GYNAECOGRAPHY

by

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Gynaecography is a procedure used for demonstration of pelvic viscera by introducing a gas into the peritoneal cavity. Even though it is a simple, safe and a useful method, it has not gained widespread acceptance in routine gynaecologic investigations. A review of the literature reveals that Weber in 1913 used combined pneumoperitoneum and radiological examination to diagnose intra-abdominal pathology. Goetze in 1918, described for the first time radiological visualisation of female pelvic viscera by intraperitoneal gas contrast study. Stein (1927, 1932 and 1950) and Semin *et al* (1966) used the same method along with injection of iodized oil into the uterine cavity. The term 'gynaecography' was introduced by Stein for this combined procedure, whereas Bonham (1963) used the same term for pelvic pneumography alone. Since the method is used mainly to outline the genital organs, we feel the term gynaecography is quite appropriate for pelvic pneumography. In this paper we describe the technique, interpretation, complications and indications of gnyaecography.

Technique

The procedure is similar to that described by various authors (Buice and Gould 1957, Schulz and Rosen 1961, Saxton and Strickland 1964, Kendall 1967). The patient is instructed not to take anything by mouth for about four hours and a cleansing enema is given about one to two hours before the procedure to have the sigmoid colon and rectum empty. An hour before the test, 100 mg of pethidine is administered intramuscularly. The bladder is emptied by a catheter just before the test is begun. She lies supine on a tilting x-ray table that has a shoulder rest attachment. A plain x-ray of the lower abdomen is taken to make sure that the bowel and the bladder are empty. Induction of pneumoperitoneum is then commenced.

This could be achieved through the uterine cavity, if the tubes are patent (Rubin in 1921), through a cul-de-sac puncture (Decker 1946) or via a transabdominal puncture. The transabdominal route is more comfortable to the patient and convenient to the operator. After careful palpation and percussion for possible masses, the abdomen is prepared with antiseptic solution and draped with sterile towels leaving a small area lateral to the left rectus muscle about three and a half centimeters below the umbilicus. If there are scars or masses, the site has to be modified. After infiltrating the site with a local anaesthetic a long fine lumbar puncture needle with stillette is introdu-

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ced into the peritoneal cavity. The abdominal wall is made tense by voluntary raising of the head makes this step easier. The needle is connected via a three-way tap to the source of gas and a 50 ml syringe. Either carbon dioxide or nitrous oxide gas is used. The table is slightly tilted and 1000 to 1500 ml of gas is injected.

The patient is turned to the prone position. The table tilt is increased to 40 degree head down so that the gas ascends to the pelvis and the intestines fall away from the pelvic cavity. The x-ray tube is angled to degree from the vertical towards the feet, resulting in a 30 degree pelvic inlet projection. The central rays enter three to five centimeters below the tip of the sacrum. The film is placed in the Bucky tray. The tube to film distance is kept at 40 inches. A soft tissue exposure is given. The film is developed immediately and viewed. If the tubo-ovarian outline is not clear or if they are placed too close to the pelvic wall, repeat exposures are made with slight pelvic tilt.

After the procedure, the table tilt is reduced to about 20 degree and the patient is turned to the supine position. Some workers (Schulz and Rosen 1961, Frimann—Dahl and Traetteberg 1962) repeat abdominal puncture to remove the gas. We have no experience about this. The patient is returned to the ward and instructed not to sit up for about two hours. If there is much discomfort the foot end of the bed is raised.

Interpretation of Gynaecograms

In normal cases the uterus is seen as a biconvex shadow. The fallopian tubes, round ligaments and ovaries are seen on either side. The parametrium appears as fine lines splitting laterally to form a triangle with the pelvic wall. The urinary bladder is seen flattened out behind the pubic bones, when it is empty or as a convex bulge when it contains some urine. The sigmoid colon is seen posteriorly close to the sacrum.

The findings in pelvic infection depends on the nature of pathological lesions present. The parametrium invariably becomes thickened and the fine parametrial triangle will no longer be visible. Bands of adhesions between the uterus, ovaries and sigmoid colon may be visible (Fig. 1.) If the intestines are adherent to the pelvic viscera, they will be seen in the films, in spite of the steep head-down position (Fig. 2). If there is hydrosalpinx or pyosalpinx the dilated tubes could be made out in the picture (Fig. 3). In the presence of extensive adhesions and masses the pelvic viscera loose their identity in the films.

In the case of primary amenorrhoea the size of the uterus and gonads could be assessed by gynaecography. The presence of small streak ovaries are easily made out suggesting a diagnosis of ovarian dysgenesis (Fig. 4). In polycystic ovarian syndrome, the ovarian outlines are found much bigger. According to Stein and Leventhal (1935) the normal ovary is about one quarter the size of the uterine body, whereas in polycystic ovarian syndrome, the ovarian outlines may be from three quarter to the full size of the uterine shadow in the gynaecogram. When the ovarian enlargement is borderline, the measurements are not reliable. Gross enlargements are easily recognised in the films (Fig. 5).

In those cases who had pelvic surgery, gynaecography may help to find out the nature of previous surgery by revealing the absence or presence of tubo-ovarian outlines (Fig. 6). However, interpretation may be difficult in the presence of extensive adhesions.

