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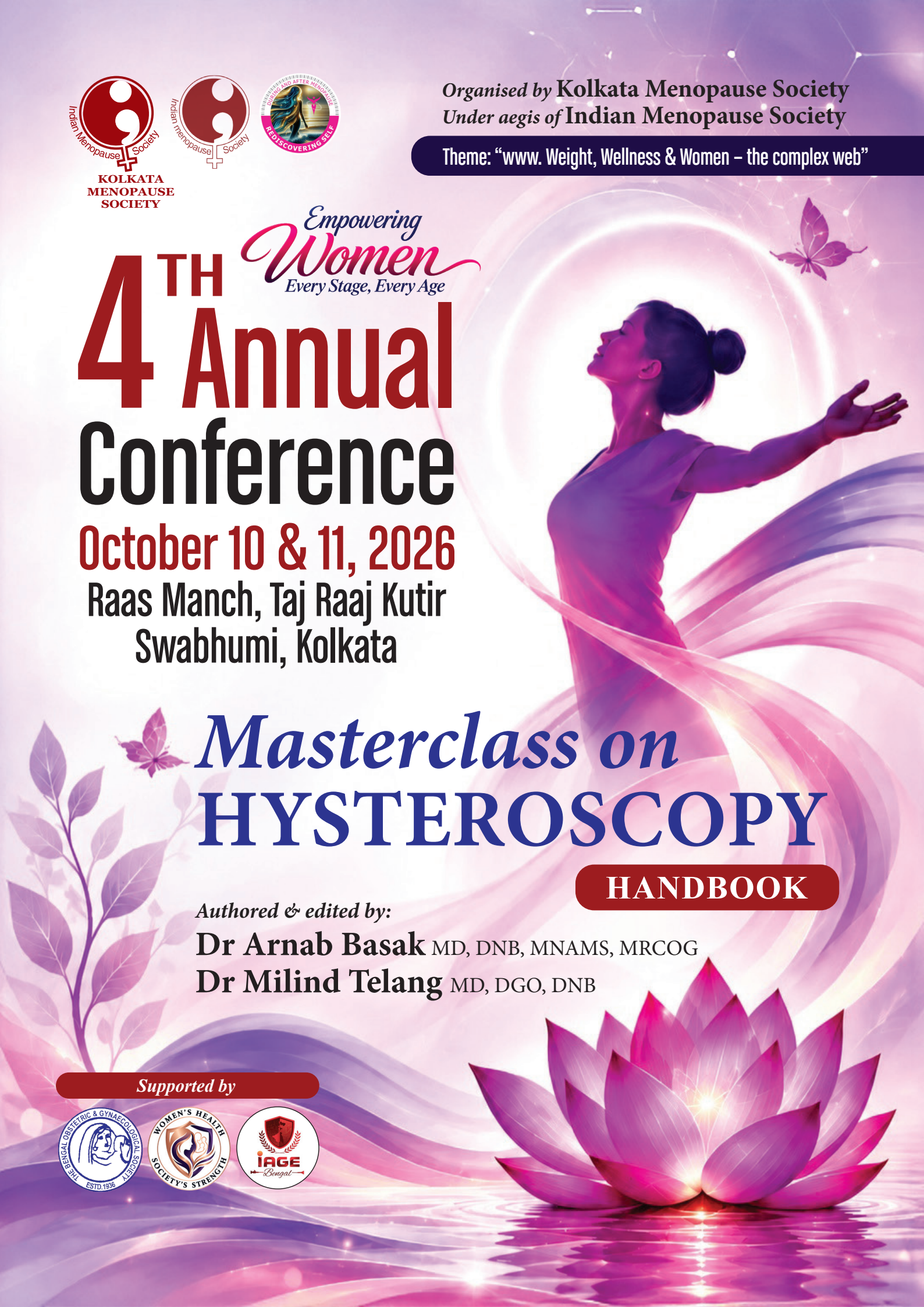
# 4TH Annual Conference

## October 10 & 11, 2026

Raas Manch, Taj Raaj Kutir
Swabhumi, Kolkata



# *Masterclass on* HYSTEROSCOPY

**HANDBOOK**


*Authored & edited by:*
**Dr Arnab Basak** MD, DNB, MNAMS, MRCOG
**Dr Milind Telang** MD, DGO, DNB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# HYSTEROSCOPY MASTERCLASS

**Date: Saturday, 10th October 2026 | Time: 12 noon – 5 pm | Lead: Polly Chatterjee**

| Program Mentor-In-Chief: Milind Telang<br>Chairpersons: Abhinibesh Chatterjee, Amit Basu, Pushan Kundu | | |
|---|---|---|
| **Time** | **Topics** | **Faculty** |
| 12.30 pm<br>12.45 pm | Introduction | Arnab Basak |
| 12.45 pm<br>01.00 pm | Instrumentation & equipments | Abhijit Halder |
| 01.15 pm<br>01.30 pm | Resectoscopes & Energy Sources | Sanjay Biswas |
| 01.30 pm<br>01.45 pm | Distension medium &Fluid Management systems | Tanuka Dasgupta |
| 01.45 pm<br>02.00 pm | Office hysteroscopy | Polly Chatterjee |
| 02.00 pm<br>02.30 pm | Panel Discussion- HYSTEROSCOPY-<br>Experts: M M S Zoha, Milind Telang<br>Moderator: Abhinibesh Chatterjee | Panelists: Aruna Tantia, Seetha Rammurthy Pal, Pushan Kundu, Barun Chakraborty, Amit Basu, Soma Dutta, Poushali Sanyal |
| 02.30 pm<br>05.00 pm | **6 STATIONS** | Leads: Abhinibesh Chatterjee, Polly Chatterjee |
| Station-1 | Diagnostic<br>(Hands-on) | Aruna Tantia, Barun Chakraborty, Lovely Agarwal, Ankur Biswas |
| Station-2 | Polypectomy<br>(Hands-on) | Amit Basu, Bidisha Roychowdhury, Ranjana Tibrewal, Farheen Rahaman |
| Station-3 | Septum Incision<br>(Hands-on) | Pushan Kundu, Poushali Sanyal, Sunabho Ghosh, Sutindra Sarker |
| Station-4<br>Station-5 | Operative Hysteroscopy<br>(Operative Instruments; Endoscopy Tower setup) | Rupasree Dasgupta, Abhijit Halder, Olympia Bose |
| Station-6<br><br>Station-7<br><br>Station-8 | Resectoscope 1<br>(Hands-on)<br>Resectoscope 2<br>(Hands-on)<br>Resectoscope 3<br>(Hands-on) | Abhinibesh Chatterjee, Soma Dutta, Ritwik Ghosh Halder, Tanuka Dasgupta, Arunasish Mallick, Polly Chatterjee, Sohini Chowdhury, Sanjay Biswas |

**All Delegates Need To Go Through All The Stations Basic, Septum, Polyps, Resectoscope, By Rotation.**

## Introduction

An overview; indications; consent; medico-legal framework; OT Setup for Hysteroscopy**.**

## Modules

1. **Basic Foundation of Hysteroscopy-** OT Setup; Indications; Consent; Medico-legal framework.
2. **Equipment and Instrumentation — Overview.**
3. **Distension Media & Fluid Pump Systems- Fluid management.**
4. **Resectoscopes & Energy Sources**
5. **Office Hysteroscopy**
6. **Complications**
7. **MCQs**

## Introduction

Hysteroscopy is the endoscopic visualization of the endocervical canal and uterine cavity using a rigid, semi-rigid, or flexible scope, introduced trans vaginally. Hysteroscopy is the ***cornerstone of modern-day endoscopy,*** in Gynaecology. In recent years, technological developments have greatly expanded the utility of hysteroscopy procedures in gynaecology. It is now possible to perform a comprehensive hysteroscopic examination of the uterine cavity without the need for cervical dilation or routine use of anaesthesia. Consequently, diagnostic and operative hysteroscopy is now routinely performed worldwide in both office (outpatient) and inpatient settings It is considered the ***gold standard for evaluation of the uterine cavity*** (superior to TVS and even to blind procedures like D&C, which has a diagnostic error rate quoted around 10–35% for focal lesions).

***Two broad categories:***

- ***Diagnostic*** hysteroscopy — visualization with directed biopsy
- ***Operative*** hysteroscopy — therapeutic intervention through the scope

## 1: Basic Foundation of Hysteroscopy

**OT Setup for Hysteroscopy** (Fig:1.1)

Trainee should understand:

- Location/Setting
- Theatre layout
- Patient positioning
- Team positioning
- Surgeon–assistant positions
- Monitor positioning
- Table movements
- Endoscopy tower
- Light source
- Camera system
- Fluid pump
- Energy generators
- Communication with anaesthesia
- WHO surgical safety principles
- Surgical time-out
- Equipment checks

### 1.1 **Location/Setting**

- Can be performed in a **minor OT/office setting** (small-diameter scopes, no anaesthesia) or **major OT** (operative procedures, resectoscope, anaesthesia).
- **Office hysteroscopy**: outpatient room with couch, light source, camera stack, and monitor — **no dedicated OT needed.**

### 1.2 **Patient Positioning** (Fig: 1.2)

- ***Dorsal lithotomy*** position (modified, low lithotomy for scope manoeuvrability).
- ***Empty bladder*** prior to procedure.

### 1.3 **Team**

- Surgeon, assistant, scrub nurse, circulating nurse (dedicated to fluid balance charting), anaesthetist (for operative/regional or GA cases).

### 1.4 **OT Requirements**

- **Fluid management system** with inflow/outflow monitoring (mandatory for operative cases using electrolyte-poor media).
- **Video tower**: camera control unit, light source (Xenon/LED), monitor, image capture/recording system.
- Energy source: **Electrosurgical Unit** (ESU) (monopolar/bipolar) or laser console as applicable.
- **Suction apparatus**.
- **Fluid deficit monitoring board**/electronic weighing scale system — critical safety element.
- **C-arm/USG availability for select complex cases** (e.g., septum resection, difficult IUCD removal) — not mandatory but useful.
- **Emergency resuscitation trolley**, **anaesthesia backup** for operative cases.

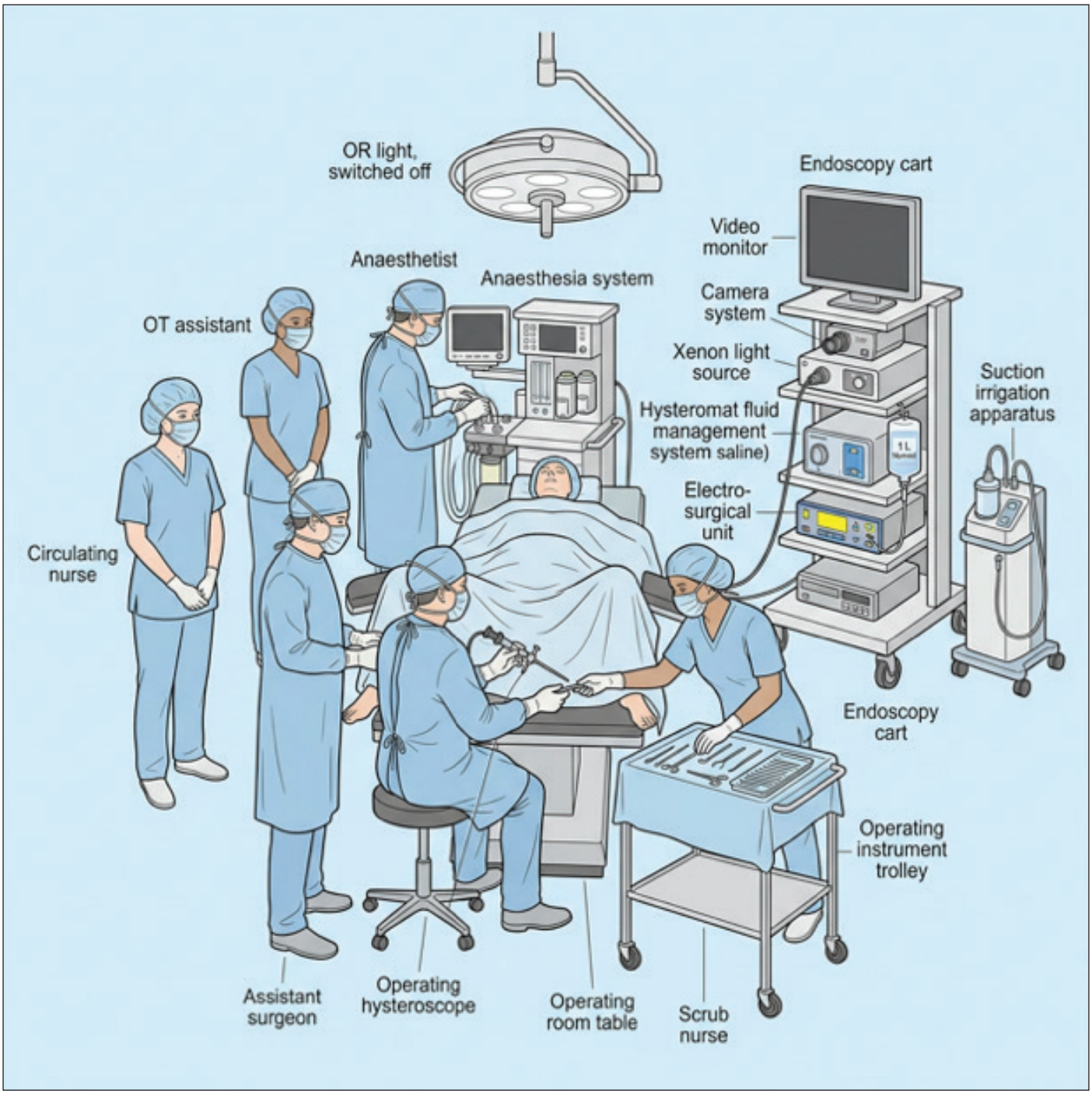



*Fig: 1.1 Hysteroscopy OT set-up*

1.5 **Checklist** Before Starting (WHO surgical safety principles)- (Fig:1.3)

- Informed consent verified
- Fluid deficit alarm threshold set (see Section 4)
- Equipment integrity check — light cable, camera white balance, scope lens clarity, energy generator settings
- Antibiotic prophylaxis as per protocol (not routinely required for diagnostic; considered in operative or high-risk cases)

