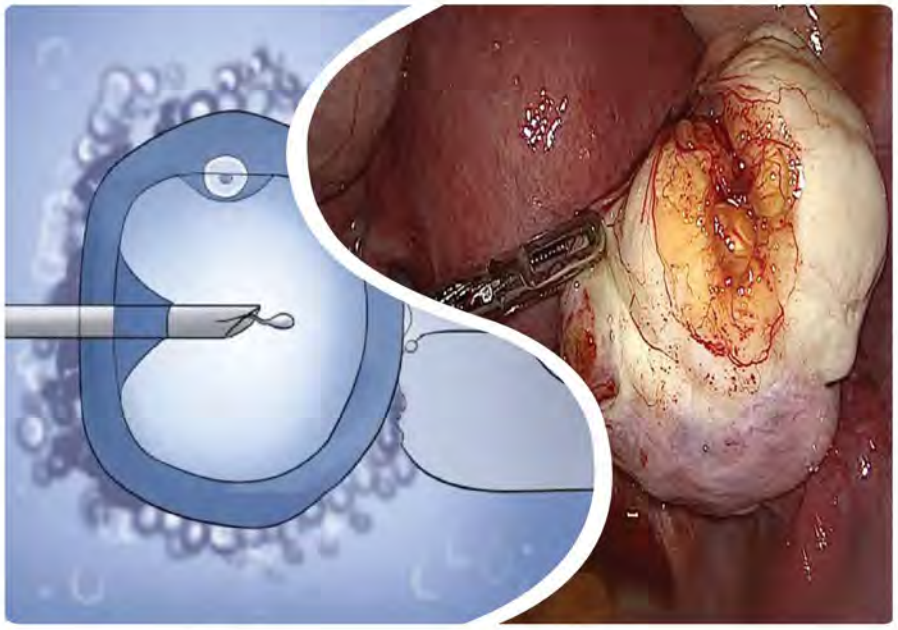
cology books, visit our website www.jaypeebrothers.com, for detailed information on obstetrics & gynecology books, visit our website www.jaypeebrothers.com, for detailed information on obstetrics & gynecology book

Indian Society for Assisted Reproduction

ART and Fertility Enhancing Surgeries: The Synergy



Chief Editors

Prakash Trivedi **Kedar Ganla**

Editors

Seema Pandey **Sanket Pisat**
Ritu Hinduja **Soumil Trivedi**

JAYPEE

Contents

1. **Basic Techniques of Laparoscopy in Infertility and Assisted Reproductive Technology: What are We Looking for?** 1
   Ashish R Kale, Sejal Nayak

2. **Hysteroscopy and Office Hysteroscopy Today: The Third Eye** 8
   Haresh Vaghasia, Neha Lalla, Surakshith Battina

3. **Essential Instruments and Equipment in Laparoscopic Surgery** 18
   Bijoy Nayak, Yashodhan Deka

4. **Essential Instruments and Equipment for Hysteroscopic Surgery** 30
   Bhaskar Pal, Abhishek Chandavarkar, Sreelasya Kakarla

5. **Anesthesia in Gynec Endoscopy: What the Gynecologist Needs to Know** 37
   Kusum Kankani

6. **Müllerian Anomalies** 41

   6.1 Uterine Septum 41

   6.1.1 Assessment of Septum and its Impact on Reproductive Outcome 41
   Pratik Tambe, Yuthika Sharma

   6.1.2 Hysteroscopic Correction of the Septate Uterus 47
   Asha Rao, Damodar Rao

   6.2 Bicornuate Uterus/Uterus Didelphis 54

   6.2.1 Assessment of Bicornuate Uterus and its Impact on Reproductive Outcome 54
   Asha Baxi, Lavanya Kiran, Dhaval Baxi

   6.2.2 Endoscopic Correction of Significant Müllerian Anomalies: Surgical Repair of a Bicornuate Uterus 59
   Neeta Warty, Anurag Bhate

   6.3 T-shaped Uterus 63

   6.3.1 Assessment of T-shaped Uterus and its Impact on Reproductive Outcome 63
   Poonam Loomba, Noshin Ashraf, Jasmeet Kaur

