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Clinical use of the laparoscope

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Summary

A technique for laparoscopy is described and the indications for operation and the laparoscopic findings in 406 patients detailed.

Introduction

The technique of endoscopic examination of the abdominal cavity was introduced, initially experimentally and subsequently clinically, in the early part of the twentieth century and sporadic reports appeared in the literature over the succeeding years. In 1944, Decker, in the United States, perfected the technique of endoscopic visualization following the induction of pneumoperitoneum by the vaginal route (culdoscopy), but the method, although popular there, has not generally found favour in the United Kingdom. At the same time that Decker was developing culdoscopy, Palmer, in France, perfected the technique of gynaecological coelioscopy by the abdominal route. Since then, instrument improvement and the development of fibre-optic systems employing external coldlight illumination (which removed the risk of thermal burns from prolonged intra-abdominal use) has led to renewed interest in the method, particularly on the Continent.

Much credit for the increased popularity of this procedure here must be given to Steptoe who, in 1967, published his book on *Laparoscopy in Gynaecology* which has brought to the attention of gynaecologists, in the United Kingdom the many advantages of the technique. The historical background of the method is to be found in this book, together with a full description of the instruments initially and currently employed.

In the present paper we outline our experience to date and hope to show the value of laparoscopy and the increasing use and reliance that we have placed on the apparatus, both for investigation and for diagnosis.

The number of patients submitted to laparoscopic sterilization reflects the generally liberal policy adopted in the unit towards this procedure.

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Technique

Although the technique of laparoscopy has been described in detail elsewhere (Steptoe, 1967), points of difference may emerge in individual practice and our method is described briefly below. The procedure is carried out in the operating theatre under general anaesthesia and with full aseptic technique, the instruments employed being shown in Fig. 1, and the theatre deployment in Fig. 2.

1. Anaesthesia

Anaesthesia has normally consisted of induction with thiopentone 250-400 mg, and succinylcholine 50-100 mg; a cuffed endotracheal tube is inserted and the patient maintained on oxygen and halothane, with spontaneous respiration. Occasionally further succinylcholine, in a dosage of 25-50 mg, has been given, the patient being respired by intermittent positive pressure ventilation. Full abdominal wall relaxation has not been found to be advantageous, for penetration of the abdominal wall is easier to judge if there is residual muscle tone.

2. Position of patient

The patient is placed in the lithotomy position with the leg-poles inclined away from the head of the patient at an angle of some 45°. Preliminary vulval and vaginal toilet is followed by catheterization and examination under anaesthesia. The cervix is then grasped with the volsellum forceps and the Spackman uterine insufflation cannula inserted into the uterus, the volsellum being locked to it. It is thus possible to manipulate the uterus and injection of coloured dye into the uterus and tubes can be carried out if necessary. Obviously the insufflation cannula is omitted if there is any possibility of an intrauterine pregnancy.

3. Induction of pneumoperitoneum

The skin of the abdominal wall is prepared, the patient draped and the Verres needle inserted through the skin in the mid-line, immediately below the umbilicus. The needle point is directed under the skin for a distance of 1 cm and then advanced through the subcutaneous tissue and muscle at an

FIG. 2. Theatre deployment during laparoscopy.

metric tissues on the stretch. Should it be impossible to see the tubes and ovaries clearly because of adjacent bowel, the latter can be displaced by means of the Palmer drill biopsy forceps inserted through a separate trocar and cannula.

After visualization of the pelvis and abdominal contents and the performance of other diagnostic or therapeutic techniques as detailed later, the carbon dioxide source and cold light cable are discontinued, the table straightened, the telescope withdrawn and, after evacuation of carbon dioxide gas from the peritoneal cavity, the cannula removed and the skin incision closed with a single Michel clip. The Spackman cannula and volsellum having been removed, the patient is returned to the ward. Under normal circumstances, the patient is discharged the following morning after removal of the Michel clip.

