INSTRUMENTS IN OBSTETRICS AND GYNAECOLOGY

Edited by

Dr Meenakshi Singh

MBBS, MD, DNB, FICOG, FICMCH, Professor, Dept. of Obstetrics & Gynaecology, Lady Hardinge Medical College,New Delhi

Published by

PINK PETALS PUBLICATIONS

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Published by Pink Petals Publication Pvt Ltd.
Official Address: Naya Moradabad, B-87-Sector-6, Moradabad (244001), India.
Phone no-
Website - https:pinkpetalspublications.com
Price: INR
First Edition 2026
Cover-

ISBN: 978-93-94156-92-0
ISBN- 93-94156-92-5

Printer: Reprographic Services, New Delhi, India.

Contents

Acknowledgement

I would like to express my sincere gratitude to all the authors for their outstanding contribution in our book 'Instruments in Obstetrics and Gynaecology'. This comprehensive guide has been an invaluable resource, providing detailed insights into the instruments used in obstetrics and gynaecology. Their expertise and dedication to this field are evident in the quality of this book."

No words to thank Sister Neeraj who helped us in collecting pictures for the book. I thank my colleagues, mentors, and collaborators who offered insights and reviewed the content. My sincere thanks to Dr. Pulkit for quality control and layout design. Last but not the least, I wish to show my indebtnessto my parents, who made me capable of doing this. Thanks to my Husband and my kids who had been the constant motivators.

Abbreviations

CIN: Cervical Intraepithelial Neoplasia
D&C: Dilation and curettage
D&E: dilation and evacuation
HPV: Human Papilloma Virus
HSG: Hysterosalpingography
IUD: Intrauterine Device
IVF: In Vitro Fertililization
LEEP: Loop Electrosurgical Excision Procedure
MTP: Medical Termination of Pregnancy
MVA: Manual vacuum aspiration
Pap smear: Pananiculou Smear
PID: Pelvic infection Disease

Contributor's Details and Affiliations

1. Dr Mansi Kumar

Assistant Professor, Dept. of Obstetrics and Gynaecology, Lady Hardinge Medical College, New Delhi

2. Dr Vidhi Chaudhary

Professor, Dept. of Obstetrics and Gynaecology, Lady Hardinge Medical College, New Delhi

3. Dr. Puja Jain Dewan

Associate Professor, Department of Obstetrics and Gynaecology, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh

4. Dr. Ruchita Sharma

Consultant IVF and Gynecologist, Indira IVF, Kanpur

5. Dr. Malini. R. Capoor

Professor, Microbiology, Dept. of Microbiology, VMMC & Safdarjung Hospital

6. Dr Sheetal Sharma

Senior Resident, Microbiology, VMMC & Safdarjung Hospital, New Delhi

7. Dr Rajesh Ranjan

H.O.D, Department of Epidemiology and Department of Hospital Administration, NIHFW

CHAPTER 1

General Surgical Instruments in Obstetrics and Gynaecology

In this chapter, General surgical instruments in Obstetrics and Gynaecology will be discussed in details.

1.1 SIMS SPECULUM

Figure 1.1: SIMS SPECULUM

A Sims speculum is the most commonly used instrument designed to aid in the examination of the vagina and cervix, especially in clinical and surgical settings. It consists of a single, curved blade usually made of stainless steel or durable plastic that is inserted into the vagina to retract the posterior vaginal wall. Unlike the Cusco speculum, which is a self-retaining, bivalve instrument that holds the vaginal walls apart, the Sims speculum is non-self-retaining and typically requires an assistant or a second instrument (such as an anterior

wall retractor) to maintain proper visualisation. The curved shape of the Sims speculum follows the natural contour of the vaginal canal, allowing for a more comprehensive view of the cervix and upper vaginal walls, which is particularly beneficial during more detailed gynaecological examinations, cervical biopsies, or minor surgical procedures.

A speculum has a handle in the center and blades at right angles to each other. A trough runs along the length of the instrument, collecting blood and secretions.

The insertion of a speculum is a delicate procedure that must be performed with care to ensure patient comfort and effective examination. Before insertion, the healthcare provider explains the procedure to the patient and ensures privacy and proper positioning—usually the lithotomy position for a Cusco speculum, or the left lateral (Sims') position for a Sims speculum. After donning gloves and lubricating the instrument, the provider gently separates the labia with one hand and slowly inserts the closed speculum blade into the vaginal canal with the other, directing it slightly downward and posteriorly to follow the natural angle of the vagina. In the case of a Sims speculum, the blade is positioned to retract the posterior vaginal wall, and it may be used in combination with an anterior wall retractor to improve visibility. The instrument is then carefully adjusted to provide a clear view of the cervix and vaginal walls, allowing for examination or medical procedures.

Uses: Initial pelvic examination, Pap smear, colposcopy, minor procedures

1.2: CUSCO'S SPECULUM

Figure 1.2: Cusco's speculum

A Cusco's speculum is a self-retaining, bivalve gynecological instrument commonly used for visual examination of the vagina and cervix. It consists of two hinged blades that can be opened and locked in place once inserted into the vaginal canal, allowing hands-free access for the clinician during diagnostic or therapeutic procedures. Typically made of stainless steel or disposable plastic, the Cusco speculum is designed to be used with the patient in the lithotomy position which provides optimal exposure of the pelvic area.

Use: Its self-retaining mechanism eliminates the need for an assistant to hold the instrument in place, making it particularly useful in outpatient settings for procedures such as Pap smears, vaginal swab collection, intrauterine device (IUD) insertion or removal, and colposcopy. The Cusco speculum is available in various sizes to accommodate different patients, including pediatric and postmenopausal women. Its design allows for easy manipulation and minimal patient discomfort when inserted and used correctly. However, it may provide limited visualization of the lateral vaginal walls compared to other specula like the Sims, which is why the choice of speculum often depends on the specific clinical context.

1.3: FERGUSSON'S SPECULUM

Fig 1.3: Ferguson's speculum

The Ferguson speculum is a tubular, self-retaining gynecological instrument designed primarily for inspection of the vaginal canal and cervix. Unlike bivalve speculums such as the Cusco, the Ferguson speculum consists of a single hollow tube with a rounded, slightly flared end, which allows for gentle dilation of the vaginal walls as it is inserted.

Use: it is particularly useful for visualising the cervical area in procedures where minimal manipulation is needed, such as Pap smears or inspection for lesions or discharge. It is particularly useful in chemical cauterization of cervical erosion where the vagina is protected from accidental cauterisation. Ferguson speculum is rarely used in modern gynaecology.

1.4: ANTERIOR VAGINAL WALL RETRACTOR

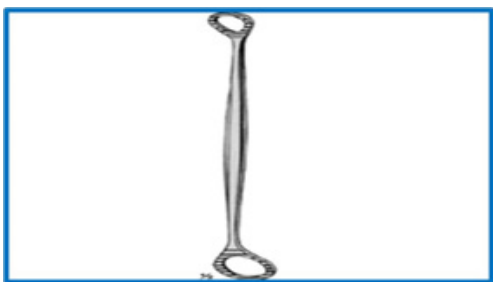


Fig: 1.4: Anterior Vaginal Wall Retractor

An anterior vaginal wall retractor is a gynaecological instrument used to retract or lift the anterior (front) wall of the vagina during pelvic examinations or surgical procedures, allowing better visualization and access to the cervix and vaginal canal. This tool is especially important in procedures where a Sims speculum is used, as the Sims speculum only retracts the posterior vaginal wall, leaving the anterior wall unsupported. Without retraction, the anterior vaginal wall can collapse into the field of view, obstructing the clinician's ability to examine or operate effectively.

The anterior vaginal wall retractor is usually made of stainless steel or high-quality plastic and comes in various sizes and shapes, such as flat-bladed, curved, or fenestrated (with openings to reduce pressure). Some models have a handle for easier grip and control during procedures. The instrument is gently inserted into the vaginal canal and positioned against the anterior wall to hold it away from the line of sight. In some cases, it is held manually by an assistant, while in other cases, self-retaining versions may be used to keep both the anterior and posterior walls apart.

Use: The anterior vaginal wall retractor is used during colposcopy, cervical biopsy, intrauterine device (IUD) insertion, dilation and curettage (D&C), and other gynaecological surgeries where clear visualization of the cervix or upper vaginal area is critical. It is particularly useful in multiparous women (those who have given birth vaginally) or patients with relaxed pelvic musculature, where the vaginal walls tend to collapse more easily. The retractor enhances the efficiency of the procedure, minimises the need for excessive manipulation, and helps maintain patient comfort when used with care. Proper technique and gentle handling are essential to avoid trauma to the vaginal tissues.