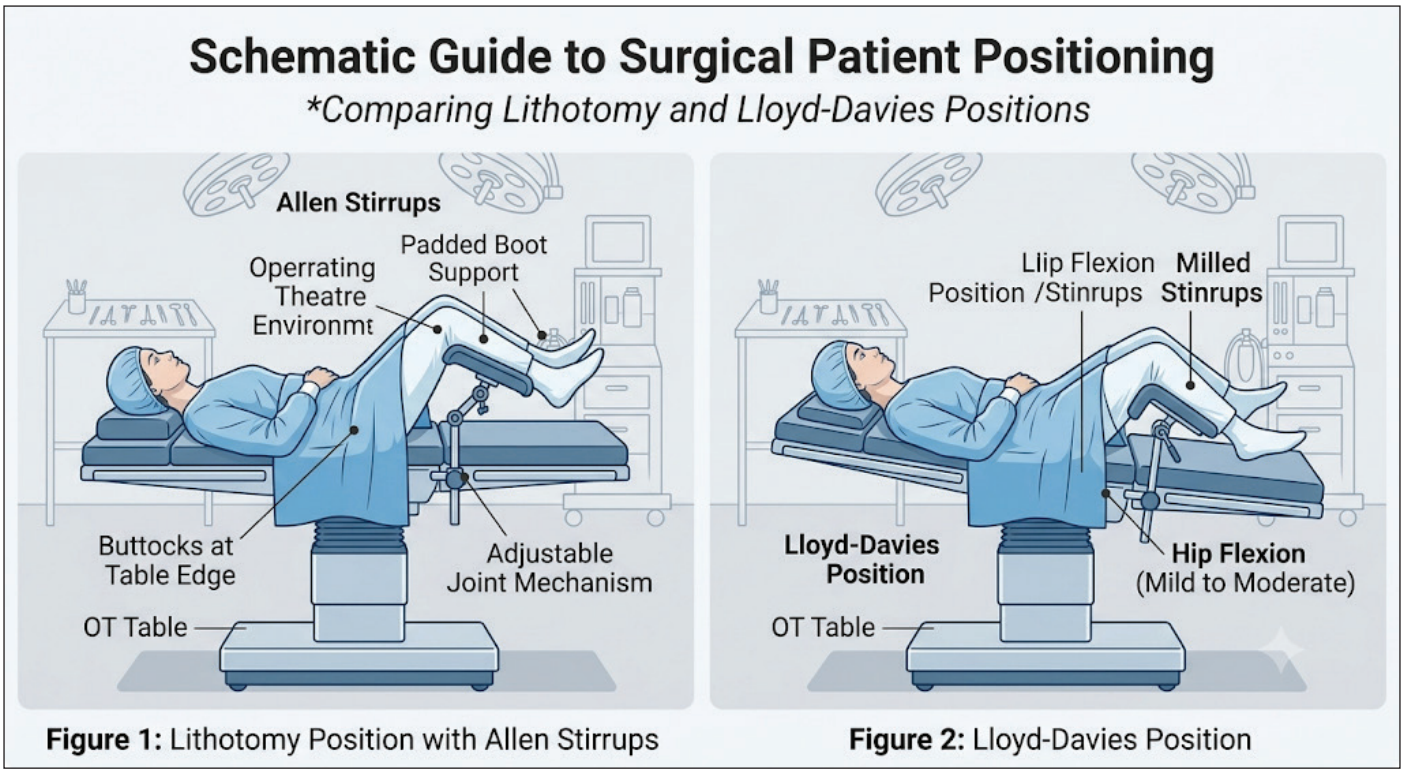



*Fig: 1.2 Lithotomy vs. Lloyd Davies*

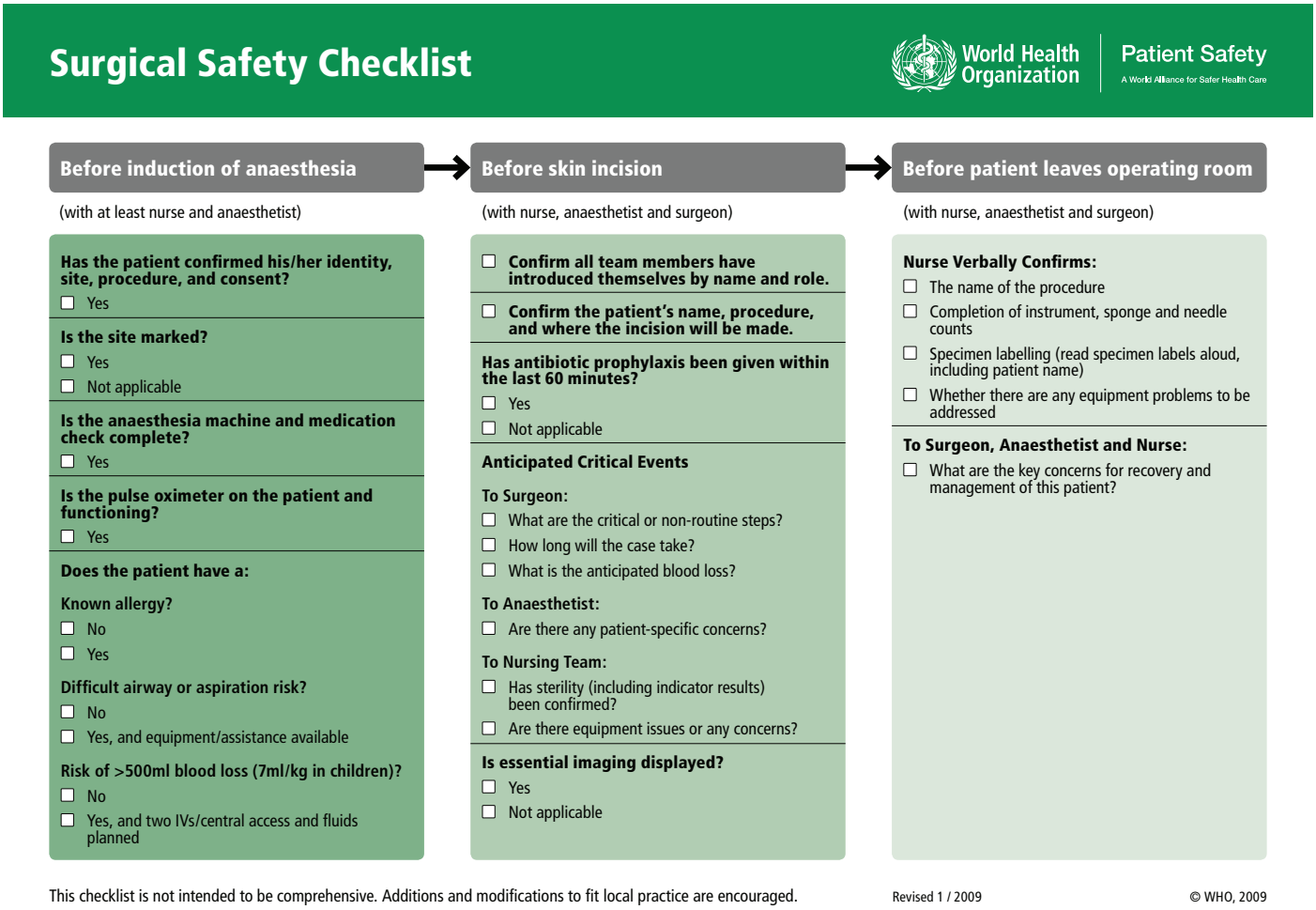



*Fig: 1.3 Surgical Checklist*

1.6 **Indications for Diagnostic Hysteroscopy**

- Abnormal uterine bleeding (AUB) — perimenopausal, postmenopausal bleeding, intermenstrual bleeding
- Evaluation of infertility — assessment of uterine cavity, tubal ostia
- Suspected intrauterine pathology on imaging (polyp, submucous myoma, adhesions, septum) — confirmatory/diagnostic step before intervention
- Recurrent pregnancy loss — evaluation for uterine anomalies/septum/adhesions
- Suspected Asherman's syndrome
- Localization/removal confirmation of misplaced or "lost" IUCD
- Follow-up after operative hysteroscopy or medical management of AUB
- Pre-IVF cavity assessment
- Evaluation of abnormal endometrial thickening or suspected endometrial pathology (with directed biopsy) — especially where blind endometrial sampling is inconclusive or discordant with imaging

1.6 **Indications for Operative Hysteroscopy**

- Polypectomy — endometrial polyps
- Myomectomy — submucous fibroids (FIGO G0,G1,G2)
- Septal resection — uterine septum
- Adhesiolysis — intrauterine adhesions (Asherman's syndrome)
- Endometrial ablation/resection with/without mirena — for AUB unresponsive to medical management, in women who have completed family and wish to avoid hysterectomy
- Removal of retained products of conception (RPOC) — under vision, reducing risk of Asherman's compared to blind curettage
- Removal of embedded/mal positioned IUCD or other foreign bodies
- Division of a Müllerian anomaly (e.g., septate uterus)
- Cannulation of proximal tubal blockage (selective tubal cannulation, historically)
- Tubal sterilization (historical — Essure-type devices, now withdrawn in most markets)

1.7 **Consent for Hysteroscopy** (Fig: 1.4)

1.7.1 **Principles** of **Informed Consent**

- Must be **written, informed**, and **voluntary**, explained in a language the patient understands, ideally with a witness.
- Should be obtained by the operating surgeon (or a person capable of performing the procedure) — not solely delegated to a junior/nursing staff for explanation.

1.7.2 **Elements to be Explained and Documented**

- **Nature** and **purpose** of procedure (diagnostic vs. operative), and what it entails
- **Alternative options** available (e.g., medical management for AUB, blind D&C vs. hysteroscopy, TVS vs. hysteroscopy for diagnosis)
- Anticipated **benefits**
- **Risks** and **complications** — general (perforation, bleeding, infection) and specific to the planned procedure (e.g., fluid overload risk in myomectomy, recurrence risk in ablation, possible conversion to laparotomy/laparoscopy if perforation occurs)
- **Possibility of incomplete procedure** or **need for a second procedure**
- Possibility of **unplanned hysterec**tomy in case of uncontrollable haemorrhage or major visceral injury (this should be explicitly consented for in operative hysteroscopy, especially myomectomy)
- **Anaesthesia-related consent** (separate anaesthesia consent as applicable)
- **Consent for use of tissue removed for histopathological examination**
- **Consent for photography/video recording** for documentation/education if applicable
- **Consent for blood transfusion** if significant haemorrhage risk anticipated

1.7.3 **Special Consent** Considerations

- For **minors** — parental/guardian consent required.
- For **sterilization-related** or **fertility-altering procedures** (e.g., septal resection affecting future fertility, endometrial ablation precluding future childbearing) — specific discussion regarding future fertility implications must be documented.

Royal College of Obstetricians and Gynaecologists

**Consent Advice No. 1**

December 2008

# DIAGNOSTIC HYSTEROSCOPY UNDER GENERAL ANAESTHESIA

This is the second edition of this guidance, which was previously published in October 2004 under the same title.

This paper provides advice for clinicians in obtaining the consent of women undergoing diagnostic hysteroscopy under general anaesthesia. It follows the structure of Consent Form 1 of the Department of Health, England/Welsh Assembly Government/Scottish Government/Department of Health, Social Services and Public Safety, Northern Ireland. It should be used in conjunction with RCOG Clinical Governance Advice, *Obtaining Valid Consent*.[1]

The aim of this advice is to ensure that all women are given consistent and adequate information for consent; it is intended to be used together with dedicated patient information. After discharge, all women should have clear direction to obtain help if there are unforeseen problems.

Clinicians should be prepared to discuss with the woman any of the points listed on the following pages.

**Presenting information on risk**

| Term | Equivalent numerical ratio | Colloquial equivalent |
|---|---|---|
| Very common | 1/1 to 1/10 | A person in family |
| Common | 1/10 to 1/100 | A person in street |
| Uncommon | 1/100 to 1/1000 | A person in village |
| Rare | 1/1000 to 1/10 000 | A person in small town |
| Very rare | Less than 1/10 000 | A person in large town |

The above descriptors are based on the RCOG Clinical Governance Advice, *Presenting Information on Risk*.[1] They are used throughout this document.

To assist clinicians at a local level, we have included at the end of this document a fully printable page 2 of the Department of Health, England/Welsh Assembly Government/Scottish Government/Department of Health, Social Services and Public Safety, Northern Ireland, Consent Form 1. This page can be incorporated into local trust documents, subject to local trust governance approval.

*Fig: 1.4 Consent*

1.8 **Medico-Legal Issues Specific to Indian Practice**

1.8.1 **Consent Framework** in India

- Governed by general principles under **Indian Contract Act**, Indian Penal Code (Sections relating to consent — now under **Bharatiya Nyaya Sanhita**), and **Consumer Protection Act, 2019** (medical services are covered as "services" — established via Indian Medical Association v. V.P. Shantha).
- **Spousal consent is NOT legally mandatory for a competent adult woman** undergoing gynaecological procedures, including those affecting fertility — the **woman's own informed consent suffices**. However, in practice, many Indian institutions still obtain ***spousal/family consent as an additional safeguard, especially for procedures affecting future fertility*** (e.g., endometrial ablation, hysterectomy) — this is a common source of medico-legal/ethical discussion and exam questions.

1.8.2 **PCPNDT Act, 1994** (Pre-Conception and Pre-Natal Diagnostic Techniques Act)

- Although primarily targeted at sex-selection technologies, hysteroscopy units/facilities performing gynaecological endoscopy must ensure Form F-type documentation is NOT confused with hysteroscopy (Form F applies to prenatal diagnostic procedures) — but ***general principle of maintaining meticulous procedure records*** applies across all Indian gynaecological practice given the sensitivity around this Act.

1.8.3 **Clinical Establishments Act / State Nursing Home Registration**

- **OT where hysteroscopy** (especially operative, under anaesthesia) **is performed must be a registered clinical establishment** as per applicable state Act, with documented standards for OT infrastructure, equipment sterilization, and anaesthesia safety.

1.8.4 **Consumer Protection Act, 2019**

- Deficiency in service (e.g., uterine perforation from negligent technique, failure to obtain proper informed consent, failure to disclose risk of fluid overload) **can be litigated as a consumer complaint**. Documentation of consent and procedure notes is the primary defence.

1.8.5 **Record Keeping**

- Medical Council/NMC regulations require **retention of case records for a minimum of 3 years from commencement of treatment**; if litigation is anticipated or a minor is involved, retain longer.
- **Operative notes, fluid balance charts, energy source settings used,** and **histopathology reports** should be preserved as they are frequently scrutinized in negligence claims.

1.8.6 **Common Litigation Scenarios** in Hysteroscopy (India)

- ***Uterine perforation with bowel injury***, missed at time of surgery — delayed diagnosis leading to peritonitis.
- ***Fluid overload*** leading to pulmonary oedema/ death — inadequate fluid balance monitoring.
- ***Unintended hysterectomy*** performed without adequate prior consent for the same.
- ***Retained products/failed procedure requiring re-intervention*** — alleged negligence.
- ***Loss of fertility*** after septal resection/ablation without adequate pre-procedure counselling.

1.8.7 **Standard of Care**

- Indian courts (post Jacob Mathew v. State of Punjab) apply the **Bolam test** (modified by Bolitho) — ***a doctor is not negligent if the treatment conforms to a practice accepted as proper by a responsible body of medical practitioners skilled in that field***, provided this body of opinion is logically defensible.

1.9. **Task.**

- **Interactive session: "5-minute theatre challenge"**
- Before every case the trainee should answer:
- **Patient. Procedure. Preparation. Position. Equipment. Energy. Expected difficulty. Rescue plan.**
- **Competency principle:** *Candidate's knowledge of working environment inside the OT and ergonomics, indications for operative and diagnostic procedures, the nuances of medicolegal issues and consenting.*

## 2. Equipment and Instrumentation — Masterclass

Instead of teaching instruments through lectures, create an Hysteroscopy equipment can be grouped as: **"Instrument Olympiad."**

**Trainees must identify, assemble and correctly use:**

1. Telescopes (optics)
2. Sheaths (diagnostic/operative)
3. Light source and cable (Fig: 2.8)
4. Camera and video system (Fig: 2.9)
5. Hand instruments (mechanical)
6. Resectoscope assembly (for operative cases)

2.1 **Diagnostic Hysteroscopes** (Fig: 2.1)

- Telescope **diameter *2.7–4 mm (0° or 30°)***, fitted within a diagnostic sheath (total outer diameter often 3.5–5.5 mm).
- ***Continuous-flow diagnostic sheaths with separate inflow/outflow channels*** preferred.

