

Innovations and Improvisations in Gynaecological Endoscopy

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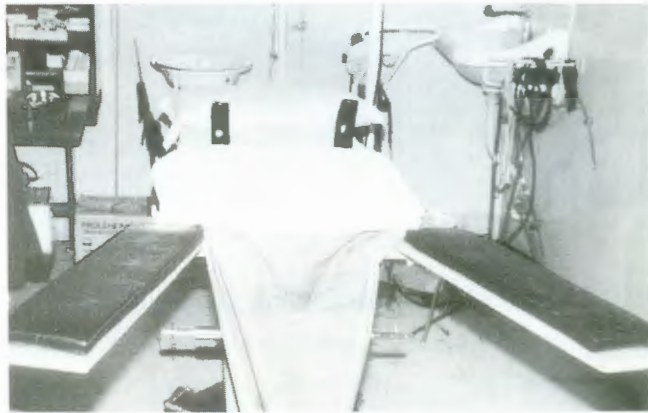


Fig. I New position for Laparoscopy.

Introduction

Gynaecological Endoscopy has advanced by leaps and bounds in the last decade or so. Almost all the gynaecological surgeries can be tackled endoscopically. However, it entails acquiring sophisticated expensive, imported armamentarium. The author has introduced several innovations and improvisations which can allow gynaecologists especially in the developing world to perform endoscopic surgeries at much lower cost and with full safety to the patients. The various innovations and improvisations are described in detail :

A. Laparoscopy

1. Position : Position used is supine with legs abducted 30 degree to 50 degree in a 'V' formation on 2 leg extensions made of Plywood 2 meters long, 6" wide and 1" thick with a cushion (Fig. 1). The upper part of plywood leg extensions are pushed under the patient's body and fixed to the operation table with side clamps. However, new electronic operation tables have built in metal leg extensions which can abduct

the leg in a 'V' formation. This position is used at Polyclinique, Clermont-Ferrand. The advantages of this position are :

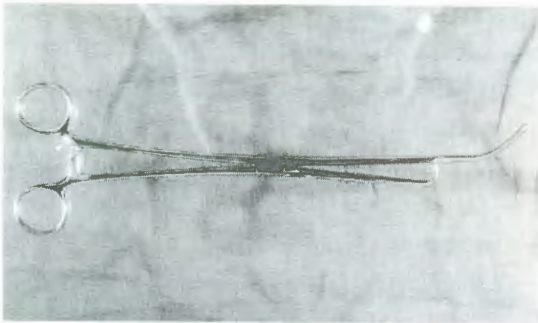
1. Patient lies in a comfortable position.
2. Vagina is easily accessible for introducing uterine manipulators and other instruments.
3. Hysteroscopy can also be carried out.
4. Second puncture accessory instruments can have a full range of movement without the thighs obstructing them.
5. Venous return from the lower limbs is facilitated. There is pressure on the popliteal fossa with knee support rods, impeding venous return.
6. The assistant can stand between the legs and help more efficiently
7. The view of T.V. monitor is unobstructed by the thighs of patient.

II. Anaesthesia

- A) Local with neuroleptanalgesia especially Ketamine. This is adequate for diagnostic laparoscopy, diagnostic hysteroscopy and basic to intermediate laparoscopic/hysteroscopic surgeries. Ketamine administered I.V. in small boluses gives very good analgesia.
- B) Regional (Spinal or epidural) is used for advanced endoscopic surgeries.

III. Uterine manipulator (Khandwala 1984)**a) Speckman's Cannula : (Fig. II)****Fig. II Speckman Cannula with weight**

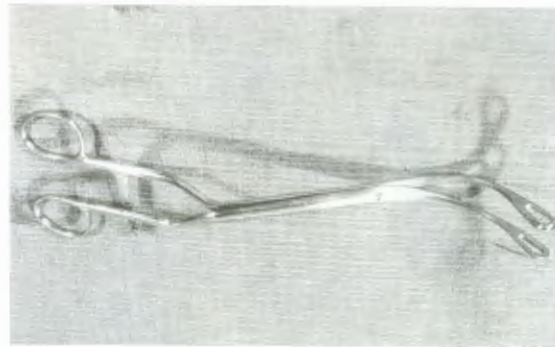
The ideal uterine manipulator is the Speckman's cannula. This is self retaining and allows chromopertubation and keeps the uterus anteverted. A brass weight of 100 gms hung on to the rings of the cannula keeps the uterus well anteverted and acts as a dumb assistant.