1.5: UTERINE AND BLADDER SOUND

1.5.1: UTERINE SOUND

A uterine sound is a slender, rod-like medical instrument used primarily in gynecology to measure the depth and orientation

of the uterine cavity. It plays an essential role in procedures such as intrauterine device (IUD) insertion, endometrial biopsy, and hysteroscopy, helping ensure safety and accuracy by assessing uterine anatomy beforehand.

- **Material:** Usually made of metal (stainless steel) or plastic. Metal versions are reusable after sterilization; plastic ones are often disposable.
- **Length:** Typically around 25–30 cm (10–12 inches).
- **Diameter:** Narrow—usually 3–4 mm in diameter.
- **Tip:** Rounded or blunt to avoid injury during insertion.
- **Markings:**
  - Graduated in centimeters or millimeters to indicate depth.
  - Helps identify uterine cavity length (normal range: 6–9 cm in most women).
- **Handle:**
  - May have a knobbed or grooved handle for a better grip and control.

Types

- Hegar Sound: Straight, thick, solid rod, often used for cervical dilation more than for depth measurement.
- Sims Uterine Sound: Thin, curved instrument, often preferred for accurate uterine sounding.
- FlexiSound (Disposable): Flexible plastic version, often used for IUD insertion.

Uses

- Measuring uterine depth before
  - IUD insertion (to avoid perforation)
  - Endometrial biopsy
  - Hysteroscopy
  - Dilation and curettage (D&C)

- Detecting anomalies:
  - Uterine retroversion or anteversion
  - Uterine abnormalities like fibroids or adhesions
- Confirming patency of the cervical canal

Safety Considerations

- Use gentle techniques to prevent uterine perforation.
- Contraindicated in pregnancy or active pelvic infection.
- A shortened measurement could indicate:
  - Uterine hypoplasia
  - Fibroids
  - Asherman's syndrome

1.5.2 BLADDER SOUND

Bladder sounds are similar to uterine sounds except that they do not have markings over it. Bladder sound is used to know the extent of bladder and sometimes integrity of bladder in urologic surgeries of vaginal surgeries eg uterine prolapse with cystocele.

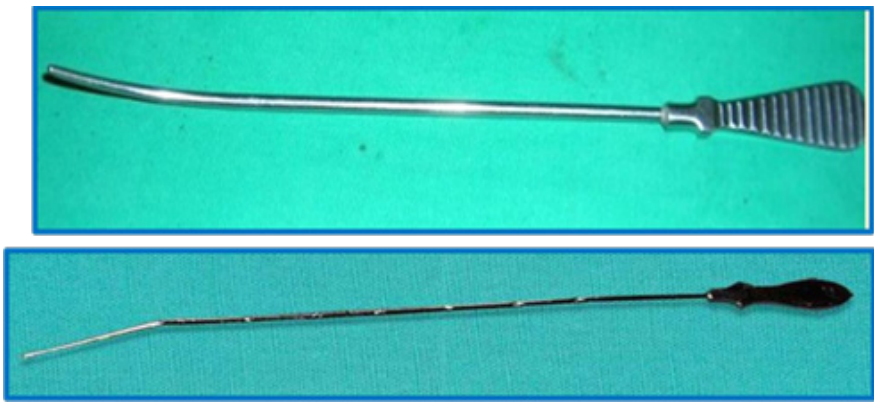


Fig: 1.5: A Uterine sound-showing markings B: Bladder sound -with no markings

1.6: HEGARS DILATOR

Fig: 1.6: Hegar's dilators

Hegar's dilators are a set of smooth, cylindrical, double-ended metal rods used to dilate the cervical canal or other stenotic (narrowed) openings. Each end of a dilator has a different diameter, allowing for a gradual and controlled dilation process. Named after Alfred Hegar, a German gynaecologist, who introduced the instrument in the late 19th century to facilitate safer uterine access during gynecological procedures.

Structural Specifications:

- **Material:** Usually made of stainless steel (can also be made of plastic in some modern versions).
- **Shape:**

o Cylindrical or slightly tapered.

o Double-ended, with each end having a different diameter.

- **Diameter Sizes:**

o Typically range from 1 mm to 26 mm in graduated sets.

o Each dilator is usually 1 mm larger in diameter than the previous.There is a difference of three millimetres in the

diameters near the tip and the maximum dilating portion of the dilator and hence they are numbered 3/6 to 23/26.

- **Length:**

o Approximately 8 to 12 inches.

- **Set Includes:** Around 8 to 16 dilators, depending on the manufacturer.

Uses:

1. Cervical dilation prior to:

o Uterine curettage (e.g., D&C - dilation and curettage).

o Hysteroscopy.

o IUD insertion in nulliparous women.

o Endometrial biopsy.

2. Treatment of cervical stenosis (narrowing of the cervix).

3. Facilitating access to the uterine cavity for surgical procedures.

4. Shirodkar's test for incompetent os: When a size 8 dilator which has been passed into a non-pregnant uterus is withdrawn there is a distinctive snap as it passes out of the internal os if the os is not competent. Absence of this snap suggests incompetent os.

Pre-procedure Pre Requisites:

- Written Informed consent in vernacular language.
- Empty bladder.
- Lithotomy position.
- Antiseptic cleaning of the perineal area.
- Local anesthesia or sedation (if required).

Procedure:

1. Pelvic examination to assess cervical orientation and size.
2. A speculum is inserted into the vagina.
3. The cervix is held with a tenaculum or vulsellum forceps.
4. Start with the smallest dilator and gently insert it into the cervical os.
5. Remove it, then proceed with the next larger size.
6. Continue incrementally until desired dilation is achieved.

Complications And Risks:

- Uterine perforation (especially with excessive force).
- Bleeding or trauma to the cervix.
- Infection (endometritis or pelvic inflammatory disease).
- Pain or discomfort during or after the procedure.
- Cervical incompetence with repeated use (rare).

Contraindications

- Pregnancy, unless medically indicated for termination.
- Pelvic infection (active PID).
- Known or suspected uterine perforation.
- Recent cervical or uterine surgery

1.7: Teale's Vulsellum

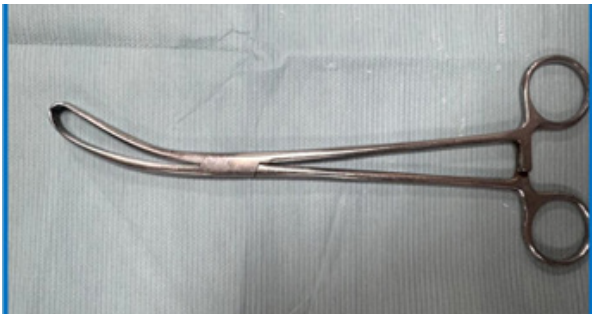


Fig: 1.7: Teale's Vulsellum

A vulsellum is a specialized surgical instrument commonly used in gynecological procedures to grasp and hold tissues, particularly the cervix or uterus, usually 28cm long

It resembles a forceps and typically has two arms joined by a hinge, ending in 2-3 sharp or toothed tips that interlock when closed. These teeth allow the instrument to firmly grip slippery or dense tissues without slipping, making it especially useful during procedures like dilation and curettage (D&C), polypectomy, intrauterine device (IUD) insertion, hysteroscopy, or cervical biopsy, assessment of degree of uterine descent. While extremely useful for stabilizing the cervix or drawing it toward the operator, care must be taken to avoid excessive force, as the toothed ends can cause tissue trauma, pain, or bleeding. Despite this, the vulsellum remains an indispensable tool in gynecology for providing control and precision during uterine access procedures.

Other types include the Jacob's Vulsellum which is similar to Teales Vulsellum but shorter and straight about 21cm.The tips of the blade have 2 teeth each with those of one blade fitting into other.

1.8: ENDOMETRIAL ASPIRATION CANNULA/ ENDOMETRIAL SAMPLER

It is a flexible or rigid cannula with a smooth, atraumatic tip and an end port for aspiration

It is often used with a syringe to collect endometrial sample as an OPD procedure.

The Endometrial Aspiration Cannula is inserted through the cervix into the uterus, and a sample of endometrial tissue is collected using gentle suction.

Benefits:

1. Minimally invasive procedure
2. Quick and relatively painless
3. Provides valuable diagnostic information regarding phase of endometrium and rule our endometrial tuberculosis for guiding treatment in cases if infertility and abnormal uterine bleeding.