   6.3.2 Lateral Metroplasty for the T-shaped Uterus: Justified or Unnecessary? 66
   Sanket Pisat, Pranay Desai

   6.4 Hypoplastic Uterus 70

   6.4.1 Assessment of Hypoplastic Uterus and Its Impact on Reproductive Outcome 70
   Shreya Gowni, Yuvraj Singh Jadeja

   6.4.2 Hypoplastic Uterus: Does Hysteroscopy offer an Edge? 78
   Pankaj Mate, Deependra Singh

7. Uterine Polyp 86

7.1 Assessment of Uterine Polyp and Its Impact on Fertility 86
Ritu Hinduja, Suma Varsha

7.2 Hysteroscopic Polypectomy: Technical Nuances 91
Sushila Saini, Farendra Bharadwaj

8. Intrauterine Synechiae 99

8.1 Assessment of Uterine Synechiae and Their Impact on Fertility Outcome 99
Kundan V Ingale, Duru Shah

8.2 Hysteroscopic Adhesiolysis Today 106
S Krishnakumar, Vimee Bindra, Rohan Krishnakumar

9. Thin Endometrium 117

9.1 Assessment of Thin Endometrium and Its Impact on Fertility Outcome 117
Kedar Ganla, Rana Choudhary, Priyanka Vora

9.2 Hysteroscopy: A Ray of Hope for the Poorly Growing Endometrium 125
Rajendra Sankpal, Sujal munshi, Jwal banker

10. Uterine Fibroid 131

10.1 Fibroids: Assessment and Impact on Fertility 131
Hrishikesh Pai, Sulbha Arora, Shweta Kaul Jha

10.2 Preoperative Assessment and Choice of Approach: Hysteroscopy or Laparoscopy? 139
Sonal Panchal, Chaitanya Nagori

10.3 Laparoscopic Myomectomy: What Determines Success of Surgery? 148
Prakash Trivedi, Soumil Trivedi

10.4 Hysteroscopic Myoma Resection: Protocols for Safe Surgery 153
Vinit Mishra, Suyash Naval, Smit Solanki

11. Adenomyosis 159

11.1 Assessment of Adenomyosis and their Impact on Fertility Outcome 159
Ameet Patki, Monica Singh

11.2 Preoperative Evaluation of Extent of Spread in Adenomyosis 165
Amitha Indersen, Rajeev Aggarwal

11.3 Surgical Correction of Adenomyosis: What Best Can We Offer? 173
Sanjay Patel, Aditi Bhardwaj

12. Endometriosis 184

12.1 Assessment of Endometriosis and their Impact on Fertility Outcome 184
Sunita Tandulwadkar, Seema Pandey, Sonu Singh

12.2 Fertility-preserving Laparoscopic Surgery for Endometriosis: Conservative or Radical? 191
PG Paul, Vivek Salunke, Poulami Barma, Shinjini Pande, Sanghamitra Thakur, Devkriti Tiwari, George Paul

13. Ovarian Cyst 206

13.1 Assessment of Ovarian Cysts and Its Impact on Fertility Outcome 206
Rishma Dhillon Pai, Shrutika Kamath Thakkar

13.2 Laparoscopic Ovarian Cystectomy: Surgical Techniques 214
Ameya Padmawar, Alka Kriplani

14. Laparoscopic Ovarian Drilling 223

14.1 Laparoscopic Ovarian Drilling in Present Day Practice 223
SM Rahman, Mayoukh Kumar Chakraborty, Gautam Khastgir

14.2 Laparoscopic Ovarian Drilling: Surgical Technique to Optimize Outcome 229
Mala Raj, Aditya Khurd

15. Borderline Ovarian Tumors 238

15.1 Assessment of Borderline Ovarian Tumors and Their Impact on Fertility Outcome 238
Fessy Louis T, Parvathy T

15.2 Laparoscopic Surgery for Borderline Ovarian Tumor 241
Dipak Limbachiya, Rohan Krishnakumar

16. Fertility Preservation Techniques 248

16.1 The Role of Fertility Preservation Techniques in Present Day ART (Benign Conditions) 248
Rohan Palshetkar, Nandita Palshetkar

16.2 The Role of Fertility Preservation in Oncology 251
Madhuri Patil

16.3 Laparoscopic Fertility Preservation Surgery: Techniques and Limitations 260
Devika Gunasheela, Srilatha Gorthi, Aparna N

17. Tubal Block 268

17.1 Evaluation of Tubal Block and Its Impact on Fertility Outcome 268
Manish Banker, Jwal Banker

17.2 Tubal Cannulation: Surgical Techniques and Predictors of Success 272
Chaitanya Sharad Ganapule, Minakshi Goyal

17.3 Tubal Recanalization Surgery: A Forgotten Art in the Era of Assisted Reproduction Technology 275
Pandit Palaskar, Nitin Shah

18. PID and Hydrosalpinx 281

18.1 Assessment of Pelvic Infection and Its Effect on Fertility 281
Jaideep Malhotra, Aarti Luthra, Neha Jha

18.2 Laparoscopic Adhesiolysis in Pelvic Inflammatory Disorder and Tubal Surgery for Hydrosalpinx 287
Parul Kotdawala, Deven Jogal