b) Tenaculum cum sound: (Fig. III)**Fig. III Modified Hulka tenaculum cum sound**

This is used for nonpregnant and 6 weeks' postabortal uteri. This is a modification of the Hulka tenaculum cum sound. The length of malleable sound beyond the tenaculum is 5 cms and the tenaculum is situated posteriorly. Many women seeking laparoscopic sterilisation in mass rural programmes in India are lactating women with small superinvolved uteri. The tip of Hulka tenaculum cum sound used to perforate these small uteri. Therefore, the length of malleable sound beyond the tenaculum was reduced to five cms thus avoiding perforation. The tenaculum was placed posteriorly, so that the sound can go deeper in normal

sized or six weeks' postabortal uteri and the tenaculum will bite deeper in the posterior fornix safely, in contrast to the anterior tenaculum which can injure the bladder. The posterior tenaculum also is useful to expose the posterior fornix for passing the Veress' needle in cases where pneumoperitoneum is desired by the vaginal route.

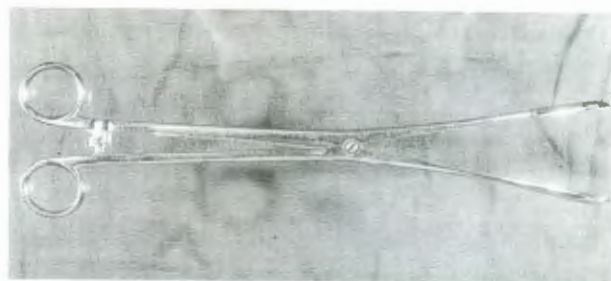
This can also be used for diagnostic and operative laparoscopy for cases not needing chromopertubation.

c) Medium Ring Manipulator : (Fig. IV)**Fig. IV Medium Ring manipulator**

This is used for 8 to 20 weeks' postabortal or late postpartum (6th day and later) cases. This is a modification of the Hulka ring manipulator for postabortal cases. Here, the leaf spring is replaced by a ratchet mechanism near the finger grips. This is more economical and sturdier. The instrument is curved and the ring tips can be passed through a eight mm dilated cervix. When the finger grips are approximated the rings open in the uterine cavity, thus making it self retaining.

d) Large Ring Manipulator : (Fig. V)

This is used in early postpartum (2nd-4th day) cases. The

**Fig. V. Large Ring manipulator**

design is the same as the medium ring manipulator. It is longer (30 cms), sturdier and less curved and the terminal ends are spoon shaped. This allows safe manipulation of the large heavy uterus in these cases.

IV. Air Pneumoperitoneum

Room air passed through a microporefilter is used for creating pneumoperitoneum. An electronic air insufflator (Fig. VI) which allows air insufflation at rates varying from ½ to 6 litres per minute and at pressures not

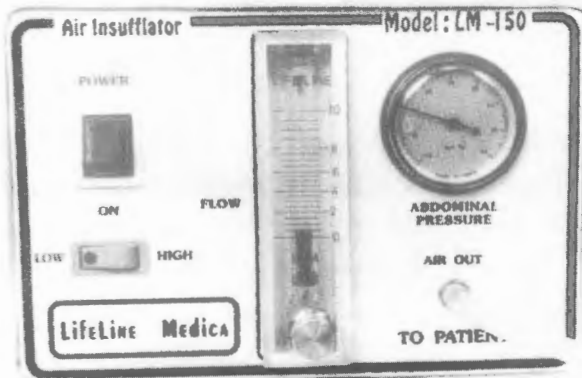


Fig. VI. Electronic air insufflator

exceeding 12 to 15mm Hg is used for creating pneumoperitoneum. There is no risk of air embolism even during laparoscopic surgeries unless the Veress' needle is in a blood vessel and air is directly insufflated into a blood vessel. The Indian Association of Gynaecological Endoscopists' survey (Khandwala 1993) reports mortality from air embolism in 4 out of 494,319 laparoscopic sterilizations (0.8 per 100,000) and nil in 2612 laparoscopic surgeries using air (Khandwala 1994). Chamberlain (1978) reports mortality from CO₂ embolism causing hypercarbia in 3.4 per 100,000 in an RCOG survey of 29,661 laparoscopic sterilizations. The Indian Association of Gynaecological Endoscopists (Khandwala 1993) has officially resolved that "Air is safe for laparoscopy - both diagnostic and therapeutic".