Fig: 1.8: Endometrial Aspiration Cannula/ Endometrial Sampler

1.9: HAYWOOD SMITH OVUM FORCEPS

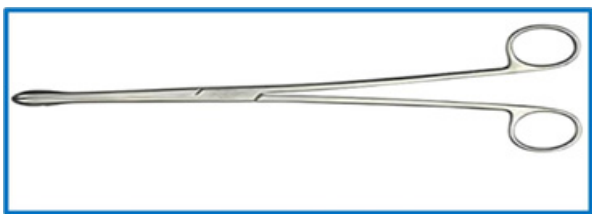


Fig: 1.9.1: Haywood Smith Ovum Forceps(Full picture)

Ovum forceps are long, slender, spoon-shaped instruments designed primarily for grasping and removing products from the uterine cavity, such as during uterine evacuation procedures. These forceps are characterized by their smooth, blunt, and fenestrated (open) ends, which are carefully crafted to reduce trauma to the uterine walls while allowing effective

removal of tissue. They are curved or straight, depending on the type, and are typically made of stainless steel. Unlike vulsellum forceps, ovum forceps do not have teeth—this is a crucial feature that minimizes the risk of injury to delicate intrauterine structures.

Fig: 1.9.2: Haywood Smith Ovum Forceps (Inset picture) Uses:

1. Evacuation of Uterus:

o Removal of retained products of conception after miscarriage or incomplete abortion.

o During manual vacuum aspiration (MVA) or dilation and evacuation

(D&E).

o In postpartum procedures to ensure

2. Assistance in Surgical Procedures:

o Used during D&C (dilation and curettage) procedures to remove clots

or tissues.

o Assisting in hysteroscopic procedures to remove polyps or other growths.

3. Handling of Sterile Materials:

o Can be used to hold gauze, swabs, or packing material for intrauterine placement or removal.

4. Gynecologic Oncology:

o Sometimes used to retrieve biopsy specimens or necrotic tissue from the uterine cavity.

Complications:

1. Uterine Perforation
2. Injury to intraabdominal structures like small bowel,colon.
3. Intrauterine infection
4. Incomplete abortion

1.10: BLAKE'S UTERINE CURETTE

Fig: 1.10: Haywood Smith Ovum Forceps

Blake's uterine curette is a specialized gynecological instrument used for scraping and removing the endometrial lining of the uterus. It consists of a long, slender, metal handle with a loop-shaped or scoop-shaped blade at one end. The blade is typically sharp-edged to allow effective curettage (scraping), and the instrument is slightly curved to match the natural contour of the uterus, enabling access to the entire uterine cavity. The handle is designed for precise control, allowing the practitioner to apply gentle but firm pressure during the procedure. It is usually made of stainless steel, making it durable and easy to sterilize.

Uses:

1. Diagnostic Curettage:

o To obtain endometrial tissue samples for histopathological examination in cases of abnormal uterine bleeding, postmenopausal bleeding, or suspected endometrial carcinoma.

2. Therapeutic Curettage:

o To remove retained products of conception after miscarriage or abortion.

o To evacuate the uterus in cases of incomplete abortion or molar pregnancy.

o As part of dilation and curettage (D&C) procedures for menstrual irregularities or uterine polyps.

3. Postpartum or Post-abortal Procedures:

o To ensure the uterus is completely emptied, reducing the risk of infection or hemorrhage.

- **Sharp Curette:** For more thorough scraping (commonly used in Blake's design).
- **Blunt Curette:** For gentler procedures or when a sharp curette is not suitable.

Precautions & Risks:

- Risk of uterine perforation if used improperly or with excessive force.
- Potential for excessive bleeding or infection.

1.11: PUNCH BIOPSY FORCEPS

Fig: 1.11: Punch Biopsy Forceps

Cervical punch biopsy forceps are used to obtain small tissue samples from the cervix, particularly during diagnostic procedures like colposcopy. These forceps are designed with a scissor-like handle-and a small, sharp-edged, punch-shaped jaw at the distal end. The jaws are typically cup-shaped or oval, enabling the precise "punching" out of a small portion of cervical tissue. The instrument is designed to be both sharp enough to cut through cervical tissue and small enough to minimize trauma, bleeding, and discomfort.

Most cervical biopsy forceps are made from stainless steel for durability and easy sterilization. Some versions come with a teeth or serrated edge for better grip, and others may include a built-in needle or spike to hold the tissue securely once it is cut.

The shaft may be straight or slightly curved, depending on the manufacturer and intended use.

Uses:

1. Diagnosis of Cervical Lesions:

o To collect tissue from areas of the cervix that appear abnormal under colposcopic examination.

o Used to diagnose cervical intraepithelial neoplasia (CIN), cervical cancer, dysplasia, or HPV-related changes.

2. Histopathological Examination:

o Tissue obtained with punch biopsy forceps is sent to a pathology lab to examine for malignant or pre-malignant cells.

o Essential in screening follow-up when Pap smear results are abnormal.

3. Evaluation of Cervical Erosion or Ulceration:

o To identify the cause of persistent cervical bleeding, discharge, or visible erosions.

4. Follow-up in Post-treatment Monitoring:

o Biopsy may be needed after treatments like cryotherapy, LEEP, or cone biopsy to confirm treatment success or recurrence.

Procedure:

1. The patient is positioned in the lithotomy position.
2. A speculum is inserted to visualize the cervix.
3. A colposcope may be used to magnify and locate abnormal areas.
4. The cervical punch biopsy forceps are inserted and aligned with the target tissue.
5. A small piece of tissue is "punched out" and retrieved.
6. Hemostasis may be achieved with silver nitrate, Monsel's solution, or cautery.

Risks and Complications:

- Mild bleeding or spotting for a few days.
- Pain or cramping during or after the procedure.
- Infection, though rare.
- Inadequate sample if the biopsy is too superficial or taken from the wrong site.

1.12: ALLIS FORCEPS

Figure 1.12.1: Allis Forceps

Allis forceps, also known as Allis tissue forceps, are a type of surgical instrument used primarily for grasping, holding, and manipulating tissues during surgical procedures. These forceps are ring-handled and resemble scissors, with interlocking toothed jaws at the distal end that provide a firm grip on tissues. The jaws typically have multiple fine teeth arranged transversely (e.g., 4x5 or 5x6 teeth), allowing them to securely hold soft tissues without excessive slippage.

Use: However, because of their toothed design, Allis forceps are usually used to hold tissues that are being excised or are less delicate, since they may cause crushing or trauma.

FIGURE 1.12.2: ALLIS FORCEPS

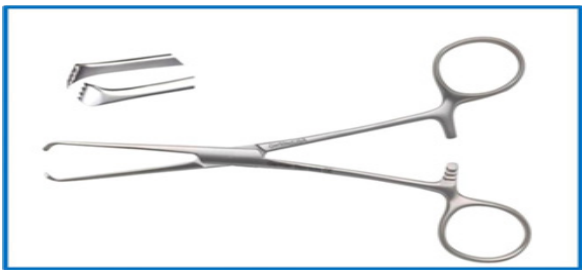


Figure 1.12.2: Allis Forceps

Made of stainless steel, these forceps are autoclavable and reusable. They come in various lengths (typically 6 to 10 inches) to accommodate different surgical needs and may be straight or slightly curved depending on the anatomical area being accessed.

Uses

1. Tissue Handling in Surgery:

o Used to grasp and hold fascia, skin, or soft tissues during dissection.

o Commonly employed to retract or stabilize tissue during suturing or excision.

2. Gynecological Procedures:

o Used to hold the cervix or vaginal walls during procedures like hysterectomy, D&C, or IUD insertion.

o Frequently used in vaginal surgeries for tissue manipulation.

3. General and Abdominal Surgery:

o Helps to hold muscle, peritoneum,rectus sheath or other firm structures during laparotomy,cesarean section or bowel surgery.

4. Biopsy Procedures:

o May be used to secure small tissue samples before excision.

Advantages:

- Firm and secure grip on tough or slippery tissue.
- Ratchet mechanism allows hands-free holding.
- Durable and long-lasting with proper maintenance.
- Versatile across many surgical disciplines.

Disadvantages:

- Not suitable for delicate tissues (e.g., nerves, blood vessels, bowel) due to the crushing effect of the teeth.proper use can cause tissue damage, bruising etc.
- Can lead to delayed healing if used inappropriately.

1.13: BABCOCKS FORCEPS

Figure 1.13: Babcocks Forceps

Babcock's forceps are a type of atraumatic, ring-handled surgical instrument used primarily to grasp delicate and tubular structures without causing damage. Unlike Allis forceps, Babcock's have no teeth at the gripping end. Instead, the jaws are broad, flat, and fenestrated (open in the middle), allowing the instrument to gently encircle and hold tissues without crushing them.

The inner surfaces of the jaws are smooth or lightly serrated, providing enough friction to hold tissues in place while minimizing trauma. The instrument typically includes a ratchet mechanism near the handle to lock it in a closed position, enabling the surgeon to maintain grip without continuous pressure.