*Fig: 2.1 Bettochhi 1.9 mm Telescope*

*Fig: 2.8 Xenon Light Source with Cable*

*Fig: 2.8 Xenon Light Source with Cable*

*Fig: 2.9 HD 4K Camera System*

- Can be ***rigid*** or ***flexible fibre-optic hysteroscopes*** (useful in nulliparous/virgin cervix, better patient tolerance, but inferior optics compared to rigid rod-lens systems and more fragile/expensive).
- Panoramic (non-contact) technique is standard; contact hysteroscopy is an older, largely obsolete alternative.

Standard diameter: 2.9 or 4 mm, with 0°, 12°, 25°, or 30° fore-oblique lenses (30° most popular — allows panoramic view by rotation).

- ***Office/mini-hysteroscopes***: 2.7 mm or smaller (down to 1.9–2 mm) telescopes.
- ***Rod-lens (Hopkins) system*** — rigid; fibre-optic — flexible. (Fig: 2.2)

2.2 **Sheaths** (Fig: 2.3)

- ***Diagnostic sheath:*** smaller diameter, working channel (if present) only accommodates fine semi rigid instruments **(5 Fr).**
- ***Operative sheath:*** larger outer diameter (accommodating continuous-flow inflow/outflow + working channel for rigid semi-rigid instruments or resectoscope loop assembly).
- Single-flow vs continuous-flow (double sheath) — ***continuous-flow*** (separate inner and outer sheaths for inflow/outflow) is ***preferred*** as it maintains clearer visual field by continuously clearing blood/debris.
- Sheath sizes generally quoted in French (Fr); ***operative sheaths for resectoscopes*** typically ***24–26 Fr***; ***mini-resectoscope sheaths 15–19 Fr***.

2.3 **Operating Instruments** (Fig: 2.4)

2.3.1 **Mechanical** (Semi-rigid, 5 Fr, through diagnostic/office scope working channel)

- ***Scissors*** — for Adhesiolysis, septum incision, targeted biopsy
- ***Grasping forceps*** — for polyp avulsion, foreign body/IUCD removal
- ***Biopsy forceps***

2.3.2 **Resectoscope Instruments** (through operative sheath, larger diameter) (Fig: 2.5)

- ***Cutting loop electrode***
- ***Roller ball/barrel electrode***
- ***Vaporizing electrode***

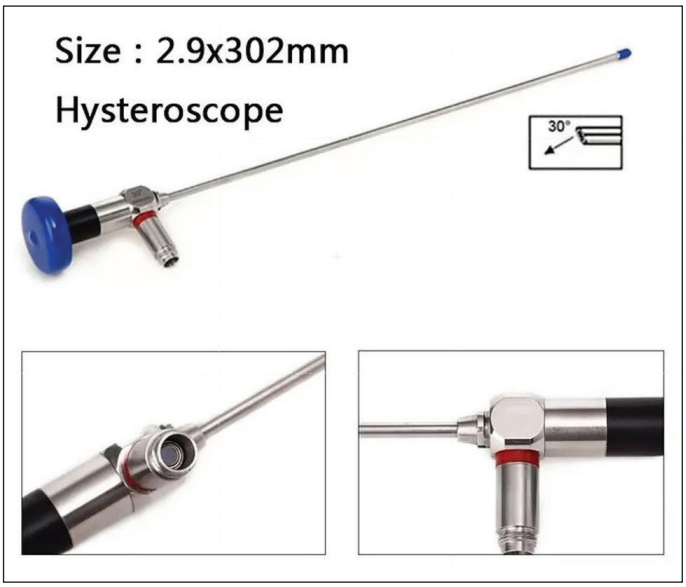



*Fig: 2.2 2.9 mm, 30° Telescope*

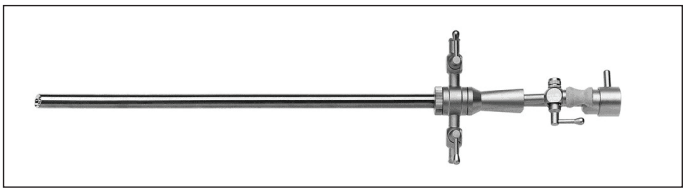


*Fig: 2.3 Diagnostic Hysteroscopy Sheath*

*Fig: 2.4 Operative Hysteroscopy Instruments*

2.3.3 **Mechanical Morcellator Systems** (Fig: 2.6)

More recently, hysteroscopic morcellators, now called ***hysteroscopic tissue removal systems (HTRS)***, that maintain visualization through simultaneous tissue cutting and removal has become increasingly popular.

- HTRS are electricity driven ***mechanical devices*** comprising a ***0-6 degree telescope*** with a specialized operating channel that allows the use of ***disposable cutting instruments*** and is connected to an ***external suction system.***

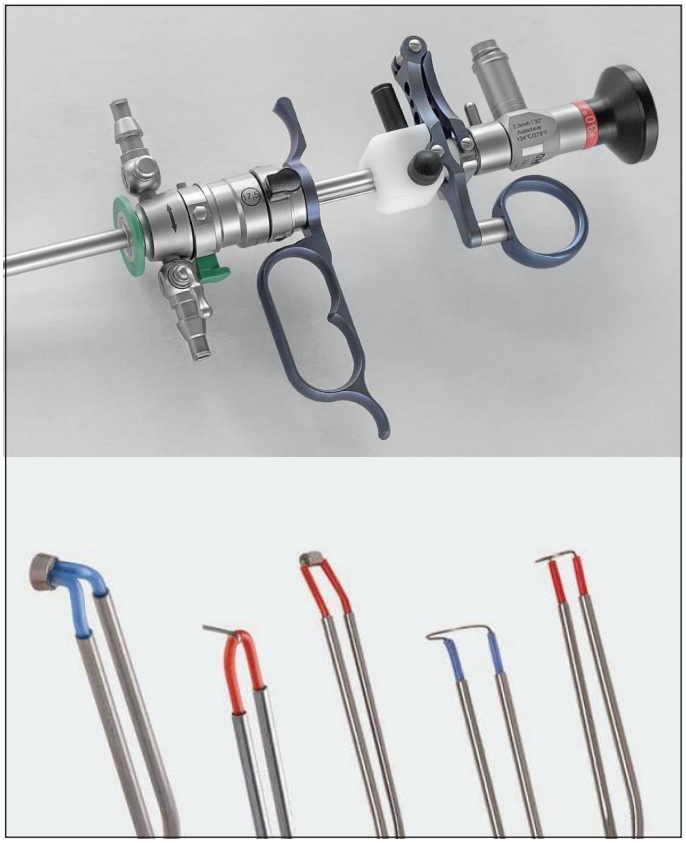


*Fig: 2.5 Resectoscope with electrodes*

*Fig: 2.6 Hysteroscopic Tissue Resection System*

*Fig: 2.6 TruClear - Hysteroscopic Tissue Resection System*

*Fig: 2.6 Intrauterine Bigatti Shaver (IBS)*

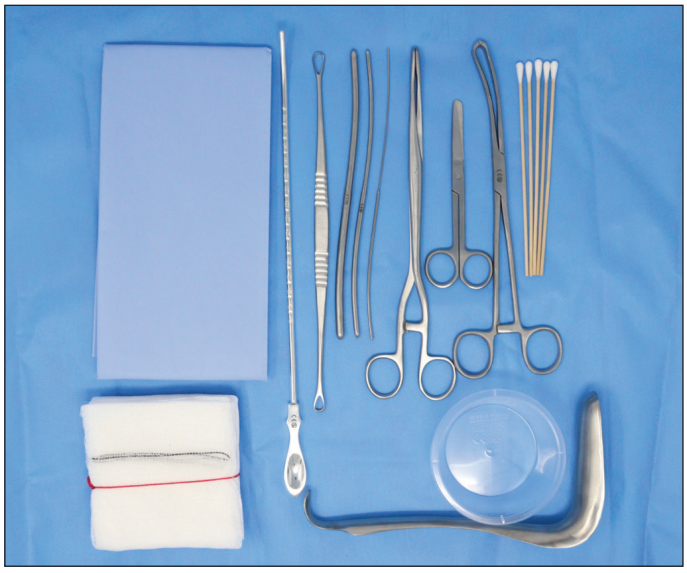


*Fig: 2.7. OT Layout Trolley for Operative Hysteroscopy*

- Tissue removal systems have ***a quicker learning curve***, are ***faster to complete***, ***less painful***, ***more tolerable***, and ***allow better surgical excision*** of polyps compared to electrosurgical devices such as the resectoscope.
- ***Rotating/oscillating blade with integrated suction*** — used for polyp, myoma (types 0/1), and retained products of conception removal, visual D&C in endometrial hyperplasia

2.3.4 **Ancillary** (Fig: 2.7)

- Cervical dilators (Hegar's) only for 22-26fr resectoscopes
- Tenaculum (if not using vaginoscopy technique)

2.4. **Task.**

**Competency principle:** *Candidate's knowledge of equipment constructions, operating principles and basic idea of assembly.*

## 3. Distension Media & Fluid Pump Systems-Fluid management.

**Distension Media**

Uterine cavity is a potential space — must be distended for visualization. Optimal visualization of the uterine cavity requires the use of distension media that can accommodate both diagnostic and operative hysteroscopy.

Fluid (i.e., glycine, dextran, water, sorbitol, and normal saline) and gaseous distention media (i.e carbon dioxide) have both been described in the literature. Generally, ***fluid distention media are preferred in comparison to gaseous ones***.

3.1 Gaseous Media (obsolete)

- ***$CO_2$*** — used ***only for diagnostic hysteroscopy***, not operative.
    - Delivered via a dedicated hystero-insufflator (NOT laparoscopic insufflator — different flow/pressure specs; laparoscopic insufflators deliver flow too fast → risk of gas embolism).
    - Flow rate: 40–100 mL/min; pressure ≤ 100 mmHg.
    - ***Disadvantage:*** bubble formation ***obscures view if bleeding present;*** cannot be used with blood in the field.
    - Carbon dioxide use is also associated with ***a small risk of air embolism***, and for this reason, the use of an electronic hystero-insufflator (to monitor intrauterine pressure and gas insufflation) is advisable.

3.2 Liquid Media

A. Low-viscosity media

- Electrolyte-containing (***Normal Saline***, Ringer Lactate):
    - Used only ***with bipolar energy*** or ***mechanical instruments*** (morcellators) because they conduct electricity and would disperse monopolar current.
    - ***Safer*** — isotonic, so less risk of hyponatremia; but caution still needed for fluid overload.
- Electrolyte-free / Non-conducting (used with monopolar systems):
    - ***1.5% Glycine*** — classically used; ***risk of hyperammonemia***, transient visual disturbance, hyponatremia, cerebral oedema.neurotoxicity.
    - 3% Sorbitol / Sorbitol-Mannitol mixture
    - 5% Mannitol — osmotic diuretic property; slightly better safety in fluid overload but still non-electrolyte.
    - ***Dextran 70 (Hyskon)*** — high viscosity, historically used for diagnostic scopes; risk of anaphylaxis, coagulopathy, pulmonary oedema, ARDS — ***largely abandoned now***.

3.3 **Choice of Media-guide:**

- The preference for "a particular" type of fluid distention media depends on the ***safety profile of the selected fluid***, the ***type of operative system*** (mechanical or electrosurgical technology), and the ***purpose of the hysteroscopy.***
- As such, ***isotonic normal saline is the preferred fluid distension media*** for operative hysteroscopy as its "normal physiologically compatible" nature allows for ***less risk of severe osmotic imbalance*** in the event of inadvertent fluid overload (hypovolemic hyponatremia).
- This advantage makes it ***a safe choice*** for mechanical operative procedures (e.g., polypectomy).
- Similarly, ***operative technology*** using different electrical circuits, i.e., monopolar or bipolar instruments, also ***impacts the choice of fluid*** distension media. Monopolar instruments require the

use of nonconductive, non-ionic, hypo-osmolar solutions (e.g., sorbitol or glycine), whereas bipolar instruments require the use of conductive, ionic solutions (e.g., normal saline or Ringer's lactate).

- Table. 3.1 provides ***a summary of the types of distension media*** and their clinical application.
- Irrespective of which fluid is used, the ri***sk of fluid overload with or without electrolyte imbalance remains a major concern.***

3.4 **Fluid Overload / TURP-like Syndrome**

Discussed under Complications (Section 7.2).

**Fluid Pump Systems**

3.5 ***Gravity System***

Fluid bag hung 1 metre above patient — generates approx. 60–70 mmHg pressure. Low-cost but less controlled, least favoured. (Fig: 3.1)

3.6 ***Automated Fluid Management Pumps***

- **Electronic pump systems** (e.g., Hysteromat-type systems) that regulate: (Fig: 3.2)
  - ***Intrauterine pressure*** (set typically to ***just above patient's MAP,*** commonly 70–80 mmHg, not exceeding 120–150 mmHg)
  - Inflow and outflow rates
  - ***Continuous fluid deficit calculation*** — automatically alarms at preset deficit thresholds.
- **Fluid deficit safety thresholds** (widely quoted, AAGL guidance):
  - ***Electrolyte-poor media (glycine/sorbitol)***: **stop procedure at <u>1000 mL deficit</u> in healthy patients**; 750 mL in those with cardiovascular/renal comorbidity.

*Fig: 3.1 Fluid in pressure bag*

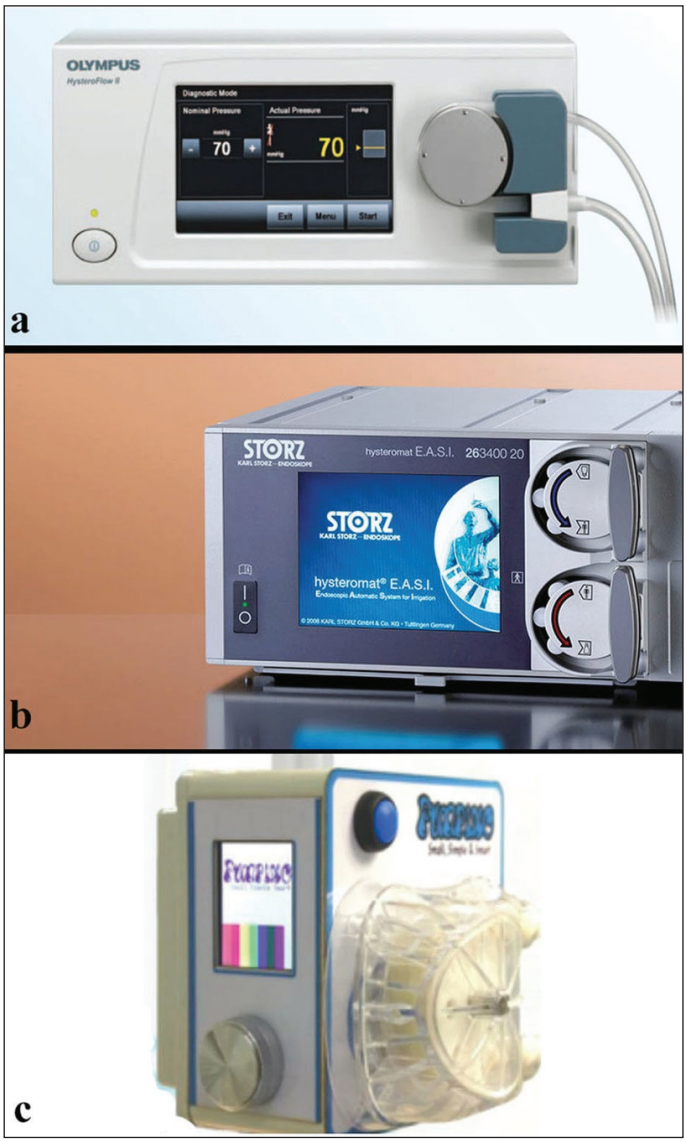



*Fig: 3.2 Hysteromat*

Table: 3.1

| Energy Source | Compatible Media |
|---|---|
| No energy (diagnostic/mechanical) | Normal Saline or $CO_2$ |
| Monopolar | Glycine 1.5%, Sorbitol, Mannitol (non-conducting) |
| Bipolar | Normal Saline / RL (conducting, isotonic) |
| Laser | Normal Saline (usually) |

*Fig: 3.3 Continuous Fluid monitoring System in Operative Hysteroscopy*

- ***Isotonic saline (bipolar systems)***: **threshold raised to <u>2500 mL (healthy)</u>**, 1500 mL in co-morbid patients.