19. Laparoscopic Uterine Transplantation Surgery: India Leads the Way! 296
Shailesh Puntambekar, Sandesh Kade

20. Complications of Laparoscopic Surgeries: Avoiding a Catastrophe. 305
Nikita Trehan, Hafeez Rahman

21. Avoiding Complications in Basic and Advanced Hysteroscopic Surgeries 315
Sandip Datta Roy, Subhanjali Sen, B Ramesh

22. Consents in Endoscopic Surgeries 326
Sudha Tandon, Aditi Trivedi

23. Medicolegal Aspects of Endoscopic Surgery 338
Manish Machave, Meenu Handa

Index 343

CHAPTER

4 Essential Instruments and Equipment for Hysteroscopic Surgery

Bhaskar Pal, Abhishek Chandavarkar, Sreelasya Kakarla

JAYPEE BROTHERS

INTRODUCTION

Various technical advances in the field of endoscopy serve as a boon, thus widening the horizons of the endoscopic surgeon in treating various reproductive tract disorders. The proper choice of instrument and their proper usage is the basis for the success of any surgery. In the field of hysteroscopy, continual progress in instruments has made it possible to tackle complex procedures. Various changes in the inflow, outflow sheath, advances in the operating tools, insufflators, and use of energy have widened the indications of hysteroscopic surgery and made the procedures easier.

Instruments in hysteroscopy are discussed as below **(Fig. 1)**:

- Camera and monitor
- Light source
- Distension media
- Hysteroflators/Endomat
- Telescopes
- Sheaths
- Resectoscope
- Energy sources
- Hysteroscopic morcellator/intrauterine morcellator (IUM)
- Sterilization methods
- Office hysteroscopy.



Fig. 1: Instruments in hysteroscopy.

CAMERA AND MONITOR

The mobile cart for hysteroscopy either in the operating room or in the office contains a camera control unit, LCD color monitor, and cold light source.

The use of an endocamera is essential in modern hysteroscopy. Camera is attached to eye piece of the hysteroscope and the image is displayed on the video monitor.

The quality of video/image depends on the following technical parameters:

- Sensitivity (lux)
- Resolution (given by number of lines or pixels)
- The quality of the reproduction/video images.

A high signal to noise ratio indicates variations in image quality under conditions like hemorrhages, where the loss of light intensity is reduced to a minimum.

High-definition (HD) cameras offer a high resolution and almost natural color reproduction.

Video recorders and video printers are also available. Complete systems are also available, allowing still images, video and audio data to be recorded, and also printing of still images using a printer.

LIGHT SOURCE

An adequate light source is essential for the proper visualization of the endometrial cavity. The intensity of light required in hysteroscopy is less than that for laparoscopy as the proximity of visualization is <5 cm. Light sources available are halogen, xenon, and LED.

Fiberoptic cables transmit light with minimal loss and without excessive heat generation.

Xenon light source with a liquid fiberoptic cable is a better option. In general, a 175-watt light source is considered sufficient for routine procedures, whereas for special applications or those performed with miniature telescopes, a 300-watt light source is recommended. A light source operating at higher power levels usually produces more thermal energy, which in turn causes a greater rise in temperature. Light is transmitted through fiberoptic or fluid light cables with a diameter of 3.5–5 mm and a length of 180–350 cm. For standard hysteroscopic procedures, cold light cables with a diameter of 5 mm and a length of 180 cm are used.

DISTENSION MEDIA

The endometrial cavity is a virtual space which is distended in certain pathological situations. For the panoramic view of uterus, the walls must be forcibly separated. A minimum pressure of 40 mm Hg is required to distend the uterine cavity sufficiently to see with a hysteroscope.

There are essentially two kinds of distension media used. They are:

1. Fluid distension system
2. Gaseous distension system

Fluid Distension System

Fluid is the most common distension media used for operative hysteroscopy.

The goals of fluid management include:

- Choosing distention media least likely to cause complications in the event of excess absorption
- Minimizing systemic absorption
- Early recognition of excess absorption

Fluid distending media are classified according to their osmolality, their electrolyte content, and their viscosity.

- Low-viscosity fluids
- High-viscosity fluids

Low-viscosity Fluids

Low-viscosity fluids are of two types:

1. Fluids containing electrolytes
2. Fluids devoid of electrolytes

Low-viscosity fluids with electrolytes: Usually, while performing operative hysteroscopy with mechanical tools or laser, it is beneficial to use a distending medium containing electrolytes, particularly sodium. Sodium is the main cation which is necessary to maintain a balanced homeostasis, when intravasation occurs. Sodium will promote the increase in urinary output and decreases the threshold for possible fluid overload; the threshold for fluid overload would be higher than when fluids without electrolytes are used **(Figs. 2A and B)**.



Figs. 2A and B: Fluids.

The low-viscosity fluids with electrolytes which are used for operative hysteroscopy are:

- Normal saline
- Dextrose 5% in half normal saline (0.45 NaCl)
- Ringer's lactate.

These are balanced solutions which permit adequate visualization. These media should not be used with electrosurgical energy.

Low-viscosity fluids without electrolytes: While monopolar electrosurgery, specifically the resectoscope is used, only fluids devoid of electrolytes are to be used. Because of the conducting capacity of the electrolytes, they may erratically disperse the electricity, resulting in possible injury to other organs.