Possible laparoscopic procedures

The laparoscope may be used for visualization of the pelvis and lower abdomen in cases of acute or chronic pain, in the investigation of amenorrhoea or scanty and infrequent periods, in the investigation of tubal function, for visualization of small tubal,

ovarian or uterine masses and for appendix visualization. Operative procedures which may be carried out include lysis of adhesions, tubal sterilization, ventro-suspension and biopsy. The instrument may also be employed in the differential diagnosis of ascites and fluid for cytological examination may be aspirated from the Pouch of Douglas.

Indications in current series

The indications for diagnostic, investigational and operative laparoscopy in the current series of 406 cases are shown in Table 1.

A. Diagnostic/investigational laparoscopy

1. *Acute abdominal/pelvic pain:* One of the more frequent diagnostic problems in gynaecology is that of the ectopic pregnancy. Despite examination under anaesthesia and needle aspiration of the Pouch of Douglas, the diagnosis may remain in doubt and can only be settled by exploratory laparotomy. Similar symptoms may be produced by a leaking follicle or corpus luteum haematoma and mild cases of salpingitis or appendicitis may provide a further problem in diagnosis. The value of endoscopic

TABLE 1. Indications for laparoscopy (406 cases)

Indication	Number of cases	% of Total
Acute abdominal pain	60	14.7
Chronic abdominal pain	90*	22.1
Amenorrhoea/oligomenorrhoea (including three cases of Turner's syndrome)	16	4.0
Investigation of tubal function	46	11.2
Dyspareunia	7	1.8
Ascites	2	0.5
Tubal sterilization with preceding vaginal termination	20	5.0
Tubal sterilization without preceding vaginal termination	150	37.0
Second laparoscopy	3	0.6
Investigation of pelvic/abdominal mass	10	2.6
Carcinoma follow-up	2	0.5

*Lysis of adhesions in three patients.

TABLE 2. Laparoscopic findings in sixty cases of acute abdominal pain

Findings	Number of cases
Normal pelvis	14
Tubal pregnancy	13
Pelvic inflammatory disease	17
Ruptured follicular cyst	9
Varicosities of broad ligament	1
Ovarian cyst	2
Endometriosis	1
Hydrosalpinx and intrauterine pregnancy	1
Uterine myomata	1
Torsion of ovarian cyst	1

TABLE 3. Laparoscopic findings in ninety cases of chronic abdominal pain

Findings	Number of cases
Normal pelvis	52
Old pelvic inflammatory disease with adhesions	16
Endometriosis	8
Follicular cyst	10
Uterine myomata	4

TABLE 4. Laparoscopic findings in seven cases of dyspareunia

Findings	Number of cases
Normal pelvis	3
Old inflammatory disease	1
Mobile retroverted uterus	3*

*Laparoscopic ventrosuspension performed in all.

visualization in establishing diagnosis is obvious, for direct visualization allows the operator to determine the exact site of disease and, in those cases where operation is unnecessary, the patient is spared the discomfort of exploratory laparotomy.

2. Chronic abdominal/pelvic pain: Patients with long standing or recurrent right or left iliac fossa pain sorely trouble the gynaecologist. In most instances, general and local examination reveals no abnormality and, although it may be assumed that there is no serious organic disease, there may be a suspicion that some condition has been overlooked. The knowledge that the instrument is available for direct visualization has led us to a more direct approach to the problem so that one can confidently say whether or not there is abnormality in the pelvis. We have, as has Steptoe, placed an increasing reliance on the apparatus and have been able to save much waste of time in unnecessary investigation. Where there exists definitive pelvic disease, then appropriate treatment is undertaken. We feel that, if the laparoscope were used only on such cases, it would immediately prove its worth to the gynaecologist.