Made of surgical-grade stainless steel, Babcock's forceps are available in various lengths and sizes, and are autoclavable for repeated use.

Uses

1. Handling Delicate Tissues:

o Ideal for grasping bowel, appendix, ureter, fallopian tubes, and ovaries.

o Commonly used to handle soft, tubular, or vascular tissues that should not be crushed.

2. Gynecological Procedures:

o Used to gently hold the fallopian tubes during tubal ligation or salpingectomy.

o Grasping ovaries or cervical tissue.

3. Gastrointestinal Surgery:

o To handle and manipulate the intestines or appendix without damaging the walls.

o Used during bowel resections to hold segments of intestine for suturing or inspection.

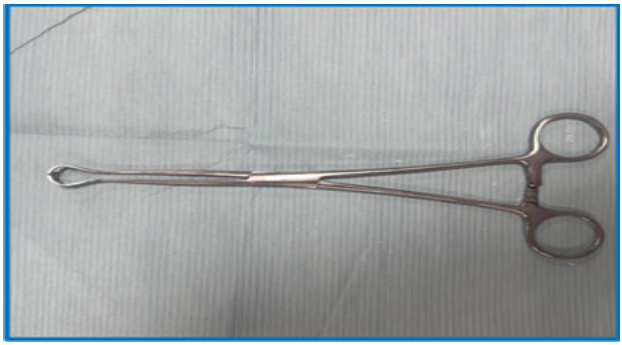


Figure 1.13.2: Babcocks Forceps

4. Urological Procedures:

o Safely used to hold the ureters or bladder walls during pelvic surgery.

5. Laparoscopic Surgery (modified versions):

o Laparoscopic Babcock forceps are used with a similar purpose but adapted for minimally invasive surgery.

- Atraumatic – causes minimal or no damage to soft tissues.
- Secure hold without crushing – ideal for sensitive anatomical structures.
- Versatile – used in multiple surgical specialties.
- Reusable and sterilizable
- Should not be used for firm or fibrous tissues as the grip may not be strong enough.
- Improper use on tough or slippery tissue may result in slippage.

FIGURE 1.14: KOCHERS FORCEPS

Figure 1.14: Kochers Forceps

Kocher's forceps, also known as Ochsner forceps, are strong, ring-handled surgical instruments designed for firmly grasping and holding tough tissues. They are characterized by their straight or curved serrated jaws and a distinctive single sharp tooth (or sometimes multiple teeth) at the tip of one or both jaws. This tooth helps to securely anchor the forceps into tissue, preventing slippage even under tension.

These forceps are made from surgical-grade stainless steel, which makes them durable, autoclavable, and reusable. A ratchet locking mechanism near the handle allows the forceps to remain clamped in place, freeing the surgeon's hands during procedures.

They come in various lengths (usually 6–10 inches) and are available in both straight and curvedforms to suit different surgical needs.

Uses:

1. Grasping Tough Tissues:

- Used to hold fascia, tendons, skin, and muscles during surgical dissection or closure.
- Ideal for firm structures that need to be held securely.

2. Hemostasis:

o Can be used to clamp and control bleeding vessels before ligation.

o The serrated jaws and tooth provide a secure grip on bleeding points.

3. Traction and Countertraction:

o Provides strong grip for pulling or retracting tissues during deep surgical procedures.

Advantages:

- Provides an exceptionally strong grip – won't slip under tension.
- Very effective for tough or fibrous tissues.
- Ratchet mechanism allows for hands-free clamping.
- Versatile and widely used across multiple surgical specialties.

Table 1: Comparison of Features of Allis Forceps, Babcock's Forceps an Kocher's Forceps

Feature	Allis Forceps	Babcock's Forceps	Kocher's Forceps
Design	Ring-handled with multiple interlocking teeth at the tip	Ring-handled with rounded, fenestrated (open) tips and no teeth	Ring-handled with single large tooth at the tip and serrated jaws
Grip Type	Firm and traumatic	Gentle and atraumatic	Very strong and traumatic
Locking Mechanism	Yes (ratchet lock)	Yes	Yes
Used On	Tough tissues (fascia, cervix, skin)	Delicate tissues (intestine, tubes) fallopian	Tough tissues (muscle, fascia, skin, thyroid)

1.15: LEECH WILKINSON CANNULA

Figure 1.15: Leech Wilkinson cannula

The Leech Wilkinson cannula is a specialized gynecological instrument used primarily for uterine insufflation procedures, such as hysterosalpingography (HSG) and chromopertubation during diagnostic laparoscopy to assess fallopian tube patency It consists of a long curved metallic cannula with a conical or bulbous tip and a side opening for injecting contrast media or dye. The instrument typically includes a screw or locking mechanism that allows it to be securely fitted into the cervical canal, ensuring a tight seal and preventing backflow of fluid. During procedures like chromopertubation, a dye (usually methylene blue) is passed through the cannula into the uterine cavity and fallopian tubes to observe whether the tubes are open or blocked. The Leech Wilkinson cannula is valued for its ability to provide a firm seal and steady flow of contrast, making it essential in the evaluation of female infertility.

1.16: DOYENS RETRACTOR

Figure 1.16: Doyens Retractor

Doyen's retractor is a commonly used surgical instrument in abdominal and pelvic surgeries, particularly in gynaecology and obstetrics. It is a hand-held, flat-bladed retractor designed to hold back the edges of surgical incisions, allowing the surgeon better visibility and access to internal organs and structures.It has a varied length of 2030cm.

Doyen's retractors are typically made of stainless steel and come in various lengths and widths. The blade is broad and curved with a rounded, blunt tip, making it suitable for gently retracting soft tissues and viscera without causing trauma. The handle is ergonomically designed for a firm, comfortable grip, allowing the surgeon or assistant to hold it for extended periods during surgery.

Uses:

1. Abdominal Hysterectomy: Used to retract the abdominal wall and expose the uterus, ovaries, and fallopian tubes during surgery.

2. Cesarean Section: Helps in retracting the abdominal muscles and bladder to gain clear access to the uterus for delivery.

3. Pelvic Surgeries: Employed to hold back bowel loops or soft tissues during procedures involving the ovaries,

tubes, or uterus. Useful in surgeries for ectopic pregnancy, myomectomy, or ovarian cystectomy.

4. Exploratory Laparotomy: Assists in deep abdominal exploration, particularly in identifying pathology in the pelvic cavity.

5. Tubal Surgeries: Keeps the surrounding tissue away while performing procedures like tubal ligation or salpingectomy.

Advantages:

1. Provides excellent exposure of deep pelvic or abdominal structures.
2. Atraumatic design reduces the risk of tissue injury.
3. Reusable and durable.
4. Easy to use by hand or held in place by an assistant

1.17: DEAVERS HANDHELD RETRACTOR

Figure 1.17: Deavers Retractor

The Deaver retractor is a surgical instrument widely used in various surgical procedures to hold back the abdominal wall and deep organs, providing better visibility and access to the operative field. It is especially common in abdominal and thoracic surgeries.

The Deaver retractor has a long, flat, and curved blade (often described as "question mark" shaped). The curve allows it to conform to the contours of the body, minimizing trauma.

- **Blade Size:** Varies in length (8–18 inches) and width (1–4 inches) depending on the depth and extent of retraction needed.

- **Handle:** Typically has a flat or slightly rounded handle for easy grip and maneuverability, sometimes fenestrated or ribbed for improved control.

- **Material:** Made from stainless steel or other surgical-grade alloys to allow sterilization and repeated use.

Uses: The Deaver retractor is typically used in:

- A**bdominal surgeries:** To retract the abdominal wall, liver, intestines, or stomach during procedures like laparotomies or bowel resections.

- **Gynecologic surgeries:** For uterine or ovarian access or retro peritoneal access.

- **Hepatobiliary surgery:** Retraction of the liver during gallbladder or liver procedures.

- **Urologic surgeries:** To expose the bladder or prostate.

- **Cardiothoracic surgeries:** In some cases, for exposure of the diaphragm or thoracic cavity.

Advantages

- **Deep Retraction:** Excellent for deep tissue retraction due to its long curved blade.

- **Minimal Tissue Trauma:** Curved design allows for smooth insertion and retraction with reduced risk of tissue damage.

- **Versatility:** Comes in multiple sizes for various surgical depths and fields.

- **Simplicity:** Easy to use, often requires only manual operation without additional tools. **Limitations**

- **Manual Retraction:** Requires a surgical assistant to hold in place, leading to fatigue during long surgeries.

- **Not Self-Retaining:** Unlike self-retaining retractors (e.g., Balfour or Weitlaner), the Deaver must be continuously held in position.