The most commonly used fluids for electrosurgery are:

- Glycine 1.5
- Dextrose 5% in water
- Glycine 1.5%
- Sorbitol 3%
- Cytal (sorbitol 3%, + 0.5% of mannitol)
- Mannitol 5%

Dextrose 5% in water has an osmolarity of 256 mOsm and can be safely used when activating the resectoscope. It is usually packaged in plastic or glass 1-L bottles, hence a pump is required to provide adequate distention of the uterine cavity.

Glycine packaged in 3-L plastic bags is employed for distending the uterine cavity by using high flow or urologic tubing gravity and a pressure bag is used to increase the flow. If the bag is elevated 3 or 4 feet above the level of the patient, the pressure obtained will be sufficient to distend the uterus without a pump. As the procedure is performed inflow, outflow, and fluid deficit are measured.

As glycine 1.5% is an amino acid that degrades in ammonia, serine, and glyoxylic acid, central nervous system toxicity may occur as a result of hyperammonemia when excessive quantities of this substance are intravasated.

JAYPEE BROTHERS

Therefore, one should take special care to measure inflow and outflow; fluid deficit of >700 mL should not be allowed. In such a scenario, the patient's vital signs, pulse oximetry, urine output should be carefully monitored and serum sodium levels should be evaluated.

Sorbitol 5% is a reduced sugar with osmolality of 165 mOsm/L. It is packaged in 3-L plastic bags. It provides good visualization similar to glycine.

Urologists also use Cytal, a component of sorbitol and mannitol because mannitol may provide slight diuresis in these patients. Cytal must be used cautiously because diuresis may be associated with natriuresis, and if hyponatremia is present, this diuretic–natriuretic effect may worsen the situation.

High-viscosity Fluids

High-viscosity media have the advantage of being immiscible with blood, thereby facilitating evaluation of the endometrial cavity in the presence of bleeding.

The most commonly used high-viscosity fluid for uterine distention is a hyperosmolar solution of 32% dextran 70 in 10% glucose (Hyskon, Coopersurgical Inc., Trumbull, CT) which provides excellent visualization because of its crystal-clear solution.

Disadvantage includes anaphylaxis to dextran compounds possibly related to prior sensitization.

Intravasation is due to the pressure required to distend the uterine cavity and the difficulty in retrieving the fluid that is injected; therefore the amount used should be limited. Hence it is important to measure the amount injected and to calculate the amount retrieved, so as not to allow >400–500 mL of Hyskon to be lost in the system.

Other problems with this medium are due to the hyperosmotic properties of the substance, which causes fluid absorption resulting in noncardiogenic pulmonary edema.

Although Hyskon is most useful for operative hysteroscopy, particularly with mechanical tools or lasers, it is cumbersome to use with electrosurgery because it produces caramelization around electrodes and instruments, causing the need for frequent cleaning and replacement, and its viscosity does not permit retrieval after infusion and this also precludes its use with flexible hysteroscopes.

Clearly, when used, the clinician must be prepared for the rare case of anaphylaxis, limit the volume of infused solution, coagulopathies, and also have detailed and compulsive protocols for the appropriate cleaning of instruments following the procedure.

Gaseous Distension Media

Carbon dioxide can be used as a distending medium for diagnostic hysteroscopy. In operative hysteroscopy, the concomitant blood and endometrial debris collect and obscure the optical field therefore it is not a suitable medium for operative procedures.

Carbon dioxide is delivered to the endometrial cavity by the sheath of the hysteroscopic system from an insufflator, which regulates pressure and gas flow. The insufflator can be a separate unit or a small cartridge attached by a handle of the hysteroscopic system. A low-pressure hysteroscopic insufflator must be used and not the laparoscopic or other type of endoscopic insufflator, which typically inflates much higher pressures.

Advantages

The best feature of CO_2 is its neatness. It does not foul the instruments, it does not mess up the office or operating room, and it allows entry evaluation of the endocervical canal. CO_2 therefore is an excellent diagnostic medium.

Disadvantages

Carbon dioxide tends to flatten the endometrium, and this can give a wrong visual impression of the endometrium.

It is highly soluble in blood, and consequently, if modest volumes of the gas enter the systemic circulation, it is quickly absorbed and there is no relevant clinical impact. However, if large volumes of CO_2 enter the systemic circulation and the heart, catastrophic cardiorespiratory collapse can occur. The use of such instruments for hysteroscopy could be associated with death secondary to CO_2 embolism.

However, liquid media are superior in most aspects for operative hysteroscopy.

HYSTEROFLATOR/ENDOMAT MACHINE

Hysteroflator/Endomat machine provides a pressure-controlled dilatation of The uterine cavity. This unit usually operates at a flow rate of 200–1,000 mL/min and an irrigation pressure of 45–300 mm Hg with a suction pressure of 0.25 bar. This gives a constant pressure inside the uterine cavity and maintains distention. If they are attached to 3-L bottles of the distending media, the need for changing the bottles regularly is reduced **(Fig. 3)**.