- **Continuous-flow systems** (separate inflow/outflow channels) preferred over single-flow for clearer vision and better pressure control. (Fig: 3.3)

3.7 **Task.**

- **Competency principle:** *Candidate's knowledge of distension fluids, principles of usage with compatible energy, meticulous attention to fluid deficit- prevent, recognise and treat.*

## 4. Resectoscopes & Energy Sources

Teach every device through:

**Energy source → tissue effect → indications → limitations → complications → troubleshooting**.

4.1 **Resectoscopes — Types**

4.2 **Basic Components** (Fig:4.1)

- Outer sheath (inflow), inner sheath (outflow), working element carrying the electrode (loop/roller/ball/vaporizing electrode), telescope, and passive/active handle mechanism.

4.3 **Classification**

A. By ***diameter***

- **Standard resectoscope**: 26–27 Fr (outer sheath)
- **Mini-resectoscope**: 15–19 Fr — used for office/outpatient operative procedures with no need for cervical dilatation. (Fig:4.2)

B. By ***energy type***

- **Monopolar resectoscope** (requires ***glycine***/sorbitol/mannitol)
- **Bipolar resectoscope** (compatible with ***normal saline***)

C. By ***handle mechanism*** (Fig:4.3)

- ***Passive (spring) handle — loop retracts automatically into sheath at rest***; activated by pulling towards surgeon (safer, prevents inadvertent perforation).
- Active handle — loop extends on activation; less commonly used now.

D. By ***electrode tip*** (Fig:4.4)

- Cutting loop (myoma/polyp resection, TCRE for endometrial resection)
- Collin's knife
- Roller ball/roller barrel (endometrial ablation)
- Vaporizing electrode

4.4 **Miniaturized resectoscopes**

- The advent of the mini-resectoscope marked a new era in managing uterine pathologies by reducing the outer diameter of traditional 22F or 26F resectoscopes.
- It enables intracavitary procedures using a "no-touch technique," eliminating the need for painful cervical dilations and associated complications while retaining standard surgical capabilities.
- Navigating the cervical canal directly without speculum placement mitigates dilation risks, reduces the requirement for analgesia or anesthesia, and expands outpatient surgical capabilities.

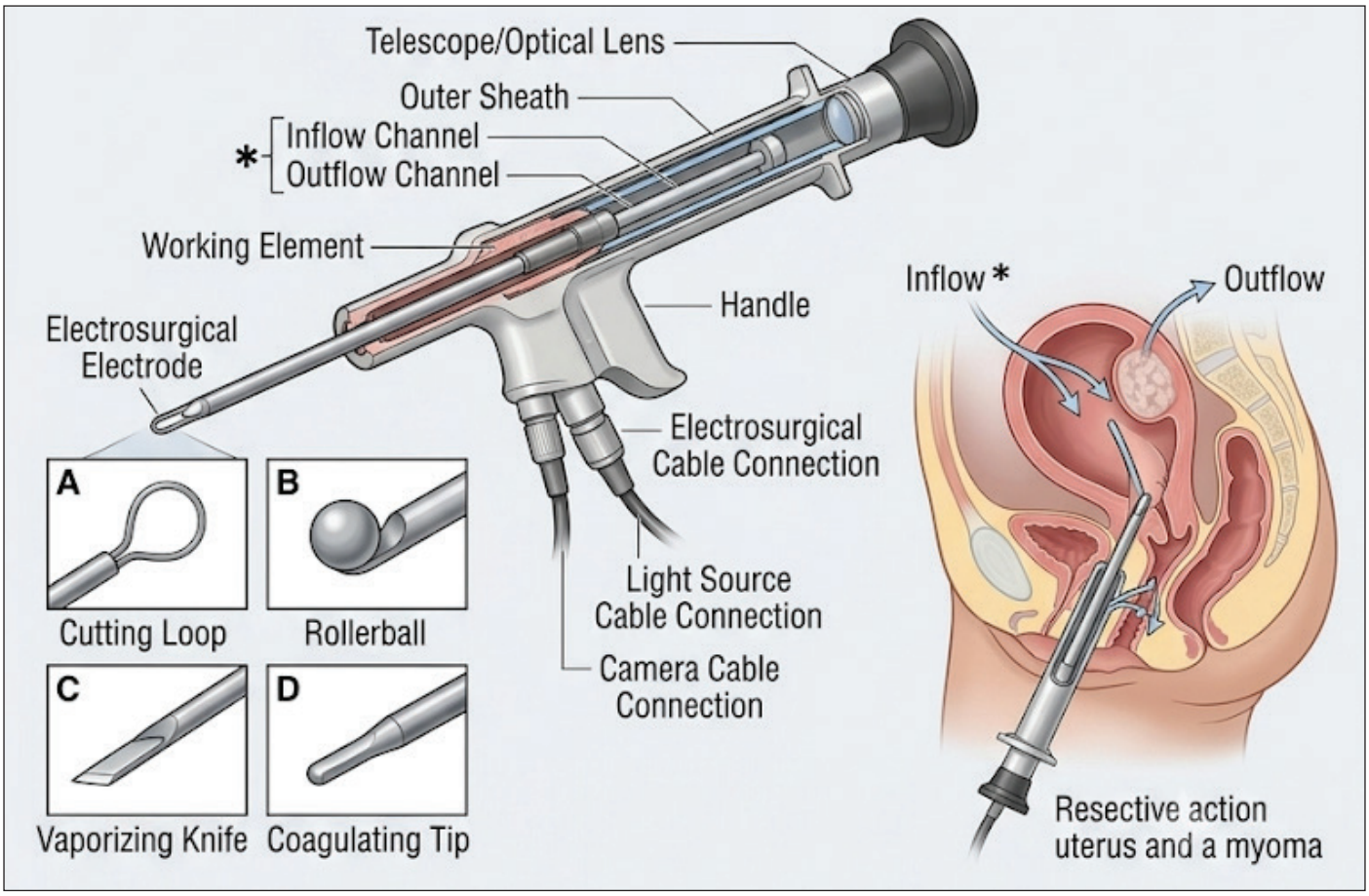



*Fig: 4.1 Basic Construction and Design of a Resectoscope*

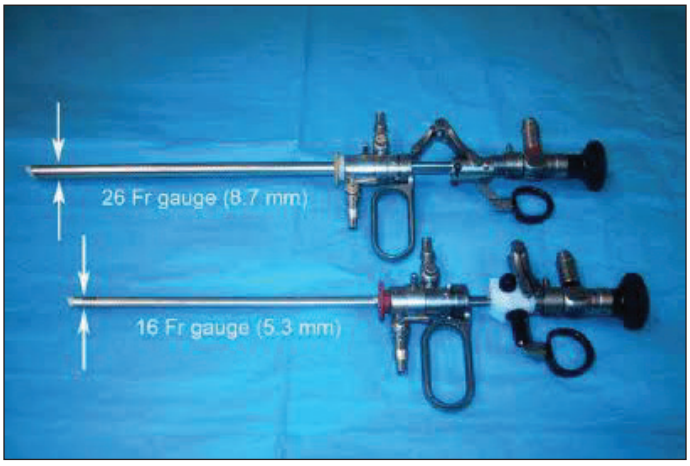



*Fig: 4.2 Different Resectoscopes based on diameters*

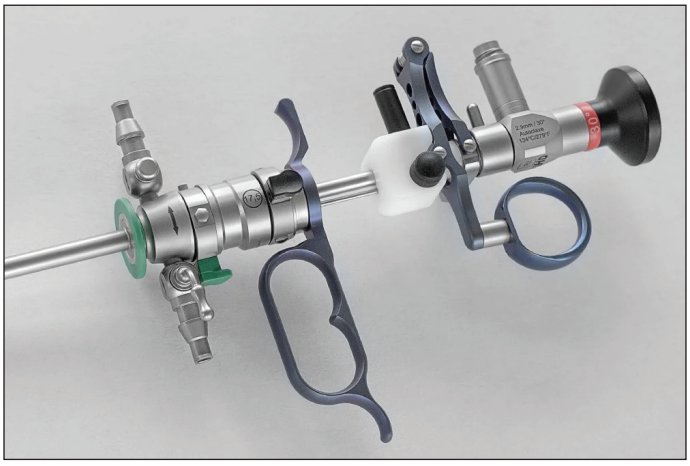


*Fig:4.3 Passive mechanism of the Handle*

- Frequently deployed in office settings to allow direct visualization and immediate treatment of intrauterine pathology with minimal patient discomfort.
- **5 mm Continuous-Flow Resectoscope (e.g., Karl Storz Mini-Resectoscope):**
    - Houses a 2.9 mm telescope within a 5 mm sheath to enable direct intracavitary visualization with minimal cervical dilation.
    - Features hybrid monopolar/bipolar working elements that accommodate saline- or glycine-based distending media.
    - Facilitates office polypectomy and resection of type 0–1 myomas (≤3 cm) under local anesthesia.

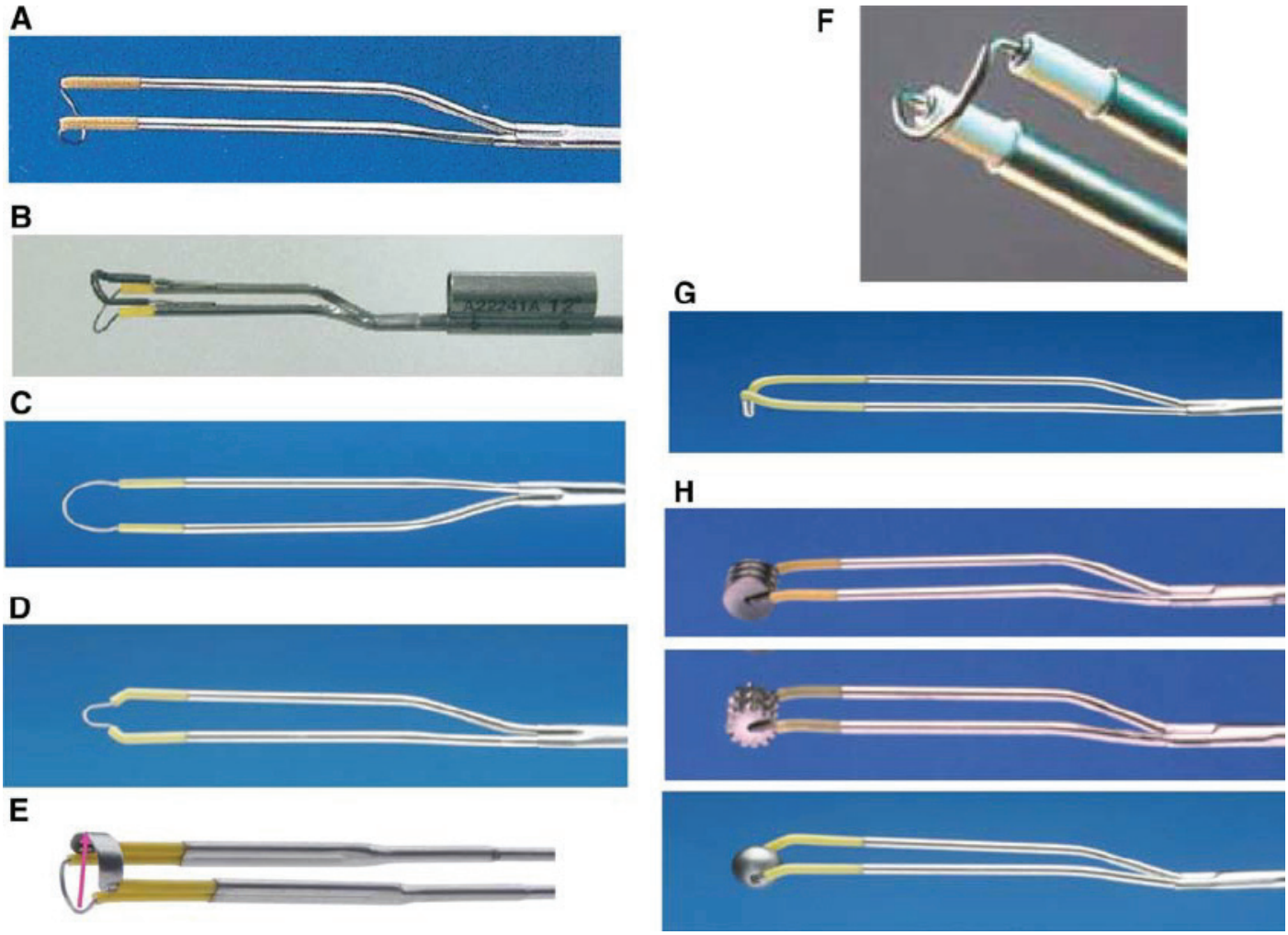



*Fig: 4.4 Different Types of Electrodes*

- **7 mm Bipolar Princess Resectoscope (Richard Wolf):**
  - Incorporates a rotatable double-sheath design paired with 2.7 mm PANOVIEW PLUS optics (12° or 30°), enabling precise loop orientation without exerting torque on the cervix.
  - Employs bipolar plasma resection in saline media, reducing thermal spread and systemic fluid overload risks.
- **SlimLine Sheath Systems (Olympus):**
  - Utilizes continuous-flow sheaths measuring 5.5–6.5 mm paired with 3 mm telescopes (0°, 12°, or 30°).
  - Accommodates 5–7 Fr bipolar electrodes (such as Versapoint) or miniature wire loops in saline.
  - Applies plasma energy technology for tissue cutting or vaporization while minimizing collateral endometrial injury.
- **Gubbini 16 Fr System (TONTARRA Medizintechnik):**
  - Features a 16 Fr (~5.3 mm) continuous-flow design utilizing a 2.9 mm rod-lens telescope and monopolar loops.
  - Demonstrates clinical performance equivalent to standard-sized resectoscopes, with reduced cervical dilation time and lower fluid absorption rates.
- **OEM and Disposable Sheaths (e.g., AED, Gimmi, RZ Medizintechnik):**
  - Comprises 5–6 mm continuous-flow sets featuring hybrid energy capability and single-use components to streamline sterilization workflows.