- **Potential for Injury:** If not carefully placed, the blade may press on or bruise internal organs.

1.18: BALFOUR RETRACTOR

Figure 1.18: Balfour Retractor

Balfour retractors, are surgical instruments commonly used in abdominal surgeries to hold open the edges of a surgical incision, providing a clear view and access to the internal organs. Designed with a self-retaining mechanism, they typically feature two lateral blades and a central blade, which can be adjusted to accommodate various sizes of incisions. The retractor's hands-free design allows surgeons to work more efficiently and reduces the need for additional assistance during procedures. Balfour retractors are especially useful in deep abdominal operations such as laparotomies and oncosurgeries where maintaining an unobstructed field is critical for surgical success.

1.19: LANDONS RETRACTOR

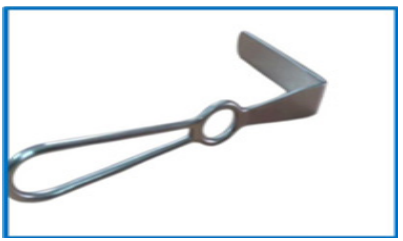


Figure 1.19: Landons Retractor

Landon's retractor is a handheld surgical instrument used primarily for soft tissue retraction during various surgical procedures.

It typically features a flat, curved blade with a broad surface and a sturdy handle, designed to provide firm and controlled retraction. The curved blade allows it to contour around anatomical structures, making it particularly useful in procedures requiring gentle yet effective tissue separation.

The instrument is generally made from stainless steel, ensuring durability and ease of sterilisation.

1.20: CZERNEY'S RETRACTOR

Hand held retractor made of stainless steel

Named after German surgeon Dr Vincenz Czerney.

It is bi flanges with spikes on one end. The shaft has a central oval fenestration.

USE:

Use in superficial retraction of skin incision

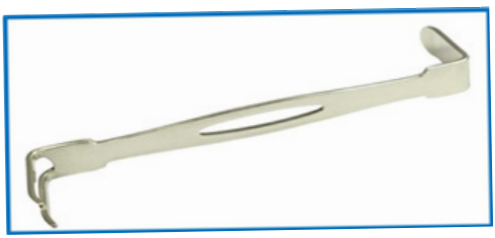


Figure 1.20: Czerney's Retractor

1.21: URINARY METAL CATHETER

Figure 1.21: Urinary Metal Catheter

Urinary metal catheters are inserted through the urethra into the bladder to drain urine.

It has a small hole at the side of the tip to drain the urine.

Indications:

During gynaecological procedures like anterioe colporrhaphy, vaginal hysterectomy, Vesico vaginal fistula repair, Manchester repair, cervical cerclage, before any pelvic procedures to ensure bladder is empty.

1.22: AYRES SPATULA

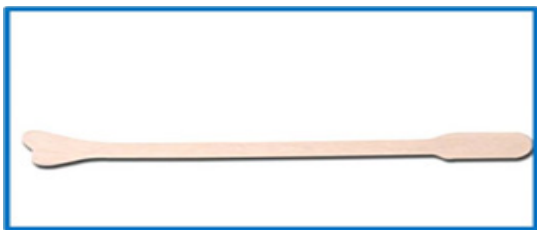


Figure 1.22: Urinary Metal Catheter

The Ayres spatula is a specialized medical instrument commonly used in gynecology, specifically for Pap smear tests(also known as Papanicolaou tests). It is a simple, yet essential tool in the screening and diagnosis of cervical cancer and other abnormalities of the cervix.

Named after Dr. John Ayres, who contributed to the development of tools used in cytological sampling. The Ayres spatula is a flat, wooden or plastic instrument shaped to facilitate the collection of cervical cells. Its design allows it to fit into the contours of the cervix and external os (the

opening of the cervix), providing a thorough and consistent sampling of cells. One end is rounded or slightly curved to fit the external os. The other end may be flat or slightly pointed, for general surface scraping

1. The patient lies in a lithotomy position (on their back with knees bent and legs apart).

2. A speculum is inserted to visualise the cervix.

3. The Ayres spatula is inserted gently into the cervical os.

4. It is rotated 360 degrees to collect cells from the:

o Ectocervix (outer part of the cervix) o Transformation zone (area where cervical cancer most commonly originates)

5. The collected material is then:

o Smeared on a glass slide and fixed (conventional method)

o Or placed in a liquid-based cytology vial (modern method)

Advantages:

- Simple and cost-effective
- Non-invasive and painless when used correctly
- Provides an adequate sample from the transformation zone
- Widely available and used globally
- Ideal for use in low-resource settings

Limitations:

- May not collect as many endocervical cells as newer devices like the cytobrush
- Operator-dependent: Inadequate technique can result in poor sampling
- Wooden spatulas can occasionally trap cells in the grain if not properly smeared

- Disposable spatulas contribute to medical waste if not biodegradable

1.23: LIQUID BRUSH CYTOLOGY (LBC)

Key Features:

1. Cells are collected using a brush or broom-like device
2. Cells are suspended in a liquid fixative
3. Sample is then processed and analyzed for abnormal cell changes

Applications:

1. Cervical cancer screening (Pap smear)
2. Detection of human papillomavirus (HPV)
3. Diagnosis of various cancers or precancerous lesions

Figure 1.23: Liquid brush cytology with plastic broom

Benefits:

1. Improved sample quality and cellular preservation
2. Enhanced detection of abnormal cells
3. Reduced inadequate sample rates

1.24: BARD PARKER KNIFE HANDLE

Key Features:

1. Ergonomic design for comfortable grip

Typically made of stainless steel or other durable mat

2. Typically made of stainless steel or other durable materials

3. Compatible with various surgical blade sizes Use:. Holding surgical blades for precise cutting

Benefits:

1. Precise control and maneuverability
2. Durable construction for repeated use
3. Easy to sterilize and maintain

Figure 1.24: Bard Parker Handle

1.25: MYOMA SCREW

It has a solid handle or T-handle design for a comfortable grip and effortless insertion.

Sterilization: Can be sterilized and reused.

Use:

A Myoma screw is typically used in laparoscopic or open surgical procedures to remove uterine fibroids, helping to minimize bleeding and facilitate safe removal.

The Myoma screw is designed to:

1. Grasp and stabilize uterine fibroids (myomas) during surgery

2. Provide traction and control during myomectomy procedures

It is made from high-grade stainless steel or medical-grade steel, ensuring durability and resistance to corrosion.

It is ergonomically designed for optimal handling and control, with a sharp tip for easy insertion into uterine tissue and smooth curves for gentle tissue manipulation.

It is available in various lengths, such as 150mm (abdominal) and 180mm (vaginal), to accommodate different surgical needs.

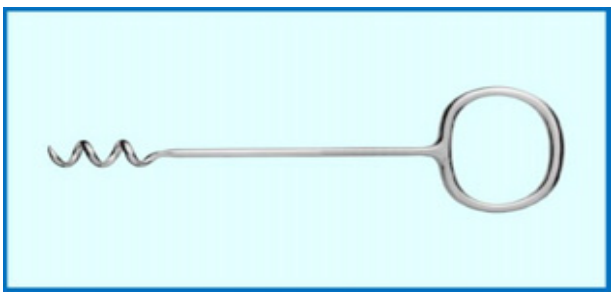


Fig 1.25 : A Myoma screw

1.26: TOWEL CLIPS

Towel clips are surgical instruments made of stainless steel with either a spring-loaded or clamp-like design. They come in various sizes and types (e.g. penetrating or nonpenetrating).

Use:

1. Attaching towels to skin or drapes and securing surgical towels or drapes in place

2. Maintain a sterile field

3. Organizing surgical site

4. Reducing contamination risk

Benefits:

1. Enhanced sterility
2. Improved surgical site visibility
3. Reduced distractions during procedures

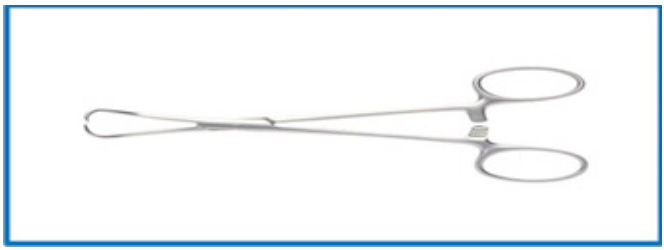


Fig 1.26 A : A Mayo's towel clip

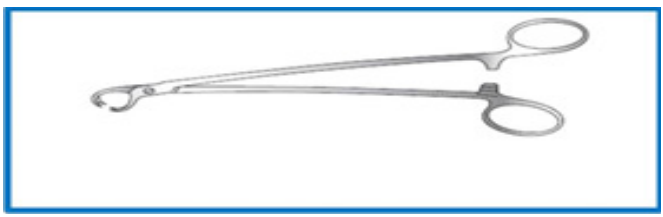


Fig 1.26 B : A Moyinihan towel clip

Fig 1.26 C : Cross action towel clip

1.27: UTERINE HOLDING FORCEPS

Fig 1.27 Uterine holding forceps

Uterus holding forceps are surgical instruments designed to grasp and hold the uterus during procedures like hysterectomy or cesarean section. They have curved, blunt tips and a sturdy grip, often with teeth or serrations, to securely hold the uterine tissue without causing damage. These forceps come in various sizes and are used to elevate, manipulate, or stabilize the uterus.