Fig. 3: Hysteroflator/Endomat machine.

JAYPEE BROTHERS

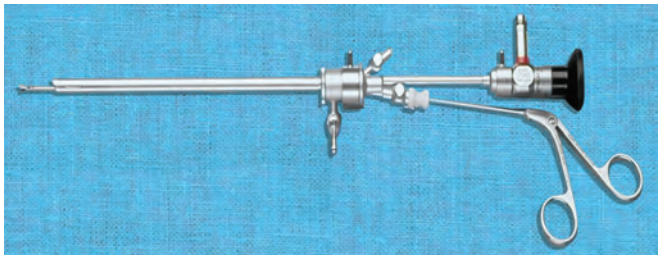


Fig. 4: Telescopes.

Pressure Bags

Two pressure bags with 1-L bottles, each attached with a TUR set, are also a very efficient mechanism for maintaining distention.

It is very essential that there is a dedicated person manning the distention machine or bags for the continuous flow of the media and to avoid any interval during the procedure.

TELESCOPES (FIG. 4)

In general, hysteroscopes are broadly classified into:

- Rigid hysteroscope
- Flexible hysteroscope

The scope diameter, lens offset, diameters of sheath, and use with a variety of distending media are the main specifications.

Rigid Hysteroscopes

The rigid hysteroscope consists of eyepiece, barrel, and objective lens. The diameter of the telescopes are available as 4 mm, 2.9 mm and 1.9 mm. There are fiberoptic bundles that are included in the barrel which provide illumination once the light source is attached. The lenses have the following angulations (0°, 12°, and 30°). Currently, rigid hysteroscopes are more commonly used and are preferred for operative procedures.

The telescopes are inserted in a metal tube or "sheath" which contains one or more channels through which distending media or instruments can be passed.

Sheath diameters:

Diagnostic sheaths—3–5 mm

Operative sheath—6–8 mm

Operative sheaths have inner sheaths for the inflow fluid, outer sheaths for the returning fluid, and instrument channels for the 5 Fr or 6 Fr instruments to pass.

Optics of Rigid Hysteroscopes

The lens system in rigid endoscopes can be of the following types.

In the classical system, width of the lenses is less than the length of the telescope and the distance between lenses is comparatively large. However, in Hopkins rod system, the lenses are larger in diameter and distance between the lenses is small. In the graded lens system [gradient index (GRIN)], the entire telescope has a slender rod of glass.

The factors which affect the image are the degree of field of view and the angle of lens to the central axis of the telescope. Depending on the position of the lens to the axis of the telescope, the field of view can be 0°–30°.

Operative Hysteroscopes

The operative hysteroscopes have two different varieties of setup.

First, operative sheath through which the 4-mm diagnostic hysteroscope of 30° angle is inserted; the other consists of a hysteroscope with an eyepiece and a straight operating channel.

There are various types of operative sheaths.

One has a single channel for the insertion of 7-Fr flexible instruments, but the relatively small size of the instrument jaws and the flexibility of the scissor shaft hamper the cutting capacity and their usage.

Another variety of sheath has a fixed rigid instrument tip (i.e., biopsy forceps, scissors, or foreign body forceps) attached to the dorsal aspect of the distal end of the sleeve, and the instrument tip would be in full endoscopic view. However, it is cumbersome to remove the entire hysteroscope and the sheath has to be changed to vary the tips. The other disadvantage is that the entire endoscopic unit must be moved when the instrument tip needs to be advanced or withdrawn thus reducing the field of vision or illumination.

The operating right-angle hysteroscope has a lens system with 10° angle of view and a single operative channel through which 3-mm instruments can be inserted. The same size and less field of vision results in a smaller images and lesser light transmission and also makes it difficult to visualize the tubal ostia.

But these instruments are comparably larger and stronger than the flexible ones.

Contact Hysteroscopes

Contact hysteroscopes depend on GRIN lens for and do not require either a distending medium or fiberoptic light for illumination and visualization. These endoscopes have a light-collecting chamber at the eyepiece to transmit light down the endoscope glass guide toward the object of interest and reflect to the eyepiece.

The rigid glass guide allows magnification by 1.6 times without the need for using special lenses and there is no distortion of the images. Depending on the eyepiece used, magnification up to 100 times can be obtained.

In order to view the image, the endoscope must either nearly touch the surface or touch the object of interest.

Contact hysteroscopes can be used for colpohysteroscopy to evaluate cervical atypia.

JAYPEE BROTHERS

Advantages:
- Special light source is not required.
- Distending medium is not required.
- It allows good visualization even in the presence of bleeding.

Disadvantages:
- High chances of a lesion being missed as there is a lack of panoramic view
- Inability to operate through the scope (e.g., take a directed biopsy).