V. Technique for inserting Veress' needle and Trocar Cannula

The patient under local anaesthesia is requested to blow out her anterior abdominal wall actively and Veress' needle as well as the trocar cannula later is passed against patients' active resistance. Here the whole abdominal

wall is elevated by patients' abdominal muscles. In classical techniques, it is difficult to lift the whole abdominal wall with hand, especially the muscles and peritoneum, resulting in wrong placement of Veress' needle and trocar cannula. This is more so in nullipara and obese women.

VI. Simple Irrigation / Suction Device (Fig VII)

An ordinary table model suction machine is used. A Y-

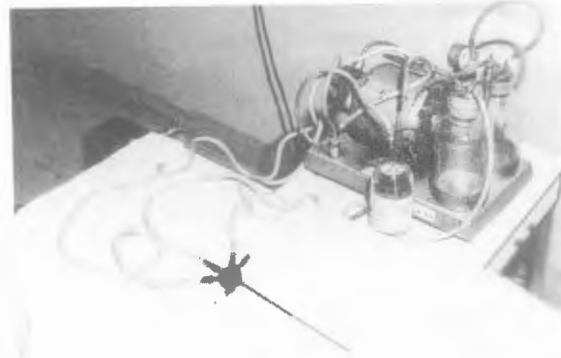


Fig. VII. Simple Irrigation / Suction Apparatus with multipurpose 'PEPSI' cannula

connection is attached to its air outlet. One limb of Y is attached to a microporefilter and tubing with needle which is inserted at the top of a ringer lactate / normal saline bottle. The other limb of Y is connected to a valve stopcock which can control the pressure of air going into top of saline bottle. The saline bottle is connected by tubing to irrigation / suction cannula. The air pressure building up in the bottle pushes saline under pressure for irrigation. The suction end of the irrigation / suction cannula is connected to the suction bottle of the same suction machine. Thus an originally suction machine connected to suction / irrigation cannula can be used as Aquapurator or Pelvicleaner for both suction and irrigation under pressure in a closed circuit fashion.

VII. Double ring Loading mechanism for Laparoscopic silicone Ring Sterilization (Khandwala 1984) (Fig. VIIIa,b)

This is a simple rubber washer two mm thick with a key hole slot. This goes between the slide and the thumb ring of the standard ring applicator. Two rings are loaded on the tip of the ring applicator. After the first ring is shot off on one tube, the rubber washer is removed and



Fig. VIIIa. Double ring loading mechanism using a rubber washer (separate)



Fig. VIIIb. Double ring loading mechanism with rubber washer in situ.

now the second ring can be applied to the other tube, without removing the applicator. This is very simple, inexpensive mechanism compared to those available by several manufacturers.

VIII. Shorter (22 cm) Laparoscopic Accessory instruments (Fig. IX)

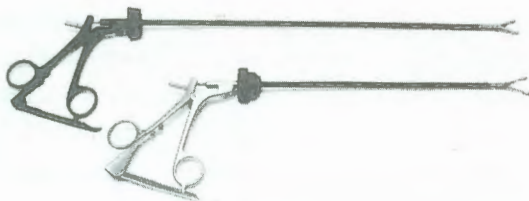


Fig. 9. (above) Standard (34 cm) second puncture accessory (below) Shorter (22 cm) second puncture accessory.