1.28: MIXTURE /RIGHT ANGLED ARTERY FORCEP

1. Grasping and clamping blood vessels or ducts
2. Dissecting and ligating vessels
3. Controlling bleeding in tight spaces

Key Features:

1. Right-angled or curved design
2. Atraumatic or traumatic tips
3. Various sizes and lengths

Applications:

1. Vascular surgery eg internal iliac artery ligation
2. General surgery
3. Gynecological or urological procedures

Benefits:

1. Precise control and manipulation
2. Reduced tissue trauma
3. Effective hemostasis

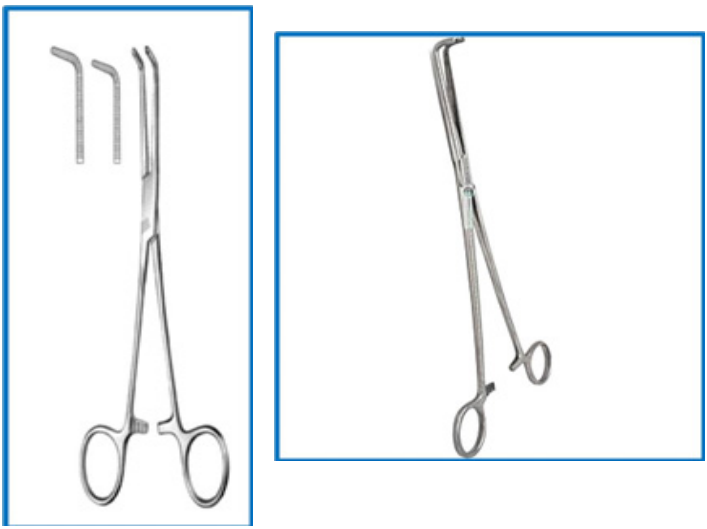


Fig. 1.28: Mixture /Right Angled Artery Forcep

1.29: NEEDLE HOLDER

Used to grasp the needles for suturing.

Key Features:

1. It has a Ratchet or locking mechanism
2. It has Various sizes and shapes (e.g., straight, curved, or angled)

3. The inner surface of the tip has criss cross serrations and a small groove (eye) for firm grasp of curved needle.

Benefits:

1. Precise needle control
2. Reduced needle slippage
3. Enhanced suturing accuracy

Fig. 1.29: Needle Holder

1.30: NON TOOTH THUMB FORCEP

Key Features:

1. Smooth, flat, or rounded tips
2. No teeth or serrations
3. Various sizes and shapes

Use:

1. Grasping and handling tissues
2. Tissue manipulation
3. Holding and suturing delicate tissues

Benefits:

1. Minimal tissue trauma
2. Reduced risk of tissue damage
3. Precise tissue handling

Fig. 1.30: Non Tooth Thumb Forcep

1.31: TOOTH FORCEPS

Are used for grasping and holding tissues firmly and providing secure grip on tissues **Key Features:**

1. Teeth or serrations on the tips
2. Different sizes and shapes

Uses:

1. Firmly grasping tissues
2. Holding tissues during surgical procedures
3. Assisting in tissue dissection or repair

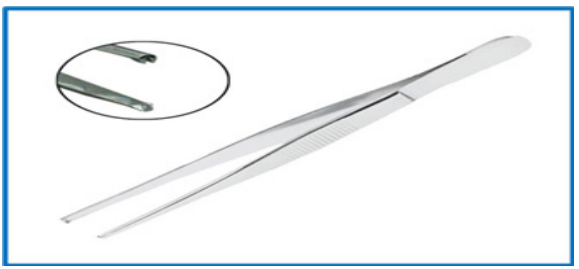


Fig. 1.31: Tooth Forceps

1.32 STRAIGHT AND CURVED CLAMPS

Straight and curved clamps are essential haemostatic instruments in hysterectomy, designed to control vascular pedicles, stabilise uterine supports, and facilitate safe

dissection in the anatomically crowded pelvis. Their design variations like jaw curvature, serration pattern, shank length, and angulation allow the surgeon to adapt to the depth, orientation, and complexity of each pedicle encountered during abdominal, vaginal, and radical hysterectomy.

Design Features of Hysterectomy Clamps

1. Jaws

- Straight jaws: Linear, parallel, ideal for superficial pedicles.
- Curved jaws: Angulated to follow pelvic contours, improving access to deep structures.
- Serrations: Transverse or cross-serrated for secure grip on vascular pedicles.
- Length: Longer jaws for deep pelvic pedicles; shorter for superficial ligaments.

2. Shanks

- Provide leverage and strength.
- Longer shanks allow access to deep pelvic spaces in radical hysterectomy.

3. Handles and Ratchets

- Multi-tooth ratchets ensure firm locking.
- Ergonomic handles reduce hand fatigue during repetitive pedicle clamping.

Straight Clamps in Hysterectomy

Straight clamps such as straight Heaney, Kocher, Billroth, and Pean clamps, are used when a direct, linear approach to the pedicle is possible. Their straight profile maintains an unobstructed visual axis, making them ideal for the round ligament, fallopian tube, ovarian ligament, broad ligament, and superficial vascular pedicles.

The uniform serrations provide firm grip, reducing slippage during ligation. In abdominal hysterectomy, straight clamps

are often used in the initial steps where the operative field is wide and accessible.

Curved Clamps in Hysterectomy

Curved clamps such as curved Heaney, Heaney-Ballantine, Zeppelin, Masterson, and Mayo clamps are engineered to conform to the deep concavity of the pelvis. Their angulated jaws allow Safe access to uterine vessels, controlled clamping of cardinal and uterosacral ligaments, Protection of bladder, ureter, and rectum, and improved visibility in narrow spaces

Curved clamps distribute pressure evenly along the pedicle and allow the surgeon to approach structures from an ergonomic angle, especially in vaginal and radical hysterectomy.

Handling Technique

- Apply clamp perpendicular to the pedicle for maximum compression.
- Ensure full jaw coverage of the pedicle before locking.
- Use curved clamps when approaching pedicles at an angle or in deep spaces.
- Avoid excessive traction to prevent tissue tearing.
- Always visualise the ureter before clamping uterine vessels.

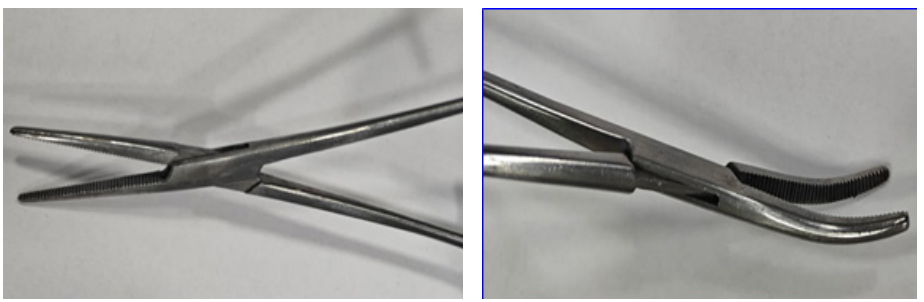


Figure 1.32 Straight Heaney Clamp: Long straight jaws with transverse serrations(left) and Curved Heaney Clamp: curved jaws with cross serrations (right)

CHAPTER 2

Instruments In MTP and Female Sterilisation

In this section we will deal with instruments used in Medical termination of pregnancy and female sterilization.

2.1: MTP (Karman's) Cannula

Karman's Cannula is a soft, flexible plastic cannula (or curette) used in medical procedures especially in MTPs with MVA aspirator or EVA machine for suction evacuation.

It derived its name from Harvey Karman in the early 1970s.

They are single use disposable cannulas.

Use: surgical MTP, incomplete abortion, hydatidiform mole

Description:

Distal end is coned with two large lateral eyes to facilitates the curette.

It has a universal adopter for connecting to suction apparatus.

Specially designed for aseptic medical termination of pregnancy.