Flexible Hysteroscopes

Flexible endoscopic equipment were previously used for the diagnosis of gastrointestinal disorders alone. They can be used for both diagnostic and operative procedures and do not require an outer sheath. These hysteroscopes with extremely small diameters have outer tip diameters of 2.5 mm, thus making them potentially ideal for office diagnostic procedures.

Drawbacks:
- Gaseous medium is the only distension medium.
- Fiberoptics is used for illumination and visualization and the resolution is compromised.
- Grainier images obtained due to the ground substance (adhesive) in between the glass fibers.

SHEATHS (FIG. 5)

The outer diameter(OD) refers to the width of the barrel including the sheath. For those which do not use a sheath, the OD refers only to the width of the optic barrel.

Outer diameter ranges from 2.7 to 10 mm in modern hysteroscopes.

In diagnostic hysteroscope sheath, OD typically ranges from 2.7 to 5.0 mm, while the OD of an operative sheath ranges from 5 to 10 mm.

Rigid hysteroscopes with an OD >5.0 mm usually require some degree of cervical dilation, while flexible hysteroscope usually requires no cervical dilation.

A rigid operative hysteroscope sheath has an outer sheath with 5.5- to 9-mm OD. The outer sheath contains input and output channels that allow for continuous laminar flow and irrigation. The input and output channels also permit the calculation of distension medium fluid deficit either manually (every 15 minutes) or with commercially available systems.

Bettocchi system: This includes single-flow operating sheath with 4.3 mm can be used as an inner sheath with 5-mm continuous-flow operating system.

HAMOU II: This includes outer sheath of 5 mm with a 4-mm microhysteroscope used for a panoramic view and for inspection of cellular layers following supravital staining in contact hysteroscopy.

TROPHYSCOPE CAMPO compact hysteroscope: This includes outer sheath of 2.9 mm.

RESECTOSCOPE

The urologic resectoscope **(Fig. 6)** is adapted in gynecology by changing its shape and size and adding continuous-flow systems.

The resectoscope is a 0°, or 15–25°, with OD of a 3.5–4 mm and an outer sheath of 8–9 mm in diameter. Two concentric sheaths have a continuous-flow system for irrigation and suction. Outer sheath has distal fenestrations and a small ceramic tip which prevents thermal conduction and provides the outer flow and the inner sheath provides the inflow. There are two types of resectoscopes: 22 Fr and 26 Fr. For use of the 26 Fr, cervical dilatation is required.

Bridge is an important component of the resectoscope; it encloses the telescope and also includes a built-in mechanism with a spring-loaded system which directs the electrode from front to back. Using the spring mechanism, electrodes can be moved about 4 cm into the visual field of the objective lens with an unobstructed view of the uterine cavity. Cutting loop, other instruments like microknife, and vaporizing and coagulating electrodes can be introduced along with the working element of the resectoscope.

Orientation of the fiberoptic cord to that of hysteroscope is opposite as the cord connection in resectoscope is upward so that the oblique vision is directed so as to note the motion of electrode. Electrical cord is connected to a high-frequency electrosurgical unit.

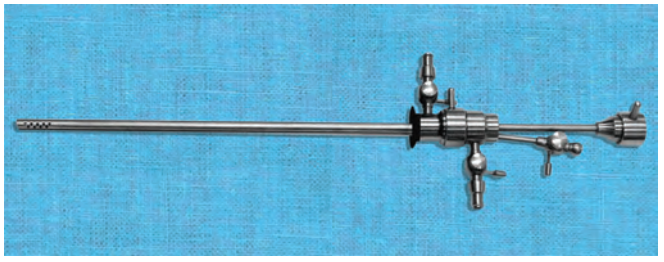


Fig. 5: Hysteroscopes sheaths.

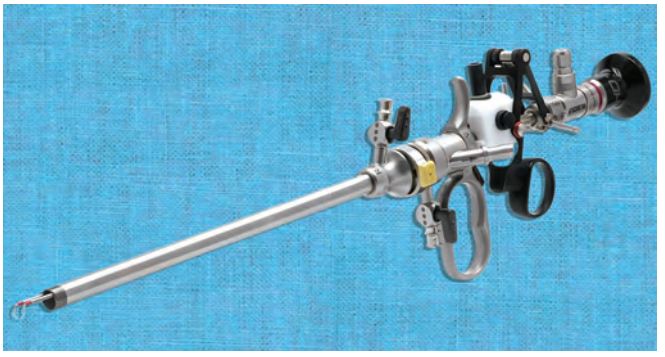


Fig. 6: Resectoscope.

JAYPEE BROTHERS

ENERGY SOURCES

Fibreoptic lasers and electrosurgery are the energy sources which can be used with the hysteroscope.

Fiberoptic Lasers

Lasers are transmitted through the fiber inserted into the operating channel and are not blocked by the distension media and can be directed to any part of the uterine cavity.

The NdYAG laser works by thermal energy. It is the most common laser used with a wavelength of 1,064 nm and is predominantly absorbed by the tissue protein. It acts by coagulating the tissue by front, back, and lateral scattering by the flow of electrons.