3. Investigation of tubal function: Tubal patency may be determined either by direct visualization of gas passed through the tubes or by the injection of indigo-carmin solution through a syringe attached to the intra-uterine cannula. The latter procedure has been preferred and demonstration of tubal filling can easily be followed as injection of dye proceeds, the free spill from the fimbriated extremity being also witnessed without difficulty. Direct visualization will give information of the position and state of the tubes and, should there be difficulty in visualization of the fimbriated ends, the latter may be lifted into view with a probe or the Palmer forceps introduced through its separate trocar and cannula. We have found on a number of occasions that, where free fimbrial spill was not demonstrated at hysterosalpingography, it was easily seen at laparoscopy. Visualization of tubal filling by indigo-carmin has also been of value in two instances where hystero-salpingography, following laparoscopic sterilization showed peritoneal spill. On both occasions dye could be seen under the peritoneal coat of the tubal remnant, without free spill; we believe that the escape of dye at hystero-salpingography resulted from peritoneal coat rupture due to the pressure employed during injection. Because it can be combined with endometrial biopsy, laparoscopic visualization would appear to be the method of choice in the investigation of infertility.

4. *Amenorrhoea/oligomenorrhoea*: Direct visualization of the ovaries has been employed in cases of amenorrhoea or oligomenorrhoea. We have not to date had recourse to ovarian biopsy, although this could be performed by means of the Palmer drill biopsy. Confirmation of ovulation following the administration of, say, clomiphene is a further use for the apparatus.

5. *Miscellaneous*: Laparoscopy has been carried out in the course of investigation of dysmenorrhoea and dyspareunia. It has also been employed in cases of ascites to determine whether widespread malignant disease was present.

B. Operative laparoscopy

1. *Diathermy coagulation of Fallopian tubes*: The method of tubal sterilization by coagulation diathermy has been fully described. (Steptoe, 1967; Steptoe & Imran, 1969; Liston *et al.*, 1970.) After insertion of the laparoscope, the Palmer biopsy forceps are introduced through the Palmer cannula, the site of the latter being either to right or left of the midline, some 3 cm below the umbilicus. The tube is picked up with the forceps adjacent to the uterus and moderate coagulation current passed until there is blanching of the adjacent uterine wall. The tube is then picked up 1 cm laterally and the procedure repeated. The tube can be divided between these areas using the drill and the cut ends of the tubes inspected to confirm haemostasis.

Because of two cases of peritoneal spill on subsequent hystero-salpingography, probably resulting from escape of dye through the peritonealized surface of the tubal remnant, we have now preferred coagulation without division and have had no further cases in which spill was recorded.

2. *Lysis of adhesions*: Although not a formal diagnosis, lysis of adhesions by means of coagulation diathermy has been employed on occasion, particularly to free the tubes or to separate omentum from the uterus and tubes.

Contra-indications to laparoscopy

Most contra-indications to the technique are obvious—namely the presence of large lower abdominal or pelvic masses (where there exists a risk of perforation by the trocar and cannula) and in severe acute inflammatory disease. Similarly any condition on which general anaesthesia is contra-indicated, or where there might be respiratory embarrassment consequent on the combined Trendelenburg position and pneumoperitoneum, would constitute a contra-indication to the technique.

Previous lower abdominal surgery, with the possibility of adhesions, may make laparoscopic examination dangerous; we were initially deterred

from using the apparatus for such cases, but have now proceeded with the investigation. Adhesions have been encountered but it has been possible to insert the telescope for visualization without adverse effects; nevertheless, care is necessary and the technique is not advised until the operator has become proficient with laparoscopy.

Complications

The most obvious complication is that of failure to insert the Verres needle into the peritoneal cavity. In such cases, as the carbon dioxide is passed through, distension of the abdomen occurs and lateral crepitus may be detected. If not recognized, insertion of the trocar and cannula and subsequent visualization will be of the extraperitoneal tissue and is easily recognized as such. If the gas is released, it is possible to re-insert the Verres needle within a few minutes and recommence the operation. In our series, there were three failures in the first ten cases due to inexperience. There have since been two other failures, one due to obesity and one due to subcutaneous emphysema but there have been none in the last 380 patients. On occasion the point of the Verres needle has passed into the omentum and given rise to gross retroperitoneal gaseous distension. This passes off quickly and there appears to have been nothing more than a transient rise in P_{CO_2} as judged from arterial samples taken during laparoscopy.