Suitable for use with MTP syringe or suction apparatus.

Sterile / Disposable / Individually packed.

They come in various sizes ranging from 5 to 12 mm , size is selected depending upon the size of pregnant uterus. The base of the cannulas are colour coded for different sizes.

Colour Code	Grey	Orange	Red	Green	Blue	Dark Blue
Size	5 mm	6 mm	7 mm	8 mm	10 mm	12 mm

During aspiration, the tip of the cannula having hole should be kept just beyond the internal os and suction should be done with rotatory movement of the cannula.

The completion of procedure is indicated by

1. Absence of any further products of conception seen in the tubing
2. Gripping of cervix over the tip of the cannula
3. Bubbles are seen in the cannula.

Advantages: It is soft cannula so causes less trauma .

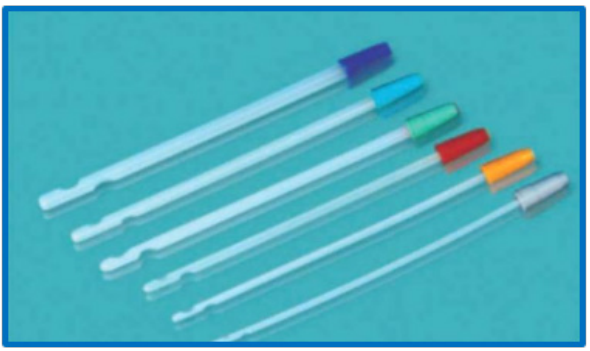


Fig 2.1: Set of colour coded Karman's cannula

2.2: MVA syringe

Description: MVA Syringe is a handheld plastic aspirator (MVA aspirator/syringe).

Use: Surgical MTP till 12to 13 weeks of gestation, incomplete abortion.

On drawing the plunger handle out, a vaccum gets created to suck out the uterine contents.

Advantages:

No need of electricity.

Safe and effective.

The products collected in the syringe are available for inspection and histopathological examination.

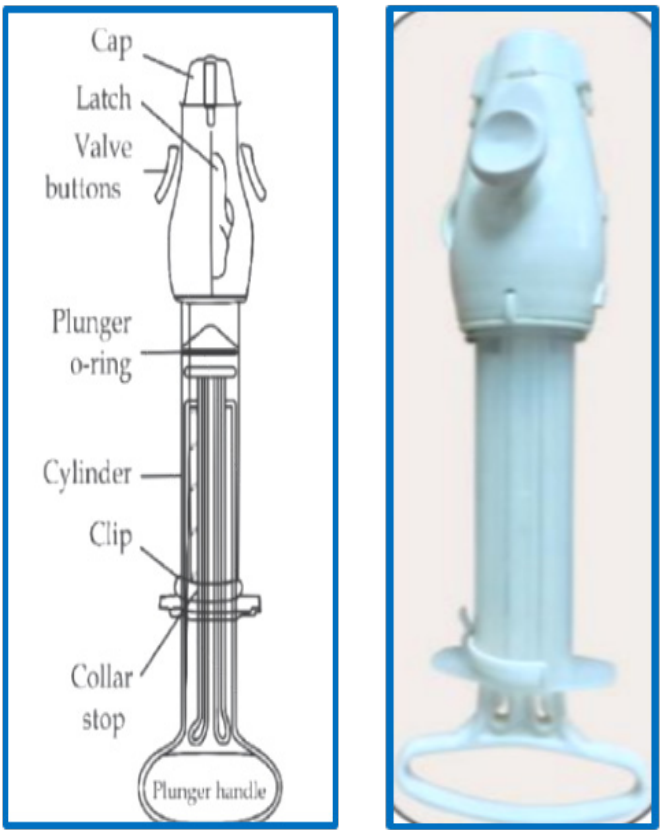


Fig 2.2: Manual vaccum aspirator (MVA Syringe)

2.3: SINGLE PUNCTURE LAPAROSCOPE FOR TUBAL LIGATION:

Description: It has a zero degree telescope with parallel/ straight eye piece.It incorporates 10 to 12 mm diameter Fibre optic light transmission.

Can be sterilised by autoclaving cidex solutions and Formalin Chamber. It has a 6 mm instrument channel/built-in ring applicator Working length of 270-275 mm

Use: Used for laparoscopic female sterilisation (tubal ligation)

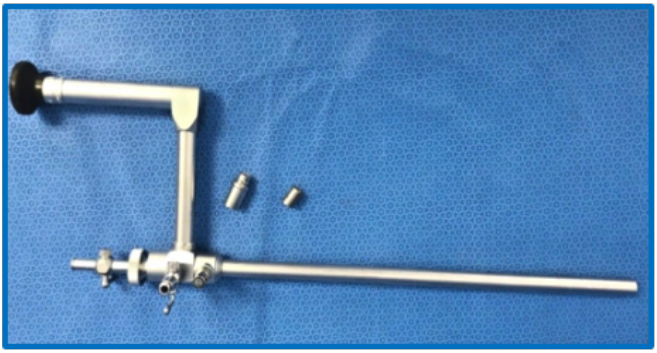


Fig 2.3: Single puncture laparoscope/ telescope

1. Falope ring applicator

The applicator has a pair of prongs which when drawn out of the the cylindrical body ,hold the rings and draws in a segment of fallopian tube in a loop shape manner and then releases the ring which constricts the base of this loop

It has a ring selection collar at the proximal end which is marked at 0,1,2.It is set at "0" when ring is roaded,1 and 2 positions if 1st and 2nd ring needs to be fired respectively if 2 rings are loaded simultaneously.

The cones and loader are used to load the falope rings on to the inner cylinder of the asssembly.

Use: It is used during laparoscopic surgeries or with single punctute laparoscope to ligate the fallopian tubes with falope rings.

Advantages: Compared to other methods like electrocautery ,the falope ring technique offers advantage of reduced tissue damage and better chances of tubal renanlisation if needed in future.

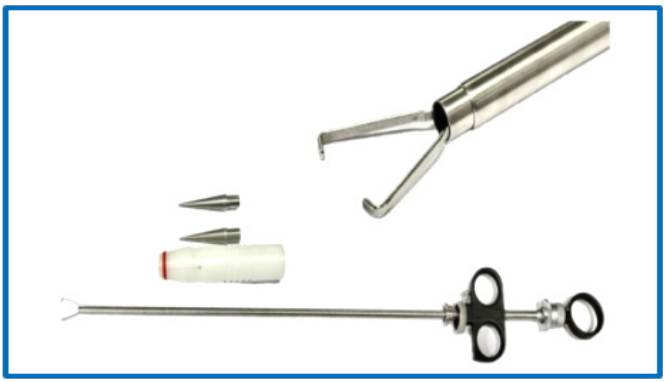


Fig 2.4: Single puncture ring applicator with a) Cones, b) Pusher, c) prongs drawn out of the ring applicator/laprocator

2.5: Falope rings:

Falope rings are small rings made of sialistic which are used in laparoscopic female sterilisation as mentioned above.

They have a memory time of 5 minutes so they should be loaded onto the ring applicator only once surgeon has identifies both the tubes and is ready for the procedure.

The ring's outer diameter is 3.6 mm, inner diameter is 1.0 mm, approximately 2.2 mm thick. The ring is made of a barium sulfate impregnanted dimethypolysiloxane, which allows its visibility on X ray.

Advantages: they are visible on X ray so can be used to confirm tubal ligation

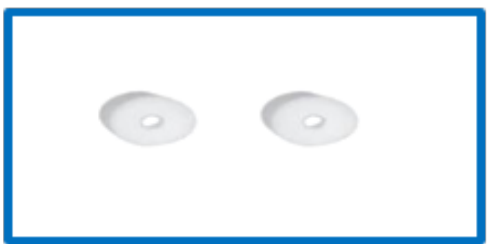


Fig 2.5: Fallope rings for tubal ligation

CHAPTER 3

Obstetrics Instruments In Instrumental Delivery

3.1: Obstetric outlet (wrigley's) forceps

Indications:

To assist vaginal delivery of fetus in second stage of labour in following conditions -

1. Fetal distress in second stage of labour
2. Maternal conditions:

Prolonged second stage

Maternal exhaustion

Maternal indications where Valsalva should be avoided: NYHA Class 3 or 4 heart disease, Severe preclampsia/ eclampsia, Proliferative retinopathy

Contraindications:

Cephalopelvic disproportion

Non cephalic presentations (except –aftercoming head of breech or mento-anterior)

Prerequisites for Forceps application

Informed Written Consent

Bladder emptied

Vertex presentation

Vertex not palpable >1/5th

Cervix fully dilated and effaced

Membranes should be ruptured

Sutures in Anteroposterior or within 45 degrees

Head station below plus 2.