4.5 **Instrumentation: resectoscope design**

- Serves as the cornerstone instrument for operative hysteroscopy and myomectomy, integrating visualization, irrigation distension, and electrosurgical capability into a single endoluminal tool.
- **Core Structural Components:**
  - **Optical lens and telescope:** Delivers direct visualization of the uterine cavity.
  - **Outer sheath:** Contains separate inflow and outflow channels to maintain continuous fluid irrigation and uterine cavity distension.
  - **Working element:** Mechanically holds, advances, and retracts the electrosurgical electrode.
  - **Electrosurgical electrode:** Available in configurations such as cutting loops, rollerballs, or vaporizing knives to resect, coagulate, or ablate tissue.
  - **Handle and activation mechanism:** Allows the surgeon ergonomic control to manipulate the electrode.
  - **Cable connections:** Connects the instrument to light sources, video cameras, and electrosurgical power generators.
- **Resectoscope Calibers and Sizing:**
  - Sized using the French gauge system (1 Fr = 0.33 mm outer diameter).
  - **22-French (Fr):** Measures approximately 7.3 mm in outer diameter.
  - **26-French (Fr):** Measures approximately 8.7 mm in outer diameter; traditionally used for major operative hysteroscopy because its larger working channel accommodates heavier electrodes and higher fluid flow rates.
  - **Mini-resectoscope (15 Fr):** Measures approximately 5.0 mm in outer diameter; optimized for office settings to enable easier cervical entry, lower dilation needs, and better patient tolerance, though resection rate may be slower.

4.6 **Electrical** (Fig:4.5)

A. **Monopolar**

- Current passes from active electrode (loop/ball/roller on resectoscope) through patient to a grounding/return pad.

*Fig: 4.5 Electrosurgical Unit*

- Requires ***non-conductive, electrolyte-free distension media.***
- **Risks:** ***electrolyte disturbances*** from absorbed glycine, ***risk of stray current injury.***

B. **Bipolar**

- ***Active and return electrodes both at the instrument tip***; current does not pass through the patient body; no lateral dispersion of current.
- ***Can be used with normal saline — major safety***

***advance*** (avoids glycine-related metabolic complications).

- Now ***preferred in most modern resectoscope /office operative systems*** (e.g., bipolar resectoscope, Versa point-type bipolar electrodes for office use).

**Electrosurgery in hysteroscopic surgery**

- Electrosurgical devices (monopolar and bipolar) can be used for the hysteroscopic treatment of submucous fibroids, endometrial polyps, intrauterine synechiae, and uterine septae. **Monopolar hysteroscopic devices** require ***nonconductive distension media*** such as 1.5% glycine or 3% Sorbitol, which are hypo-osmolar. **Bipolar devices** work in ***conductive iso-osmolar media*** such as 0.9 % saline or lactated ringer's solution.
- **Complications** such as ***electrolyte imbalance*** and its ***consequences*** are more common with ***hypo-osmolar distension media***, hence ***bipolar systems*** are considered to be ***safer*** compared to monopolar devices.
- In addition, the bipolar uses ***less voltage*** with ***less chance of dispersion of stray current***; unintended electrical injury.
- ***Bipolar hysteroscopic devices*** are somewhat ***different*** than the ***conventional bipolar device***, as in the hysteroscopic counterpart ***only the active electrode touches the tissue*** and ***the nearby return electrode drains the current through the conductive medium.***
- ***Fluid management systems*** are recommended to ***reduce fluid overload hazards*** associated with hysteroscopic surgery with both monopolar and bipolar systems.

**Electrosurgery and electromagnetic interference: Clinical implications**

- Electrosurgical devices can ***interfere with active implants*** such as permanent pace-makers (PPMs), implantable cardioverter defibrillator (ICD), and neurologic stimulators. This can damage or inhibit such implants, burn the myocardium or cause arrhythmias and asystole [13].
- The following ***prevention strategies*** can be used to avoid these problems:

  Get ***advice from the manufacturer*** or ***cardiology team*** before surgery. In patients highly dependent on the implant, use bipolar or ultrasonic devices. ***When using monopolar:***

  - place the dispersive electrode(return/patient plate) away from the implant.
  - avoid capacitively coupled return electrode.
  - use low power, cut mode to coagulate with short activation.
  - avoid current vector crossing the implant.
  - use ECG to monitor PPM during surgery and reprogram it, if required, postoperatively.
  - deactivate ICD preoperatively then activate it after surgery. A magnet can be used in an emergency when cardiology input is not available.

4.7 **Laser**

- Nd:YAG laser — historically used for endometrial ablation and myoma/septum resection; requires special safety precautions (eye protection, non-reflective instruments).
- Diode laser preferred
- KTP laser also described.
- ***Largely superseded by electrosurgery due to cost and equipment bulk***, but still mentioned in exams as historical/optional modality.

4.8 **Plasma Energy** (Cold Plasma / Plasma Kinetic)

- Bipolar radiofrequency-based systems that create a plasma field at the electrode-saline interface, producing ***tissue vaporization at relatively lower temperatures — reduces thermal spread injury***.
- Used in ***bipolar resectoscope loops*** and some morcellator-type systems.

4.9 **Mechanical Energy** (Non-thermal)

- Intrauterine morcellators – tissue-retrieval systems (e.g., TRUCLEAR, MyoSure-type systems) — use a rotating/oscillating cutting blade with simultaneous suction to shave and remove tissue (polyps, submucous myomas) without electrical energy.
- **Advantages:** ***no thermal injury***, ***faster*** tissue removal, tissue retrieved for histopathology as ***intact specimen*** (vs. fragmented chips with resectoscope), can often be done ***in office setting*** with ***normal saline as media***.Beneficial for fertility preservation surgery
- Examples of these systems include **TRUCLEAR™**, **Myosure™**, **Integrated Bigatti Shaver** (IBS), and the **SYMPHION™**. These HTRS

come in a ***variety of sizes*** so that some are suitable and indicated ***for office removal of polyps and fibroids***, whereas others are designed for removal of larger fibroids and chronic retained products of conception ***under regional or general anesthesia***.

4.10 **Task. Level 2 — Practical**

Each trainee demonstrates:

- Correct instrument selection
- Correct activation
- Tissue handling
- Avoiding unintended activation
- Avoiding thermal injury
- Safe use near ostia and cornua
- Safe use near isthmus

4.11 **Task. Level 3 — "Energy Error Lab"**

Give trainees simulated scenarios:

**"You are doing resection of myoma with Bipolar loop electrodes. How deep will carry out the resection?"**

**"When you attempt to excise the septum, would you use a loop electrode/ Colin's knife, or a pair of scissors?"**

**"There is an apprehension of uterine perforation at the fundus, while using a Bipolar resectoscope. What are your next steps?"**

**Task:**

**Competency principle:** *The emphasis should be on judgement rather than device brand names.*

## 5. Office Hysteroscopy

5.1 Concept

- ***Outpatient***, ***no-anaesthesia*** (or minimal local anaesthesia) diagnostic ± minor operative ("see-and-treat") procedure using ***small-calibre scopes.***

5.2 **Vaginoscopy (No-Touch) Technique**

- Avoids use of speculum and tenaculum — scope introduced directly through the vagina/cervix using distension media to open the vaginal canal, ***reducing patient discomfort significantly*** and eliminating need for cervical grasping instruments in most cases.

5.3 **Instruments** Suited for Office Use

- Mini-hysteroscopes (< 5 mm outer sheath)
- 5 Fr semi-rigid mechanical instruments (scissors, grasper, biopsy forceps) passed through operative channel — "see-and-treat" for small polyps, targeted biopsy, Adhesiolysis of thin adhesions, IUCD removal.
- Bipolar micro-electrodes (e.g., Versa point-type 5 Fr bipolar) for small myoma/polyp ablation, septum incision.
- Miniature mechanical morcellators are increasingly used in-office as well.

5.4 **Advantages**

- Cost-effective, avoids GA-related risks, immediate diagnosis and treatment in a single visit, better patient acceptance with vaginoscopy approach, reduced hospital stay.

5.5 **Limitations**

- Not suitable for large myomas/polyps, extensive adhesions, or where significant cervical stenosis/ patient intolerance prevents scope passage without anaesthesia.

5.6 **Analgesia** in Office Setting

- Options: no analgesia, oral NSAIDs, paracervical block, intracervical local anaesthetic gel — chosen as per procedure complexity and patient tolerance.

**Task:**

**Competency principle:** *The emphasis should be on judgement rather than device brand names.*

## 6. Complications

Complication **risks** may be **low between 1-3%**. The surgeon, whose complication rates are lower are not that they are lucky, but that they have made adequate preparation for the case after having risk stratifying each and every case. Talking about individual procedures, polypectomy carries the least complication, followed by myomectomy, endometrial resection, whereas the highest in the category is Synechiolysis in Asherman's. **Early discharge, faster recovery without any significant complain is the thumb-rule**. It is better to stop the procedure than to create complication Any complain in the post-operative period should raise a suspicion of an impending complication- and hence needs deeper review and close surveillance of these patients.

Complications can be categorised depending on the timeframe of the occurrence. The following chart is self-explanatory.

6.1 **General** (applicable to any hysteroscopic procedure)

- Uterine perforation — most common complication; risk increased with cervical stenosis, acute flexion, or retroversion, inexperienced operator, and use of energy sources (energy-related perforation is more dangerous due to potential bowel/ bladder injury).
- Cervical trauma/laceration — especially with tenaculum traction and forced dilatation.
- Infection — endometritis, rarely pelvic sepsis.
- Bleeding.
- Vasovagal reactions — particularly in office settings.
- Anaesthesia-related complications (for operative cases under GA/regional).

6.2 **Fluid Overload / Electrolyte Disturbance** (specific to distension media)

- Fluid overload can ***complicate up to 5%*** of operative hysteroscopy procedures.
- Fluid overload occurs from ***intravascular absorption*** of excess fluid into the body's circulation, with a resultant expansion of the extracellular fluid volume. This can ***lead to serious, life-threatening complications*** such as pulmonary oedema, hypertension, cerebral oedema, neurological impairment, seizures, coma, brain death and cardiac failure.
- The joint British Society For Gynaecological Endoscopy/European Society for Gynaecological Endoscopy (BSGE/ESGE) guidance suggests that ***"A fluid deficit of more than 1000 ml should be used as a threshold to define fluid overload when using hypotonic solutions in healthy women of reproductive age"*** .
- The guidance also recommends using ***a fluid deficit threshold of 2500 ml when using isotonic fluid media for the same group of women***.
- Generally, the newer generation bipolar systems are considered safe as they do not impact serum osmolality or sodium levels. However, given the risks of fluid overload, a precautionary approach is warranted.
- This fluid deficit threshold changes to 750 ml for hypotonic fluids and 1500ml for isotonic fluids; for elderly women, co-morbid conditions i.e., cardiac problems, renal problems, etc.
- **Fluid Overload Syndrome** (historically termed «TURP syndrome» analog for hysteroscopy):
  - With electrolyte-free media (glycine): ***dilutional hyponatremia***, ***hyperammonaemia*** (glycine metabolized to ammonia — can cause encephalopathy), cerebral oedema, pulmonary oedema, visual disturbances (glycine is a retinal neurotransmitter analog), cardiac arrhythmia.
  - With isotonic saline (bipolar systems): ***pulmonary oedema/circulatory overload can still occur with large deficits***, but no hyponatremia / hyperammonaemia risk — hence the higher permissible deficit threshold.
- **Prevention**: ***strict fluid deficit monitoring***, using automated pumps, setting alarm thresholds (Section 5.2), measuring input and output volumes, measures losses on the floor bt puddle-vac suctions, and constant monitoring of fluid deficit, keeping intrauterine pressure as low as possible while maintaining adequate view, limiting procedure time.

6.3 **Gas Embolism (extremely rare)**

- Risk with $CO_2$ hysteroscopy if flow rate/pressure exceeds safe limits, or with air introduced inadvertently during liquid media procedures (e.g., priming tubing incompletely). Can be fatal — presents as ***sudden hypotension***, ***decreased EtCO₂, "mill-wheel" murmur.***

| Intra-operative | Early Post-operative | Delayed |
|---|---|---|
| Uterine Perforation | Infection/ Endo-myometritis | Intra-uterine adhesions |
| Haemorrhage | Secondary haemorrhage | Incomplete resection / residual tissue |
| Fluid overload / Electrolyte imbalance | Fluid over-load related sequelae (pulmonary oedema/ cerebral oedema/ coma/ death) | Recurrence (myomas / polyps) |
| Cervical laceration | Delayed presentation- energy-related perforation (thermal bowel injury) | Uterine rupture in subsequent pregnancy |
| Gas / Air embolism | | |

- Patient in supine position, lithotomy; **never in Lyod Davies or Trendelenburg's position.**
- ***Purge the tubings of air prior to surgery.***
- ***Do not remove the scope especially resectoscope multiple times***
- ***Remove the volesllum and speculum once the resectoscope is introduced***