Shorter (22 cm) laparoscopic accessory instruments are ergonomic. They can reach any part of pelvic cavity and even the iliac fossa from left or right lateral ports. These shorter instruments compared to standard (34 cm) instruments are more stable as the operating handles

remain close to the abdominal wall. The arms of surgeons and assistants are abducted almost at right angles when grasping the handles of standard instruments. This causes fatigue, especially in prolonged laparoscopic surgeries. As the greater part of standard instruments remain outside the abdomen, the instruments are not easily controlled and the handles tend to rotate, thus twisting the tissue caught inside. Also small precise movements at the tip of instruments causes greater strain on surgeon's hands.

Thus these shorter laparoscopic accessories are stable, precise, easy to use and cause minimal fatigue and strain to surgeon's and assistant's arms.

B. Gasless Laparoscopy

1. Khandwala Laparotom : (Khandwala 1997)

- a) **Towel Clips:** (Fig. X) A single towel clip is applied midway between the umbilicus and symphysis



Fig. X. 'Laparotom' using a single towel clip for gasless laparoscopy.

pubis. This is attached to a hook and chain and elevated maximally and fixed to the hook on the tip of the right angled lithotomy rod, which is fixed to the side of the operation table. This gives good elevation of the abdominal wall like a tent in an average patient for gasless laparoscopy.

- b. **Steinman Pin** (Fig. XI) In obese patients a Steinman pin is inserted under laparoscopy control from the left lumbar region and brought out in the right lumbar region. A chain is attached to either



Fig. XI. Gasless Laparoscopy using a Steinman pin as a 'coat hanger'

end of the Steinman pin and the two chains are elevated as a 'V' and fixed to the hook of the right angled lithotomy rod, which is fixed to the side of the operation table. The two ends of the Steinman pin are covered with 2 rubber bushes. This acts like a 'Coat hanger' and elevates sufficiently the abdominal wall of obese patients for gasless laparoscopy.

C. Hysteroscopy

1. **Obturator** : An obturator is inserted in the 5mm diagnostic sheath. This allows its introduction into the uterine cavity smoothly like a dilator.
2. **Khandwala's Accelerated perfusion pump (APPU)** (Fig. XII) (Khandwala 1994)



Fig. 12. Khandwala accelerated perfusion pump (APPU)

This is used for distending the uterus with aqueous liquid media. This is a pressure bag with a B.P. cuff inserted between its 2 layers. A manometer is attached to the outside of the bag. The irrigation plastic bottle is kept in the bag and the pressure can be created by insufflating the

B.P. cuff

3. Simplified Hysteromat for Distension

The simple suction / irrigation device described in the laparoscopy section can also be used to distend the uterus. The air pressure from the suction outlet is regulated to 100-150 mm Hg and this tubing from the suction outlet is connected to top of the Glycine bottle so as to run glycine under pressure. However care should be taken to reduce the pressure when about 100-200 ml of glycine are remaining.

4. Dextrose 50% as Viscous distension medium

It has been used by Khandwala (1988) as a substitute for Hyskon. It is a clear, viscous medium with refractive index of 1.34. It does not mix with blood. It can be delivered by a 50 ml syringe. It is a physiological metabolite. It is readily available and cheap. Its caramelising effect is less than that of Hyskon. 200 to 300 ml instilled for hysteroscopy produced transient hyperglycaemia and minimal hypervolaemia (Table I), thus indicating its safety. Sheriar (1992) has demonstrated by a comparative study that 50% dextrose is as good as carbon dioxide for hysteroscopy. The following are comparative properties of 50% dextrose and Hyskon (Table II).

Table 1 : Hysteroscopy : 50% Dextrose

	0 Hour	½ Hour	1 Hour	3 Hour
Blood sugar in mgm 100 cc	75 - 145	87 - 396	80 - 333	75 - 201
Serum Potassium				
Meg / l	4.2 - 5.4	-	4.1 - 5.3	-
P.C.V.	29% - 45%	-	24% - 45%	-

Table II : Comparison of 50% Dextrose and Hyskon

	50% Dextrose	Hyskon
Viscosity	Moderate	High
Clarity (Refraction index)	1.34	1.39
Distensibility	Good	Good
Miscibility with blood	Minimal	Nil
Safety	Safe	Safe
Caramelisation	Moderate	Severe
Availability	Yes	No.
Cost	Rs. 15 for 100ml	Rs. 500 for 100ml

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