Electrosurgery

This consists of monopolar electrode, bipolar electrode, and bipolar Versapoint electrode.

Monopolar electrode: It uses monopolar energy and requires an electrolyte-free media for its usage.

Bipolar electrode: It uses bipolar energy and can be used either with electrolyte-free media or an electrolyte-based distension media.

Bipolar Versapoint electode: It uses bipolar energy with a Versapoint bipolar generator.

They are of three types: ball, twizzle, and spring electrodes.

Resectoscopes electrodes can also be categorized into unipolar and bipolar.

Unipolar resectopes electrodes are of four types:
1. Loop electrode
2. Roller ball electrode
3. Collin's knife

Bipolar resectopes electrodes are of two types:
1. Loop electrode
2. Zero-degree electrode

HYSTEROSCOPIC MORCELLATOR

The first intrauterine morcellator (IUM) in use was Truclear, with an OD of 4 mm. It is a set of two disposable metal tubes, the inner tube fits and rotates within the outer tube, driven mechanically by an electrically powered control unit. The surgeon can activate and regulate the direction of the rotation of the inner tube through a foot pedal. The inner tube incorporates a side-facing cutting window at its distal end which aspirates the resected tissue into the collecting pouch.

This device is introduced into the uterine cavity through a 9-mm rigid, 0°, continuous-flow hysteroscope **(Fig. 7)**.

MyoSure was introduced in 2009. It has a 3-mm outer tube with a 2.5-mm inner blade that rotates at a speed of

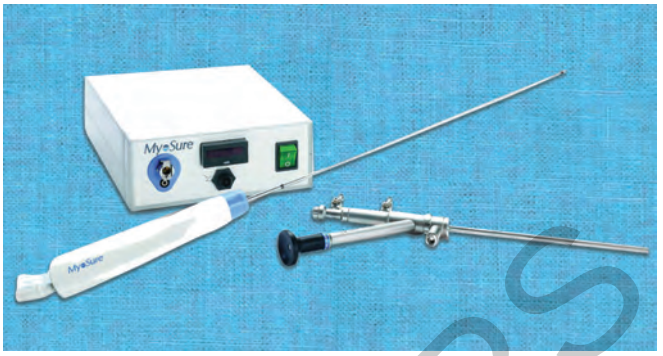


Fig. 7: Hysteroscopic Morcellator.

6,000 rpm. The device is introduced into the uterine cavity through a 6.25-mm, continuous-flow, 0° hysteroscope. The blade and hand piece are combined into a single-use device and attached to suction and a motor control unit.

Truclear 5.0 hysteroscopy system is a recent introduction. It incorporates a 2.9-mm rotary-style morcellator through a 0°, 5-mm hysteroscope.

These IUM use a physiologic saline solution as distension and irrigation media.

STERILIZATION

Cleaning the endoscopic instruments is done vigilantly with the awareness of fragility and the cost factor. After each usage, reusable instruments are cleaned and processed for sterilization. Instruments are disassembled and immersed in hot water. Water gun can also be used as it generates high pressures and ensures thorough cleaning than the regular. Lenses and scopes require utmost care like cleaning with warm water and are dried with cotton pledgets. 90% alcohol and special agents can also be used to remove spots on the edges of lens or residual blurring. Glutaraldehyde is also a potential sterilizing agent.

Fiberoptic cables are cleaned with soapy water and special disinfectants; similarly outflow, inflow sheaths, and disassembled stopcocks are cleaned and dried.

Autoclave sterilization is the cheapest method and even cleans small openings and gaps.

Optical systems and the instruments which are specifically certified for this method may be sterilized at 121°C for 20 minutes or 134°C for 7 minutes.

Gas sterilization with ethylene oxide is performed at low temperatures reducing the potential risk of damaging the endoscopic instruments.

The main drawback of this technique is that it is costly and time-consuming and also requires to have multiple sets of instruments in standby.

OFFICE HYSTEROSCOPY

Office hysteroscopy is gaining popularity as it can be performed in the office setting thereby saving cost and time.

JAYPEE BROTHERS

It obviates the need for anesthesia and multiple hospital visits. Most diagnostic hysteroscopies and simple operative procedures can be performed in the office setting.

Basic equipment required includes:

- 30° 1.9-mm telescope with 5.5-mm continuous-flow diagnostic hysteroscopic sheath
- Distension system saline or CO_2 insufflator
- Continuous suction aspiration equipment
- Light source and light cable
- Cervical speculum
- Cervical tenaculum
- Small cervical dilator
- Biopsy forceps
- Ring forceps and prep bowl
- 21-gauge needle and syringe
- 1% lidocaine without epinephrine
- Sterile drapes

Advantages: It can be done in an outpatient department (OPD)-based setting, with no anesthesia, and is cost-effective procedure and time-saving.