6.4 **Intrauterine infection / endo-myometritis**

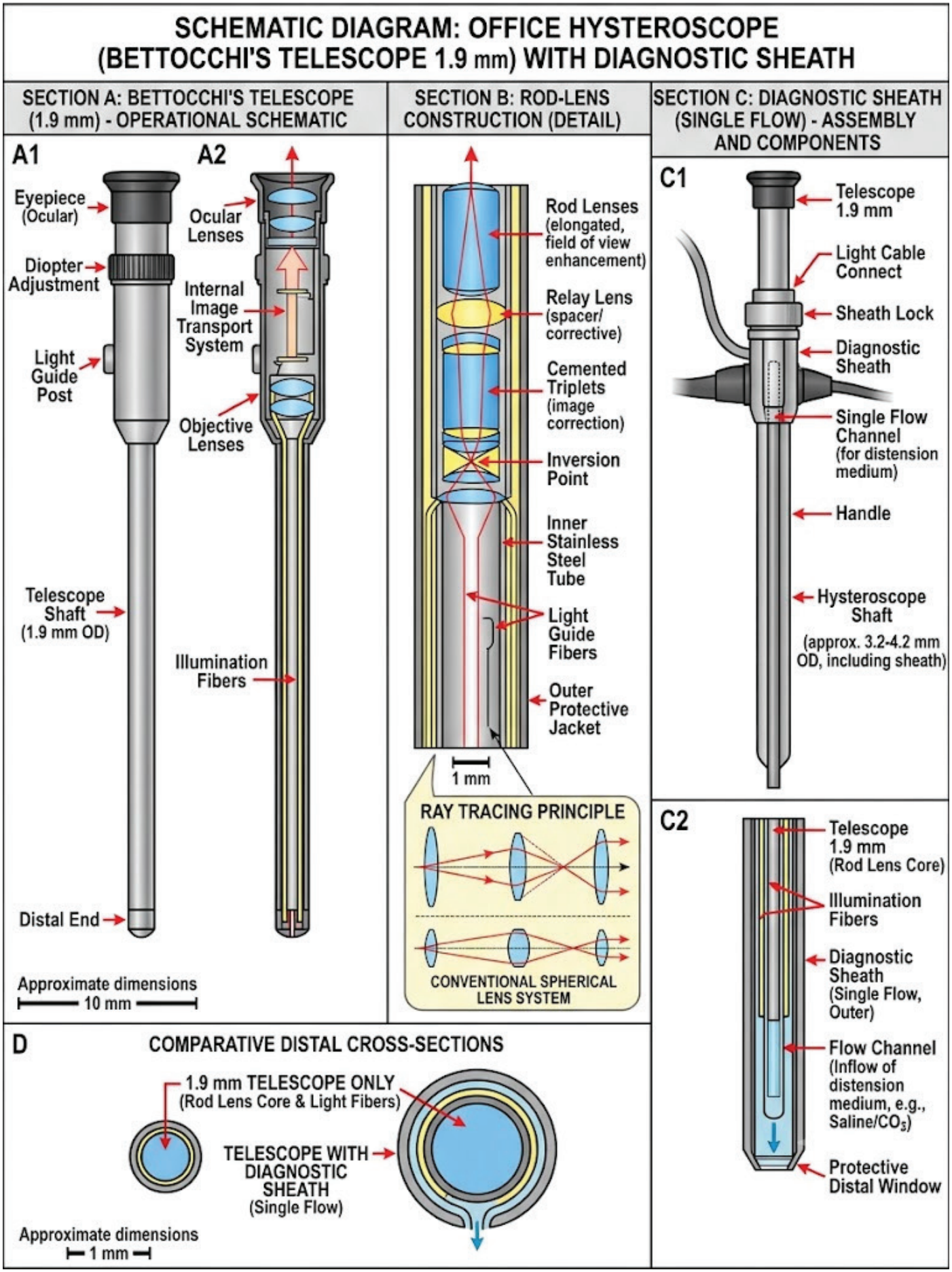
- Overall incidence is low**, less than 1-3%, only.** However, **prolonged instrumentation, retained tissues** are risk factors**. Prophylactic antibiotics are not routinely instituted.** However, any history of vaginal discharge, history of PID, immune-compromised host, multiple sexual partners or high-risk behaviours, should warrant antibiotic prophylaxis. For OP procedures, Single dose **Azithromycin** or **Doxycycline,** couple of hours before the procedure, will suffice. Any fever, with or without vaginal discharge and pelvic pain should raise the suspicion of an infection of the reproductive or pelvic organs.

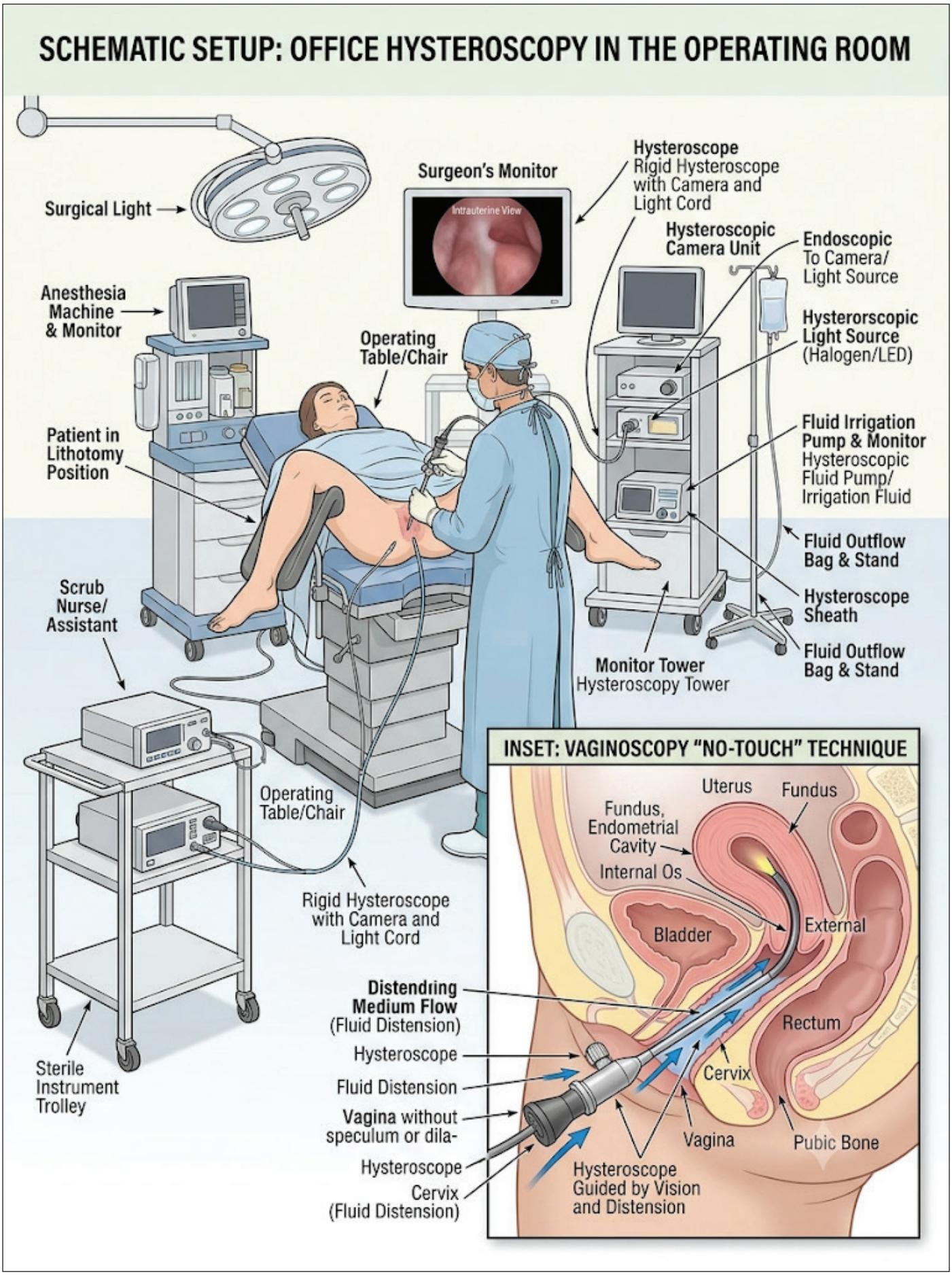
6.5 **Haemorrhage** (intra-operative or secondary)

- The **aetiology** of excessive bleeding in these **two clinical scenarios, are different.** Open venous sinuses, or capillary or arteriolar bleeding happens during surgery. Meticulous dissection, sticking to the principles of haemostasis is important. **Use of bipolar cautery** where appropriate and safe- is encouraged. Staying within the correct tissue-planes is equally important. **Intra-uterine tamponade with balloon of the Foley's catheter**- to be kept for 24-48 hours with adequate use of anti-spasmodic and analgesics, will control the bleeding in most situations. **Vasopressin in a dilution** of 5 units in 100ml (AAGL guidline); then instilling in the substance of the cervix, avoiding 3 & 9 o'clock positions, is very important.
- **Delayed bleeding** beyond 24-48 hours may be due to incomplete resection of myoma, retained tissues, un-diagnosed myometrial injury of perforation, or infection with sloughing. **Needs, prompt evaluation with appropriate workup** and intra-uterine **exploration** with or without laparoscopy, as the case would demand.

6.6 **Procedure-Specific Complications**

- **Myomectomy:** intravasation (fluid absorption via opened myoma vascular bed) — higher deficit risk than polypectomy; incomplete resection; recurrence.
- **Septal resection**: risk of perforation at fundus (thin myometrium); rarely, subsequent uterine rupture in pregnancy if excessive fundal resection.
- **Endometrial ablation/TCRE:** risk of post-ablation tubal sterilization syndrome (hematometra in cornual pockets with tubal occlusion), pregnancy after ablation carrying high complication risk (placenta accreta spectrum), failure requiring hysterectomy.
- **Adhesiolysis (Asherman's):** re-formation of adhesions (may need second-look hysteroscopy), perforation risk increased due to distorted anatomy/loss of landmarks.
- **Electrosurgical complications**: thermal injury to bowel/bladder if perforation occurs with active energy, monopolar stray current injury.
- **Laser:** retinal injury risk to staff without protective eyewear, tissue char with deeper thermal spread if not properly controlled.


SCHEMATIC DIAGRAM: OFFICE HYSTEROSCOPE
(BETTOCCHI'S TELESCOPE 1.9 mm) WITH DIAGNOSTIC SHEATH
SECTION A: BETTOCCHI'S TELESCOPE (1.9 mm) - OPERATIONAL SCHEMATIC
A1
A2
Eyepiece (Ocular)
Diopter Adjustment
Light Guide Post
Telescope Shaft (1.9 mm OD)
Distal End
Ocular Lenses
Internal Image Transport System
Objective Lenses
Illumination Fibers
Approximate dimensions
10 mm
SECTION B: ROD-LENS CONSTRUCTION (DETAIL)
Rod Lenses (elongated, field of view enhancement)
Relay Lens (spacer/ corrective)
Cemented Triplets (image correction)
Inversion Point
Inner Stainless Steel Tube
Light Guide Fibers
Outer Protective Jacket
1 mm
RAY TRACING PRINCIPLE
CONVENTIONAL SPHERICAL LENS SYSTEM
SECTION C: DIAGNOSTIC SHEATH (SINGLE FLOW) - ASSEMBLY AND COMPONENTS
C1
Telescope 1.9 mm
Light Cable Connect
Sheath Lock
Diagnostic Sheath
Single Flow Channel (for distension medium)
Handle
Hysteroscope Shaft
(approx. 3.2-4.2 mm OD, including sheath)
C2
Telescope 1.9 mm (Rod Lens Core)
Illumination Fibers
Diagnostic Sheath (Single Flow, Outer)
Flow Channel (Inflow of distension medium, e.g., Saline/CO2)
Protective Distal Window
D
COMPARATIVE DISTAL CROSS-SECTIONS
1.9 mm TELESCOPE ONLY
(Rod Lens Core & Light Fibers)
TELESCOPE WITH DIAGNOSTIC SHEATH
(Single Flow)
Approximate dimensions
1 mm


SCHEMATIC SETUP: OFFICE HYSTEROSCOPY IN THE OPERATING ROOM
Surgical Light
Surgeon's Monitor
Intrauterine View
Hysteroscope
Rigid Hysteroscope with Camera and Light Cord
Hysteroscopic Camera Unit
Endoscopic To Camera/ Light Source
Anesthesia Machine & Monitor
Operating Table/Chair
Hysterorscopic Light Source (Halogen/LED)
Patient in Lithotomy Position
Fluid Irrigation Pump & Monitor
Hysteroscopic Fluid Pump/ Irrigation Fluid
Fluid Outflow Bag & Stand
Scrub Nurse/ Assistant
Hysteroscope Sheath
Fluid Outflow Bag & Stand
Monitor Tower
Hysteroscopy Tower
Operating Table/Chair
Rigid Hysteroscope with Camera and Light Cord
Distending Medium Flow (Fluid Distension)
Hysteroscope
Fluid Distension
Vagina without speculum or dila-
Hysteroscope
Cervix (Fluid Distension)
Sterile Instrument Trolley
INSET: VAGINOSCOPY "NO-TOUCH" TECHNIQUE
Uterus
Fundus
Fundus, Endometrial Cavity
Internal Os
External
Bladder
Rectum
Cervix
Vagina
Pubic Bone
Hysteroscope Guided by Vision and Distension

# Masterclass on Hysteroscopy

## Based MCQs for Self-Assessment

**1. What is the recommended patient positioning to optimize scope manoeuvrability and surgeon ergonomics during hysteroscopy?**

A. Modified, low dorsal lithotomy position
B. Steep Trendelenburg position
C. Standard prone jackknife position
D. Left lateral decubitus position

Answer: **A** (Low lithotomy positioning allows full range of movement for the hysteroscope and provides optimal ergonomic access for the operator).

---

**2. Which FIGO categories of submucous fibroids are considered the primary candidates for hysteroscopic myomectomy?**

A. FIGO type 0, most of type 1, and selected type 2
B. Only FIGO types 0 and 1
C. Only FIGO type 0
D. None of the above

Answer: **A** (Hysteroscopic myomectomy is indicated for intracavitary lesions (type 0) and intramural lesions with significant submucosal projection (types 1 and 2).

---

**3. According to the legal framework governing medical practice in India, what is the requirement regarding spousal consent for a competent adult woman undergoing a gynaecological procedure?**

A. Spousal consent is legally mandatory for fertility-sparing operative gynaecological interventions.
B. Spousal consent is not legally mandatory, as the woman's own informed consent is legally sufficient.
C. Spousal consent is legally required only if the planned procedure has the potential to adversely affect the future fertility.
D. Spousal consent is explicitly mandated under the Consumer Protection Act of 2019.

Answer: **B** (Statutory principles in India establish that a competent adult woman has full legal authority to consent to her own medical treatment)

---

**4. Under National Medical Commission regulations in India, what is the mandatory minimum retention period for patient case records from the commencement of treatment?**

A. 1 year
B. 10 years
C. 3 years
D. 7 years

Answer: C (Regulations specify that medical records must be preserved for a minimum of three years from the start of treatment).

---

**5. Which fore-oblique telescope lens angle is most commonly preferred in diagnostic hysteroscopy to allow comprehensive cavity visualization via simple scope rotation?**

A. 30° lens
B. 45° lens
C. 70° lens
D. 0° lens

Answer: A (A 30° fore-oblique lens enables panoramic inspection of the uterine cavity and tubal ostia by simply rotating the light cable and scope around its axis).

Answer: A (Working channels of diagnostic and mini-hysteroscopes are standardly sized to accommodate 5 Fr mechanical instruments).

---

**6. Which operating characteristic represents a primary benefit of Hysteroscopic Tissue Removal Systems (HTRS) compared to conventional electrosurgical resectoscopes?**

A. They require carbon dioxide gas for a clear view of the procedure.
B. They utilize a mechanical cutting blade with continuous suction, eliminating electrical thermal injury.
C. They rely on high-viscosity Dextran 70 to lubricate the rotating blade.
D. They use low-voltage bipolar current to vaporize dense pathology rapidly.

Answer: **B** (HTRS devices shave and aspirate pathology simultaneously using rotating/oscillating mechanical blades, avoiding thermal damage and preserving specimen integrity).

---

**7. Why is carbon dioxide ($CO_2$) gas distension limited strictly to diagnostic hysteroscopy and contraindicated when intrauterine bleeding is present?**

A. Gas bubble formation mixes with blood to obscure the visual field.
B. $CO_2$ requires high flow insufflator to maintain cavity visibility.
C. $CO_2$ causes immediate hyperammonaemia upon vascular absorption.
D. $CO_2$ reacts with blood to form solid crystalline emboli.

Answer: **A** (Gas mixing with intracavitary blood produces opaque foam and bubbles that severely impair optical clarity).

---

**8. Which distension medium is compatible with monopolar electrosurgical resectoscopes?**

A. 0.9% Normal Saline
B. Hyskon 70
C. Ringer's Lactate
D. 1.5% Glycine

Answer: **D** .(Monopolar electrosurgery requires non-conducting, electrolyte-free, hypo-osmolar solutions like 1.5% glycine to concentrate current at the target tissue).