Problems and Complications

We have not encountered any serious complications due to gynaecography. One of the problems we had was unsuccessful procedures due to improper placement of needle in very obese as well as in very thin patients, resulting in extraperitoneal gas insufflation. In three obese cases it was due to preperitoneal needle position whereas in two thin patients it occurred due to puncture of retroperitoneal space. Some pain over the abdomen and discomfort were the presenting symptoms. The x-ray films showed mottling in the pelvis and no pelvic viscera were visible (Fig. 7). Screening or a large film revealed the outlines of kidneys. If there is any doubt during induction of pneumoperitoneum, screening would help to differentiate intraperitoneal from extraperitoneal gas insufflation. If the needle is in the proper position, sharp lateral margins of the peritoneal cavity are seen. If the gas insufflation is extraperitoneal, renal outlines are well defined. This is not a serious complication. If it is detected early and the discomfort is only minimal, the needle may be repositioned and the induction of pneumoperitoneum continued. The resulting picture would reveal the outline of pelvic viscera as well as kidneys (Fig. 3).

Another possible complication is occurence of haematoma of the abdominal wall, if the puncture site is over the superficial epigastric artery. This could be prevented by avoiding too low a puncture.

Gas embolism is another complication that may result due to accidental injection of a less soluble gas into a blood vessel. The needle should be checked before induction. If a highly soluble gas like carbon dioxide or nitrous oxide is used, this complication is unlikely.

Penetration of small bowel and nitrous oxide insufflation into the bowel with no discomfort or untoward symptoms has been reported (Schulz and Rosen 1961). This is a possible complication in cases who have had previous abdominal surgery or peritonitis causing adhesions of bowel to the anterior abdominal wall. Penetration of a solid organ may occur if it is situated at the puncture site. This may produce haemorrhage and gas embolism. A careful examination before the procedure would prevent such hazards.

A reflex vaso-vagal stimulation as a result of irritation of the peritoneum may produce a transient syncopal attack within a few minutes. This may also occur when she tries to get up soon after the procedure. This is said to be due to a sudden shifting of the intestines and the mesentery and ascent of a large volume of gas from the pelvic cavity causing a sudden 'mesenteric tug' (Mallik 1967). Continuous coughing on sitting up, vomiting within a few hours after the procedure and pain in the shoulder are the other symptoms noticed. All these are transient.

Indications and Contra-indications

Gynaecography is a very useful procedure to survey the pelvic cavity in obese patients. It is a helpful accessory diagnostic method in cases with hirsutism, primary and secondary amenorrhoeas, oligomenorrhoea and irregular uterine bleeding of unknown origin and a doubtful mass in the pelvis. In suspected ovarian agenesis and intersex, gynaecography would help to reveal the presence or absence of the gonads. Stein (1942 a and 1942 b) has recommended this procedure for diagnosis of suspected unruptured tubal pregnancy, where the affected tube appears as a dense cone-shaped opacity arising from the uterine cornu. An-

other indication mentioned in the literature is before performing culdoscopy on patients with suspected adhesions, in order to avoid risk of injury to the bowels by the endoscope (Schulz and Rosen 1961). It has also been used in endometriosis to observe the effect of pseudopregnancy (Borglin 1965).

There are very few contraindications to gynaecography. It is not a safe procedure for cases with multiple operation scars over the abdomen. Some of the contraindications mentioned are advanced age of the patient, poor cardiac status, the presence of acute or subacute pelvic inflammatory diseases, a tumour completely filling the pelvic cavity (Abrams Hughes 1955), shock and poor surgical risks (Strauss and Cohen 1955).

Discussion

Gynaecography is a simple procedure that does not require much skill or elaborate equipment. Side-effects are very few and no mortality or serious complications as a result of this test have been reported so far. The common gases employed are carbon dioxide, nitrous oxide and oxygen. Carbon dioxide was first introduced by Alvarez in 1921 and is being used extensively. It is absorbed rapidly from the peritoneal cavity and therefore exposures should be made quickly if repeat films are to be taken. Nitrous oxide has been used by various workers and is said to have similar advantages of rapid absorption and causing the least discomfort (Buice and Gould 1957, Schulz and Rosen 1961). Oxygen is less soluble and is absorbed slowly from the peritoneal cavity. It is easily available and useful when repeat exposure are required due to its slow absorption. (Stewart and Stein 1919, Thomas *et al*, 1968).

Interpretation of the films is not difficult. A method of calculating ovarian index to diagnose enlarged ovaries has been described by Kreel *et al* (1969). We had 17 cases of clinically suspected polycystic ovarian syndrome out of which only eight had radiological evidence of enlarged ovaries. In some cases we have been able to demonstrate adhesions. We have obtained laparotomy confirmation of x-ray findings in 10 cases with good correlation. In addition to detection of abnormal pelvic findings gynaecography helps in avoiding unnecessary laparotomy with demonstration of normal pelvic organs. We encourage a wide employment of this valuable aid to gynaecologic diagnosis.

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See Figs. on Art Paper III and IV