- Cardiac arrhythmias.
- Respiratory embarrassment.

Both surgical and anaesthetic complications are frequently the results of lack of adequate experience by the operator.

#### PRECAUTIONS

1. Abdominopelvic examination should always be performed following the general anaesthesia and preceding the operative procedure. This will permit evaluation of the uterus for size, shape and position and the detection of unexpected adnexal and abdominal masses that might interfere with the safety of the procedure.
2. Any suggestion of gastric dilatation resulting from the induction of anaesthesia should result in decompression with a nasogastric tube in order to prevent possible injury during introduction of the trocar.
3. Throughout the procedure careful attention should be directed to the maintenance of an appropriate pneumoperitoneum usually requiring a low flow rate of gas.

#### RECENT ADVANCES

Development in surgical technology demands not only improved efficacy and risk reduction, it also demands a reduction in cost and efficient use of human resources<sup>5</sup>.

Operative laparoscopy is still jockeying for its place in surgical management of gynaecological malignancies, its usefulness in staging these malignancies continues to be investigated, as does its ability to convert abdominal procedures to vaginal procedures<sup>6</sup>.

Laparoscopy remains the investigation of choice in cases of endometriosis – associated infertility and allows the possibility of surgical ablation at diagnosis this improves fertility in minimal to mild diseases whereas Danazol therapy has no benefit hence endometriosis related infertility should be treated as rapidly as

possible with thorough investigation and minimum delay between diagnosis and therapy<sup>7</sup>.

Optical access trocar has been introduced into laparoscopy and its application is practical, safe and handy. It however, requires training in its appropriate use<sup>5</sup>.

Numerous technologic and surgical advances have led to the application of operative laparoscopic techniques to gynaecologic cancers. Operative laparoscopy has been described in the surgical staging and treatment of patients with ovarian, cervical and endometrial carcinoma and it seems to be a very promising approach with the potential to revolutionize numerous aspects of the management of gynaecologic malignancies<sup>8</sup>.

Operative laparoscopy has been used successfully in the treatment of primary ovarian pregnancy<sup>9</sup>.

Adnexae pathology in paediatric patient is treated conveniently by open laparotomy however as laparoscopic procedures are constantly finding wider application in paediatric surgery, the female child presenting with a suspected acute or chronic ovarian lesion may be an ideal candidate for laparoscopic surgery. It appears that laparoscopic approach to ovarian lesion in infancy and childhood is an effective and safe method for diagnosis as well as definitive therapy<sup>10</sup>.

In the diagnosis of lymphoma, laparoscopy can safely provide tissue sample of suspected lymphoma for full diagnostic analysis. It should be considered when percutaneous biopsy is not technically possible, when chromosomal or genetic analysis is needed for treatment decisions, or when the results of percutaneous biopsy are inadequate to make therapeutic decisions<sup>11</sup>.

Laparoscopy appears to be as effective as laparotomy for second look surgery and its use in the treatment of stage II and more advanced ovarian cancer has been reported<sup>12</sup>.

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