---

**9. When using hypotonic, electrolyte-poor distension media (e.g., 1.5% Glycine) in a healthy reproductive-age woman, at what fluid deficit threshold must the procedure be stopped?**

A. 1500 mL
B. 750 mL
C. 1000 mL
D. 2500 mL

Answer: **C** (Guidance specifies stopping procedures using hypotonic media at a 1000 mL fluid deficit in healthy women to prevent severe hyponatremia and cerebral edema).

---

**10. What is the recommended fluid deficit limit for stopping an operative hysteroscopy using isotonic normal saline with a bipolar system in a healthy adult?**

A. 750 mL
B. 2500 mL
C. 1000 mL
D. 1500 mL

Answer: **B** (Because isotonic normal saline carries no risk of hyponatremia, the fluid deficit safety limit is expanded to 2500 mL in healthy reproductive-age women.)

---

**11. What is the ideal target intrauterine pressure setting for automated fluid pump systems during hysteroscopy?**

A. 120–150 mmHg
B. 70–80 mmHg (just above mean arterial pressure)
C. 150–180 mmHg
D. 50–70 mmHg

Answer: **B** (Setting cavity pressure close to the patient's mean arterial pressure (70–80 mmHg) maintains adequate visualization while minimizing fluid intravasation.)

---

**12. Why is a passive (spring-loaded) handle mechanism generally safer than an active handle in resectoscopes?**

A. The cutting loop automatically retracts inside the sheath protective beak at rest.
B. It eliminates the need for continuous fluid inflow and outflow channels.
C. It automatically converts monopolar current into bipolar radiofrequency energy.
D. It keeps the cutting loop extended forward beyond the sheath when at rest.

Answer: **A** (Passive spring handles automatically pull the active electrode safely inside the sheath when released, preventing unintended thermal or mechanical perforation).

---

**13. What is the defining technical feature of the vaginoscopic ('no-touch') approach in office hysteroscopy?**

A. Introducing the scope without speculum or tenaculum, using fluid distension to traverse the vagina and cervix.

B. Performing mechanical dilation up to 6 mm under local paracervical block prior to scope entry.
C. Using a 15 Fr resectoscope without fluid inflow to inspect the lower uterine segment.
D. Utilizing high-pressure low-flow normal saline initially to distend the vaginal walls prior to scope insertion.

Answer: **A** (Vaginoscopy uses the fluid medium to expand the vaginal vault and cervical os, allowing scope entry without painful speculum insertion or cervical traction).

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**14. What is recognized as the most common intra-operative surgical complication during hysteroscopic resection ?**

A. Gas or air embolism
B. Fluid overload with it's consequences from normal saline
C. Uterine perforation
D. Post-operative intrauterine adhesions

Answer: **C** (Uterine perforation is statistically the most frequent intra-operative complication encountered during diagnostic and operative hysteroscopy).

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**15. Beyond dilutional hyponatremia, what specific metabolic toxicity can arise from excessive systemic absorption of 1.5% Glycine?**

A. Metabolic alkalosis from lactate accumulation
B. Hyperammonemia due to hepatic metabolism of absorbed glycine
C. Severe hyperkalemia
D. Hypercalcemic crisis

Answer: **B** (Absorbed glycine is metabolized by the liver into ammonia and glycolate, which can result in hyperammonemic encephalopathy).

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**16. When managing acute intra-operative uterine hemorrhage during hysteroscopy that does not respond to focal cautery, which conservative step is recommended?**

A. Packing the uterine cavity tightly with gauze soaked in adrenaline.
B. Infiltrating pure vasopressin into the 3 and 9 o'clock cervical positions.
C. Inserting a Foley catheter balloon into the cavity and inflating it for intrauterine tamponade.
D. Irrigating the cavity continuously with ice-cold 3% Sorbitol under high pressure.

Answer: **C** (Inflating a Foley catheter balloon inside the uterine cavity applies direct mechanical compression against bleeding myometrial sinuses to

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# Understanding the Endometrium at Menopause: A Hysteroscopist's View

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**ABSTRACT**

The risk of premalignant and malignant endometrial pathologies increases in the postmenopausal period. Dilatation and curettage fail to diagnose one in ten endometrial pathologies. Hysteroscopy is the gold standard to evaluate the endometrial cavity. Hysteroscopy can identify malignant or benign pathology with approximately 20% false-positive results. Hysteroscopy combined with biopsy increases the accuracy of diagnosis up to 100%. This pictorial review takes you through the hysteroscopic view of normal-looking postmenopausal atrophic uterus, cystic atrophy, benign endometrial pathologies, endometrial hyperplasia, endometrial cancer, tamoxifen-induced endometrial hyperplasia and histiocytic endometritis. The purpose of this pictorial review is to guide the operator in systematic evaluation of the endometrial cavity with special attention to the thickness of the endometrium, vascular architecture, location of the lesion and surface aberrations, which adds value to the diagnosis and management of endometrial pathologies.

**KEYWORDS:** *Endometrial pathology, hysteroscopic view, menopause*

## INTRODUCTION

Hysteroscopy is the eye of the gynaecologist for the evaluation of the endometrial cavity. The incidence of premalignant and malignant endometrial disorders increases in the postmenopausal period.[1] The concordance of dilatation and curettage results with hysterectomy specimen is 94% in diffuse lesions and 58% when focal.[2] With the advent of miniature hysteroscopes and 5Fr instruments, office hysteroscopy now plays a major role in the evaluation of postmenopausal bleeding with focal lesions, especially near the cornu not being missed.[3]

In an experienced hand, hysteroscopy can be used to identify patients with malignant or benign pathology. Hysteroscopy combined with biopsy increases the certainty of diagnosis up to 100%.[4]

The purpose of this pictorial review is to guide the gynaecologist in the systematic evaluation of the endometrial cavity with special attention to the thickness of the endometrium, vascular architecture, location of the lesion, surface aberrations can help in diagnosing the pathology and take the targeted biopsy.

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## NORMAL POSTMENOPAUSAL CAVITY

Dr. Frank Loffer in 1989 described the negative hysteroscopic view.[5] The surface of the endometrium in normal menopausal women is pale, atrophic with a porcelain appearance. Very sparse gland openings with constriction rings created by myometrium can be seen. Tissue sampling is not warranted Figure 1a-c.

## CYSTIC ATROPHY

The atrophic endometrium has focal multiple cystic spaces which contain mucus covered by papery thin surface, which may be representative of mystically dilated glands. Small surface blood vessels can be seen with small petechial haemorrhages. Surface calcifications are visible. Cervical stenosis is encountered in the majority of the cases. Cystic atrophy is apparent if irregular proliferation occurs before the decline in oestrogen levels at menopause Figure 2a-c.[6]

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## Polyp

Polyps are common cause of PMB. Polyps vary in size, usually single, fibrotic with sparse vessels and benign. The reddish look suggests infective aetiology. May show surface necrosis. A recent meta-analysis reviewed malignant risk and suggested that the risk is highest in women with PMB (2.3%).[7] In a retrospective Multicenter study of 770 patients, it was found that the polyp diameter (>18 mm) was the only variable which was significantly associated with an abnormal histology in both asymptomatic and symptomatic women.[8] It is mandatory to remove the polyp completely to not miss atypia or malignancy Figure 3a and b.

## Endometrial Hyperplasia

Features seen on hysteroscopy are nonhomogeneous thickness of the endometrium, minor vascular distortions, glandular cystic dilatation which are focal, also known as pseudo polypoidal areas. On a closer look and with increase in experience abnormal spacing and dilatation of glandular openings can be appreciated.[9] All these criteria suggest endometrial hyperplasia. Certain features of atypical hyperplasia that help a hysteroscopist are irregularly thickened polypoidal endometrium with inter papillary bridges, irregular vascularity, denuded vessels with the increase in density. Hysteroscopic Visual D&C by tissue retrieval system, such as Truclear 5c™ is promising as all the tissue can be retrieved for examination Figure 4a-d.

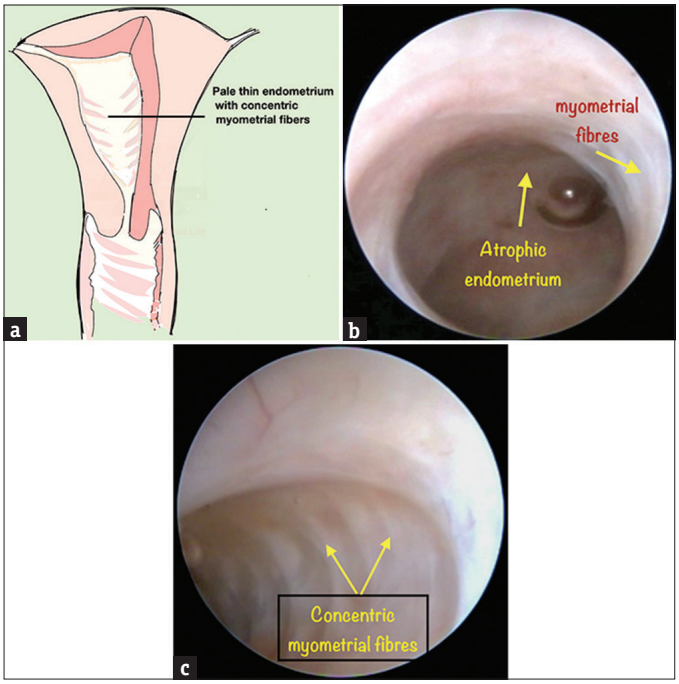


**Figure 1:** (a) Diagrammatic representation of pale endometrium (b) Hysteroscopic view of a postmenopausal endometrium showing (c) atrophy with concentric myometrial fibres

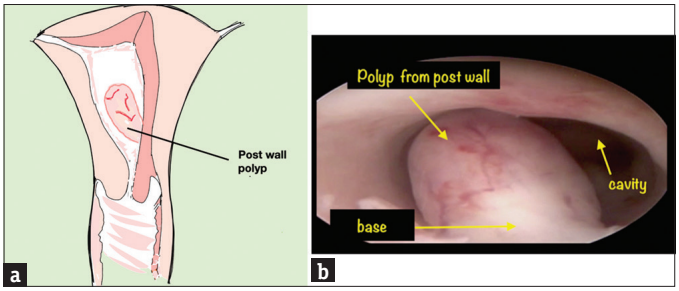


**Figure 3:** Hysteroscopic view of an endometrial polyp, (a) Diagrammatic representation of endometrial polyp; (b) Posterior wall sessile polyp

## Endometrial Carcinoma

The risk of endometrial carcinoma is about 10% in

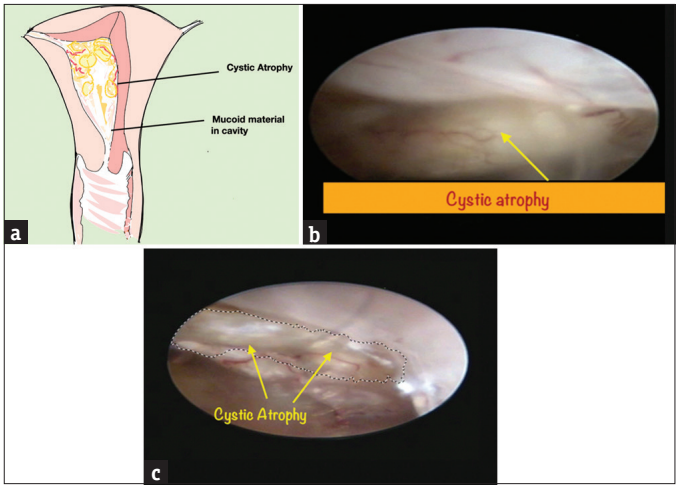


**Figure 2:** Hysteroscopic view of cystic atrophy, (a) Diagrammatic representation of cystic atrophic; (b.& c) Cystic dilatation of endometrial glands with flattened epithelium

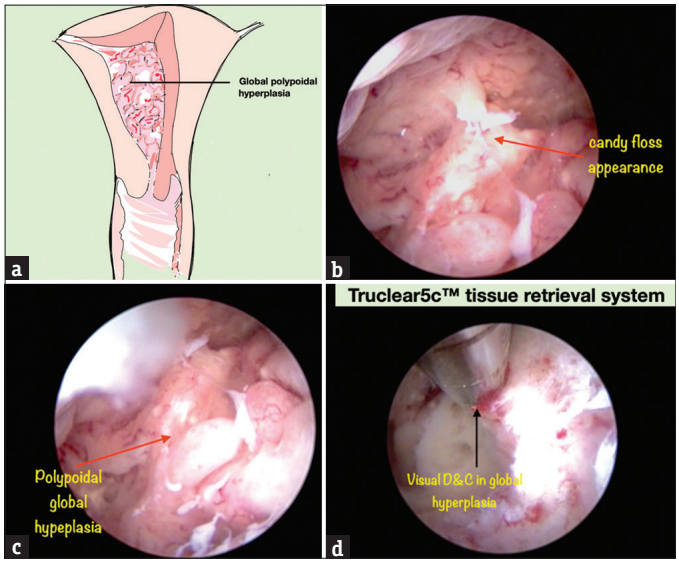


**Figure 4:** Hysteroscopic view of EIN (endometrial intraepithelial neoplasia) / atypical edometrial hyperplasia, (a) Diagrammatic representation of global endometrial hyperplasia; (b) Candy floss appearance, (c) Polypoidal global hyperplasia ; d. Visual dilatation and curretage using Truclear 5c

women with PMB and increases with age. 0.5%-1.5% may remain asymptomatic.