Care must be exercised in inserting the trocar and cannula where there is uterine enlargement, for it is possible to wound the uterus as the trocar is pushed through the parietal peritoneum. Generally, though severe complications have been reported (Fear, 1968), we have seen singularly few, these being failure to induce a pneumoperitoneum in five patients, subcutaneous or retroperitoneal emphysema in six cases, and one case where there was abdominal pain and fever some 10 days after laparoscopy, the patient having had a laparoscopic sterilization. The symptoms were thought to result from tubal infection.

Discussion

Assessment of the place of any technique in medicine must be related to the advantage over previous methods, patient safety and subsequent appraisal as to whether the use of the technique has improved the diagnostic potential of the doctor. Whilst examination under anaesthesia combined with clinical assessment remains a standard manoeuvre in gynaecology, there is a limit to the amount of information which can be obtained, and extension of investigation to direct visualization of the pelvic contents is logical and desirable. We have no personal experience with culdoscopy although we have seen it in use; the superiority of the abdominal route is firmly established with us.

Regarding patient safety, minor complications have been encountered but we have seen no major problems in the series under survey. The ease and speed of the procedure, which can be completed in the case of a diagnosis-survey within 15 min, means that there are few patients who cannot tolerate the procedure.

The question of diagnostic potential needs scrutiny. It could be argued that existing diagnostic methods make direct visualization unnecessary, for in cases where doubt exists, exploratory laparotomy will solve the problem. It has been difficult for us to be entirely objective in this direction, although we have tried, on each case, to decide whether or not we should have proceeded to exploratory operation had we not had the apparatus available. On this basis, there were 120 cases in whom exploratory laparotomy was avoided. Conversely, the availability of the apparatus means that we have employed it more freely in the investigation of obscure pain, and there is a potential danger that necessary and informative investigation might be neglected in favour of the immediate use of visualization. We have, to date, avoided this, but recognize it as a hazard in investigational technique.

The ability to obtain direct pelvic visualization has certainly altered the attitude to the 'wait-and-see' principle, for where investigation has proved unhelpful, we have been more aggressive in outlook and have freely employed direct pelvic visualization.

The technique of laparoscopic sterilization by tubal diathermy offers outstanding advantage over the conventional approach at operation. Apart from the ease of the operation, the in-patient stay is reduced from the normal 7–10 days to 48 hr. From an economic point of view, the saving in hospital bed time needs no emphasis; additionally, patients find it more easy to come in for the short period of time and there is less burden placed on the family. In a unit which has for some years been committed to a forthright and aggressive policy of family limitation, sterilization has been encouraged and we have correspondingly made an increased use of the apparatus for this purpose.

The advantages of the laparoscope, both from the diagnostic and operative point are clear. Cohen (1968) has found the chief application in the investi-

gation of infertility and in the investigation of obscure pelvic pathology with pelvic pain. Fear (1968) is enthusiastic about the use of the apparatus, with the emphasis on the investigation of acute or chronic pelvic pain and the investigation of infertility. We regard the instrument as a significant advance in gynaecological management and agree with Steptoe that, as one becomes more familiar with the technique, one will employ the apparatus more frequently and for wider indications. It is now difficult to imagine a return to conditions in which laparoscopic visualization is denied and we would place the weight of our limited experience behind the wealth of experience of Steptoe in recommending its use as a day-to-day instrument in all gynaecological departments.

Conclusion

The clinical use of the laparoscope in gynaecological practice has been outlined and recommendation made for its routine use by all practising gynaecologists.

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