Significant technological advances over time have expanded the indications of operative hysteroscopy. It has also reduced the learning curve and made procedures shorter and safer. With the advent of office hysteroscopy, it can be made available to more women in a safe manner. New energy sources and morcellators have made it possible to manage more complex pathology with the hysteroscope. Advances in instrumentation have also reduced the complications and morbidity from operative hysteroscopy.

FURTHER READING

1. AAGL Advancing Minimally Invasive Gynecology Worldwide; Munro MG, Storz K, Abbott JA, Falcone T, Jacobs VR, Muzii L, et al. AAGL Practice Report: Practice Guidelines for the Management of Hysteroscopic Distending Media: (Replaces Hysteroscopic Fluid Monitoring Guidelines. J Am Assoc Gynecol Laparosc. 2000;7:167-8). J Minim Invasive Gynecol. 2013;20(2):137-48.
2. Brooks PG. Hysteroscopic instruments. In: Pasic RP, Levine RL. (Eds). A Practical Manual of Hysteroscopy and Endometrial Ablation Techniques. A Clinical Cookbook. London: Taylor & Francis; 2004; pp. 13-24.
3. Choe JK, Baggish MS. Hysteroscopic treatment of septate uterus with neodymium-YAG laser. Fertil Steril. 1992;57:81.
4. Cohen S, Greenberg JA. Hysteroscopic morcellation for treating intrauterine pathology. Rev Obstet Gynecol. 2011;4(2):73-80.
5. Corson SL, Brooks PG. Resectoscopic myomectomy. Fertil Steril.1991;55:1041.
6. Corson SL. Hysteroscopic fluid management. J Am Assoc Gynecol Laparosc. 1997;4(3):375-9.
7. Emanuel MH. New developments in hysteroscopy. Best Pract Res Clin Obstet Gynaecol. 2013;27(3):421-9.
8. Fernández-Bañares F, Esteve M, Viver JM. Fructose-sorbitol malabsorption. Curr Gastroenterol Rep. 2009;11(5):368-74.
9. Hulka JF, Peterson HB, Phillips JM, Surrey MW. Operative Hysteroscopy. American Association of Gynecologic Laparoscopists 1991 Membership Survey. J Reprod Med. 1993;38:572.
10. Isaacson K. Office hysteroscopy: a valuable but under-utilized technique. Curr Opin Obstet Gynecol. 2002;14(4):381-5.
11. March CM. Hysteroscopy. J Reprod Med. 1992;37(4):293-311.
12. Mencaglia L, de Albuquerque Neto LC, Alvarez RA. Manual of Hysteroscopy Diagnostic, Operative and Office Hysteroscopy. Tuttlingen, Germany: EndoPress Publishers; 2013; pp. 5-19.
13. Pellicano M, Guida M, Zullo F, Lavitola G, Cirillo D, Nappi C. Carbon dioxide versus normal saline as a uterine distension medium for diagnostic vaginoscopic hysteroscopy in infertile patients: a prospective, randomized, multicenter study. Fertil Steril. 2003;79:418-21.
14. Shapiro BS. Instrumentation in hysteroscopy. Obstet Gynecol Clin North Am. 1988;15(1):13-21.

JAYPEE BROTHERS

for detailed information on obstetrics & gynecology books, visit our website www.jaypeebrothers.com, for detailed information on obstetrics & gynecology books, visit our website www.jaypeebrothers.com, for detailed

ART and Fertility
Enhancing Surgeries: The Synergy

Assisted Reproductive Techniques and Fertility Enhancing Surgeries: The Synergy is an insightful exploration into the field of ART and fertility enhancing surgeries within the dynamic realm of reproductive health. In this groundbreaking book, modest attempts to gather the knowledge, experience, and expertise of a diverse range of authors, from ART specialists to endoscopic surgeons and fertility physicians using assisted reproductive technology (ART) and fertility enhancing surgeries currently available for use in fertility practice. In order to determine the right protocol and process and uses of therapeutic options in a range of clinical circumstances, we hope that this book will be a reliable resource.

Embarking on a journey that transcends traditional boundaries, the book delves into the multifaceted aspects of fertility enhancement. From in-depth discussions on cutting-edge assisted reproductive technologies to the exploration of the emotional landscape of fertility journeys through various surgical mediums, this book offers a comprehensive and holistic understanding of the subject.

Join us in unravelling the intricate synergy between assisted reproductive techniques and fertility enhancing surgeries and discover a new perspective on the transformative potential that lies at the crossroads of several techniques.

Printed in India

Available at all medical bookstores
or buy online at www.jaypeebrothers.com



JAYPEE BROTHERS
Medical Publishers (P) Ltd.
EMCA House, 23/23-B, Ansari Road,
Daryaganj, New Delhi - 110 002, INDIA
www.jaypeebrothers.com

Join us on facebook.com/JaypeeMedicalPublishers

Shelving Recommendation
OBSTETRICS & GYNECOLOGY