The false-negative rate of hysteroscopy is <3%. A review of 65 articles that evaluated 26,345 women and the role of hysteroscopy determined that a positive hysteroscopy increased the probability of endometrial cancer to 71.8%, whereas a negative result had the probability of 0.6%.[10]

Sugimoto was the first to describe the visual morphological features of carcinoma endometrium on hysteroscopy. He classified them as circumscribed or exophytic with distinct forms such as polypoidal, nodular, papillary and ulcerated. He also described abnormal vascularity.[11]

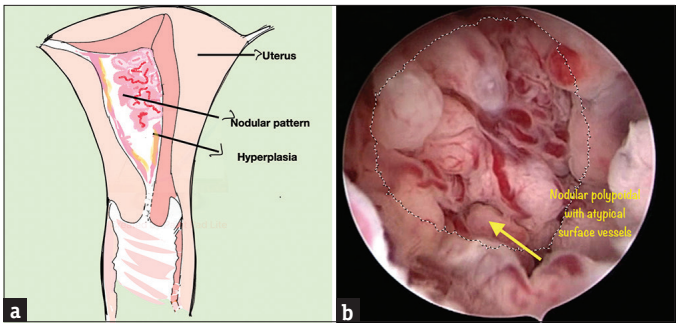


**Figure 5:** (a) Diagrammatic representation of nodular pattern of endometrial cancer (b) Hysteroscopic view of nodular pattern of endometrial cancer

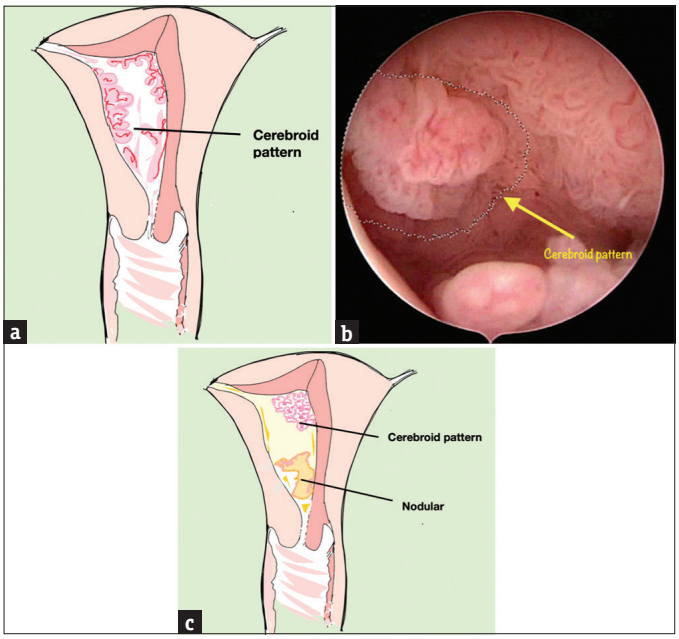


**Figure 7:** (a) Diagrammatic representation of cerebroid pattern of endometrial cancer (b) Hysteroscopic view of cerebroid pattern of endometrial cancer

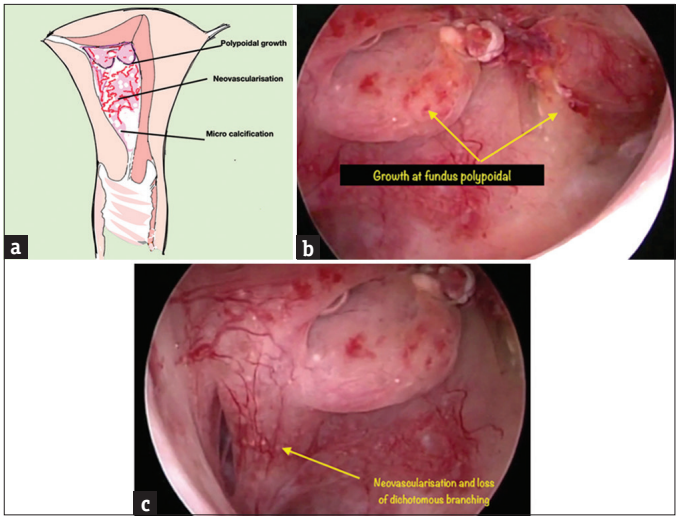


**Figure 6:** (a) Diagrammatic representation of polypoidal pattern of endometrial cancer (b) Hysteroscopic view of polypoidal pattern of endometrial cancer, (c).Neovascularization and loss of dichomatous branching

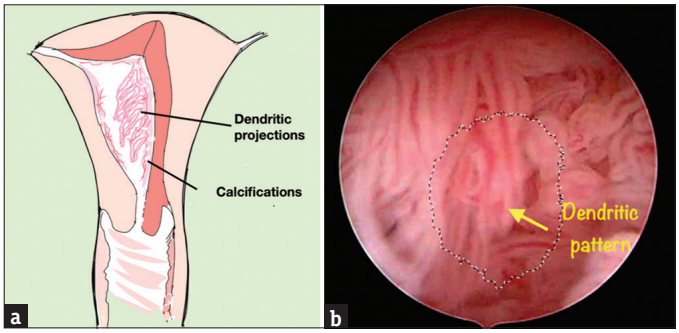


**Figure 8:** (a) Diagrammatic representation of dendritic pattern of endometrial cancer (b) Hysteroscopic view of dendritic pattern of endometrial cancer

**Table 1: Morphological features of endometrial cancer on hysteroscopy**

| | Nodular pattern [Figure 5a and b] | The polypoidal pattern [Figure 6a-c] | The cerebroid pattern [Figure 7a-c] | The dendritic pattern [Figure 8a and b] | The gomerular pattern [Figure 9a-c] |
|---|---|---|---|---|---|
| Morphological features | Numerous small nodes that protrude with irregular surface and vasculature and cover the endometrium diffusely or locally | Polypoidal surface extensions with increased vascularity, irregular branching of vessels with loss of arborization, neo vascularization. Areas of microcalcification | Nodular and cerebroid pattern can also be seen, circumscribed well-defined lesions | Fine dendritic tentacle-like projections giving a velvety appearance | Increased vascularity of small irregular vessels and micro-calcifications resembling the glomerulus |

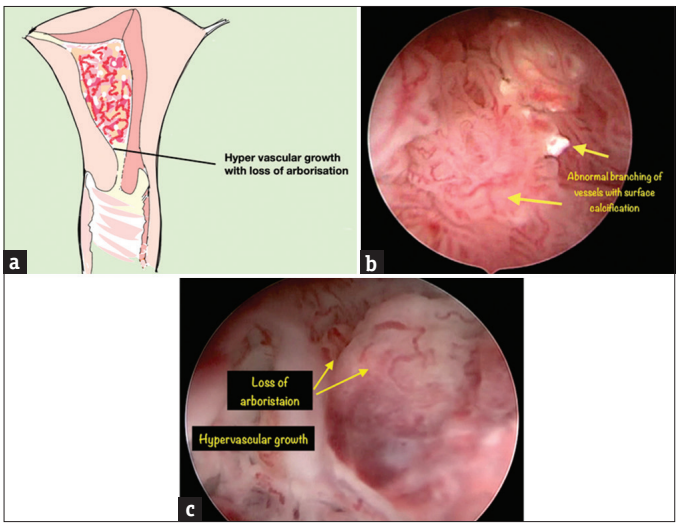


**Figure 9:** (a) Diagrammatic representation of Glomerular pattern showing hypervascualr growth, (b and c) Hysteroscopic view of glomerular pattern of endometrial cancer. There is abnormal branching of vessels with surface calcifications ans loss of arborisation.

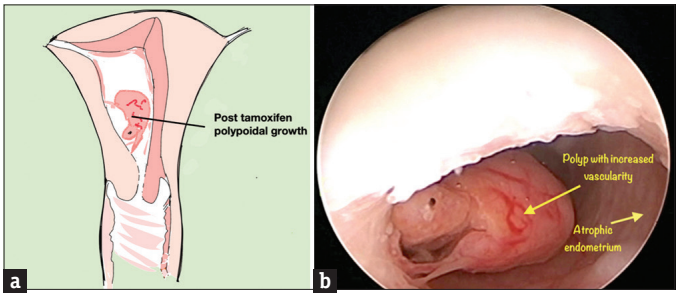


**Figure 11:** (a) Diagrammatic representation of post tamoxifen polypoidal growth with increased vascularity; (b) Hysteroscopic view of post tamoxifen endometrial polyp

Valli and Zupi created nomenclature and classification by grading four features: Thickness, surface, vascularization and colour. High-risk features include the endometrial thickness of 10 mm, polymorphous surface, irregular vascularization and whitish-gray color [Table 1].[12]

The proper and complete description of the lesion is essential and should take into account the following features to suggest malignancy.

- Pattern of growth
- Intra cavitary extension and topography
- Involvement of cervical canal.

When compared with the histologic diagnosis of the uterus, the hysteroscopic findings showed a diagnostic sensitivity of 98%, a specificity of 95%, a positive predictive value (PPV) of 96% and a negative predictive value (NPV) of 98%. Hysteroscopy was found to have a greater diagnostic accuracy than D&C: The sensitivity and the NPV of the two diagnostic procedures were statistically different.[13]

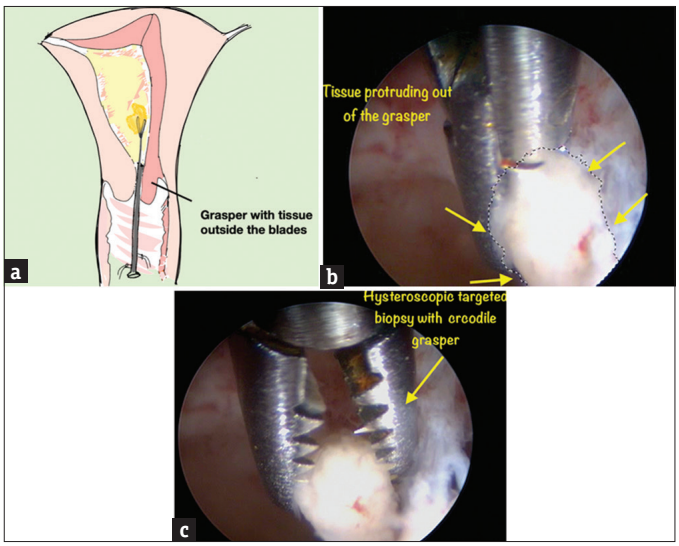


**Figure 10:** (a) Diagrammatic representation of Targetted endometrial biopsy; (b) Technique of endometrial biopsy using a 5 Fr forceps; (c) Tissue is grasped with the forceps, advanced forward parallel to the endometrium and downward. The hysteroscope along with the forceps holding the tissue is brought out of the uterine cavity

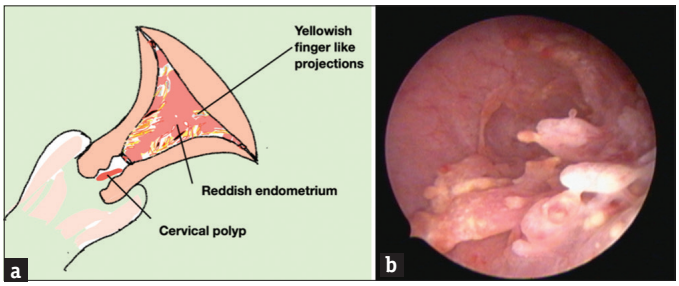


**Figure 12:** (a) Diagrammatic representation showing yellowish finger like projections; (b) Hysteroscopic view of histocytic endometritis

## Technique of Targeted Biopsy [Figure 9a-c]

The Grasp technique described by Bettocchi is a type of targeted biopsy for focal lesions. 0.5–1 cm of the tissue is grasped with the jaws of the 5Fr alligator forceps, giving it a gentle push forward. The scope along with the forceps is withdrawn from the uterine cavity. This allows not only the tissue entrapped in the grasper but also the tissue protruding out to be evaluated and enabling an adequate biopsy. Multiple biopsy's can be taken Figure 10a-c.

## Posttamoxifen [Figure 10a and b]

Tamoxifen is selective estrogen receptor modulator used in the treatment of breast cancer. Tamoxifen has a marked oestrogenic action on the endometrium with different patterns varying from atrophy to endometrial cancer. Hysteroscopy is indicated in symptomatic patients with endometrial cut-off on TVS of 8–12 mm. Perez-Medina *et al*. 2011 described different hysteroscopic patterns.

Atrophic, hypervascularized, cystic, polypoidal and cerebriform projections with irregular growths.[14] In the case of polyp in tamoxifen users, it is mandatory to remove the entire polyp as they have higher rate of malignant transformation than the non-tamoxifen patients Figure 11a and b.

## Histiocytic Endometritis [Figure 11a and b]

This pathology has to be suspected if the patient has persistent leukorrhoea, pruritus, pelvic pain and recurrent PMB. Cervical stenosis leading to retention of fluid in the cavity with resultant pyometra can lead to endometritis and in extreme cases replacing the endometrial mucosa with sheets of foamy lipid-containing histiocytes, siderophages, giant cells, calcification and polymorphonuclear leuckocyes plasma cells.[15] On hysteroscopy, the features mimic carcinoma endometrium. Yellowish finger-like projections scattered globally with micro polyps with microcalcification. Carcinoma endometrium can co-exist and therefore multiple biopsies may be required. Cytology and immunohistochemistry can resolve the suspicion. Treatment is antibiotics and hysterectomy Figure 12a and b.

## Conclusion

Hysteroscopy is found to have high diagnostic accuracy for endometrial cancer. Hysteroscopic view also helps to differentiate endometrial cancer from endometrial hyperplasia. This pictorial review gives the reader an understanding of the endometrium at menopause from an hysteroscopist viewpoint.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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The pictures are from the personal collection of the authors. The pictures are copyrighted.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

## References

1. Günakan E, Atak Z, Albayrak M, Kurban Y, Şimşek GG. Endometrial histopathology results and evaluation of endometrial cancer risk in geriatric women. Prz Menopauzalny 2018;17:18-21.
2. Epstein E, Ramirez A, Skoog L, Valentin L. Dilatation and curettage fails to detect most focal lesions in the uterine cavity in women with postmenopausal bleeding. Acta Obstet Gynecol Scand 2001;80:1131-6.
3. Litta P, Merlin F, Saccardi C, Pozzan C, Sacco G, Fracas M, *et al.* Role of hysteroscopy and endometrial biopsy to rule out endometrial cancer in postmenopausal women with abnormal uterine bleeding. Maturitas 2005;50:117-23.
4. Luca M, Luiz CA, Alfonso AA. Manual of Hysteroscopy Diagnostic, Operative and Office Hysteroscopy. Tuttlingen: Endo Press; 2013.
5. Loffer FD. Hysteroscopy with selective endometrial sampling compared with D&C for abnormal uterine bleeding: The value of a negative hysteroscopic view. Obstet Gynecol 1989;73:16-20.
6. Kurman RJ, Ronnett BM, Hedrick Ellenson L, editors. Blaustein's Pathology of the Female Genital Tract. 6th ed. New York: Springer; 2011.
7. Lieng M, Istre O, Qvigstad E. Treatment of endometrial polyps: A systematic review. Acta Obstet Gynecol Scand 2010;89:992-1002.
8. Ferrazzi E, Zupi E, Leone FP, Savelli L, Omodei U, Moscarini M, *et al.* How often are endometrial polyps malignant in asymptomatic postmenopausal women? A multicenter study. Am J Obstet Gynecol 2009;200:235.e1-6.
9. Nappi C, Di Spiezio Sardo A. State-of-the-Art Hysteroscopic Approaches to Pathologies of the Genital Tract. Tuttlingen: EndoPress; 2014.
10. Clark TJ, Voit D, Gupta JK, Hyde C, Song F, Khan KS. Accuracy of hysteroscopy in the diagnosis of endometrial cancer and hyperplasia: A systematic quantitative review. JAMA 2002;288:1610-21.
11. Sugimoto O. Hyteroscopic diagnosis of endometrial carcinoma. A report of 53 cases examined at women's clinic of Kyoto University Hospital. Am J Obstet Gynecol 1975;121:105-13.
12. Valli E, Zupi E. A new hysteroscopic classification of and nomenclature for endometrial lesions. J Am Assoc Gynecol Laparosc 1995;2:279-83.
13. Ceci O, Bettocchi S, Pellegrino A, Impedovo L, Di Venere R, Pansini N. Comparison of hysteroscopic and hysterectomy findings for assessing the diagnostic accuracy of office hysteroscopy. Fertil Steril 2002;78:628-31.
14. Pérez-Medina T, Salazar FJ, San-Frutos L, Ríos M, Jiménez JS, Troyano J, *et al.* Hysteroscopic dynamic assessment of the endometrium in patients treated with long-term tamoxifen. J Minim Invasive Gynecol 2011;18:349-54.
15. Stefano B, Luigi N, Oronzo C. Hysteroscopy and menopause past and future. Curr Opin Obstet Gynecol 2005;17:366-75.

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