Note: Outlet forceps is applied when head is at perineum and fetal scalp is visible at introitus

Disadvantages: can cause traumatic postpartum hemorrage by causing vaginal, cervical tears, extension if tears may cause avulsion of uterine vessels, broad ligament hematoma, bladder injury

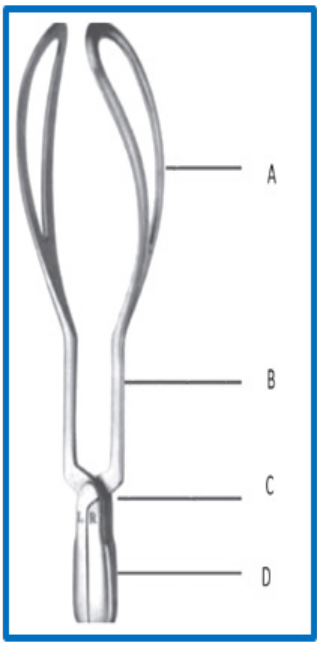


Fig 3.1: Parts of an Obstetical outlet forceps: A -Blade, B-Shank, C-Lock, D-Handle

3.2: VENTOUSE/ VACCUM

Indications : same as for forceps

Contraindications:

Preterm

Maternal coagulopathy

Advantages over forceps:

Less traumatic

Easy application

Can be applied at higher head station and non fully dilated cervix (>6 cm dilatation)

Fig 3.2: Ventouse/ vaccum with cup, connector and suction tubing

CHAPTER 4:

Laparoscopic Instruments in Gynaecology

Dr. Vidhi Chaudhary
Professor (Obstetrics and Gynaecology), LHMC, New Delhi

LAPAROSCOPY INSTRUMENTS

INSUFFLATOR

A laparoscopic insufflator is a medical device used in laparoscopic surgery to create a safe and working space within the abdominal cavity Function:

- **Creates Pneumoperitoneum:**

The insufflator delivers gas (usually CO2) into the abdominal cavity, creating space by lifting the abdominal wall and pushing aside internal organs.

- **Provides Visualization:**

This space allows the surgeon to see the surgical site clearly through the laparoscope (a camera inserted through a trocar).

- **Enables instrument manipulation:**

The pneumoperitoneum allows for the insertion and movement of surgical instruments, enabling complex procedures to be performed minimally invasively.

Key Features

- **Gas Source:**

The device is connected to a source of pressurized gas, most commonly carbon dioxide.

- **Pressure Regulation:**

The insufflator regulates the flow rate and pressure of the gas to maintain a safe and stable working pressure within the abdomen.

- **Safety Features:**

Many insufflators include safety mechanisms such as alarms and automatic pressure adjustments to prevent over-inflation or sudden pressure drops.

- **Monitoring:**

Devices often have displays showing preset pressure(a), actual pressure(b), flow rate(c), and total gas used(d). See figure. This setting is prior to creation of pneumoperitoneum.

Fig: 4.1: Insufflator

Fig.4.2: Gas tubing

4.3: HIGH DEFINITION(HD) ENDOSCOPIC CAMERA

An HD endoscopy camera is a high-definition imaging device used in endoscopic procedures to provide clear and detailed visuals of internal organs and structures. All cameras are based upon CMOS TECHNOLOGY .CMOS camera can be either HD (1920*1080) , /4K (3840*2160)resolution. CMOS can use either one or 3 image sensor each for red, green and blue light spectrum respectively. However ,due to technological improvements, most CMOS cameras come with single image sensor. In addition, these CMOS chip can have capacity to perceive near infra-red light (NIR) useful in Indocyanine Green (ICG) imaging .

Fig.4.3: High Definition(Hd) Endoscopic Camera Unit

Fig 4.4 Light source (left) and light cable (right)

4.4 LIGHT SOURCE AND CABLE

Laparoscopic light source cables are an essential component of the visualization system used in minimally invasive surgery. They transmit light from an external light source to the laparoscope, illuminating the surgical field for the surgeon. Now days most of light source are LED.

Types of cables

- **Fiber optic cables:** These are the most common type, composed of bundles of glass fibers that transmit light via internal reflection. They are known for their high quality of optical transmission but can be fragile and prone to fiber breakage over time.

- **Liquid crystal gel cables:** These cables utilize a clear optical gel to transmit light, offering potentially higher light transmission than traditional fiber optic cables, up to 30% more theoretically. However, they are more susceptible to damage from heat and can be more rigid due to a metal sheath.

Function

- **Illumination:** The primary role is to provide bright, clear illumination of the internal organs and tissues during laparoscopic procedures.

- **Enhanced Visualization:** High-intensity light transmitted by the cable improves the surgeon's ability to see and perform precise manoeuvres.

- **Minimal Heat Production:** Fiber optic cables are designed to transmit light with minimal heat generation, reducing the risk of thermal injury to tissues.

Safety precautions

- **Heat Generation:** The cables can generate heat, and prolonged contact with skin or drapes can lead to burns. Always ensure the light source is turned off or the cable is placed in a designated holder when not in use.

- **Eye Protection:** Avoid direct eye exposure to the intense light emitted by the cable.

- **Cable Integrity:** Regularly inspect cables for signs of damage or wear, such as kinks, fraying, or broken fibres.

VERESS NEEDLE

This is a specially designed needle with a blunt-tipped, spring-loaded inner stylet and a sharp outer needle, used to achieve pneumoperitoneum while performing closed laparoscopy. It is available in both disposable and reusable form, with 12cm or a 15cm length.

Used in closed entry technique of creating pneumoperitoneum, prior to primary port insertion.

The most recent Cochrane review concluded there is a lower risk of vascular injury with the direct entry in comparison to use of Veress needle.

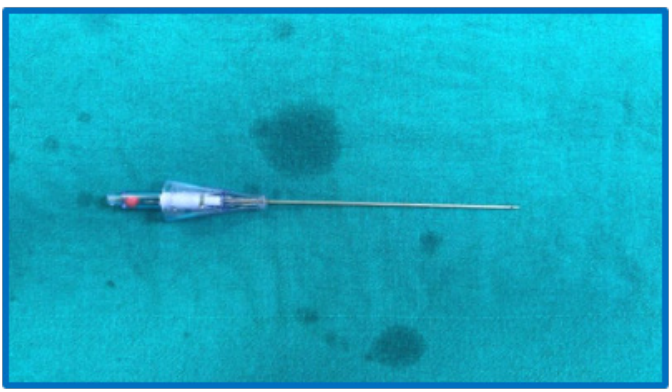


Fig 4.5 Veress needle

TROCAR AND CANNULA

Disposable and reusable trocars are available in various sizes and generally consist of the following common components:

- **Tip**: Trocars feature either sharp or blunt tips. Sharp tips cut through the abdominal wall to create an entry path, while blunt tips separate and stretch the tissues to access the peritoneal cavity without cutting.

- **Sleeve (Cannula)**: This is the working channel through which instruments are passed. Some trocar sleeves have textured outer surfaces to help anchor them to the abdominal wall. Others include an internal inflatable balloon or a plastic/rubber ring at the tip to enhance stability and prevent dislodgment.

- **Valve System**: Various valve mechanisms are used to prevent gas leakage during procedures while still allowing the passage of surgical instruments.

Side Port: Many trocars include a side port that facilitates gas insufflation or smoke evacuation during laparoscopic procedures.

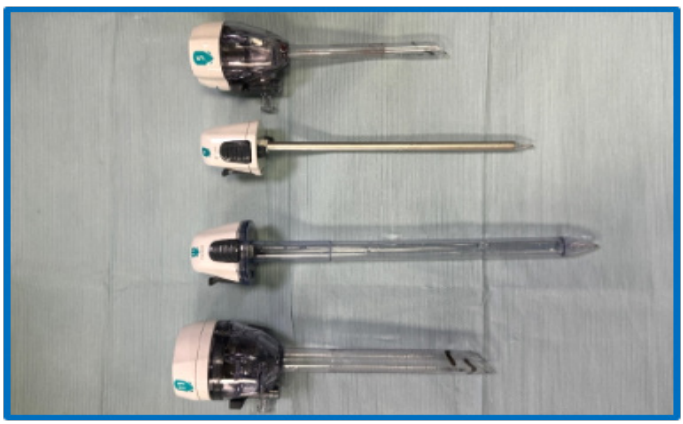


Fig 4.6 Trocar and cannula

LAPAROSCOPIC TELESCOPES AND INSTRUMENT DIMENSIONS

Telescopes used in laparoscopy are available in diameters ranging from 2 mm to 12 mm, with the 10 mm scope being the most commonly used in gynaecology. Instruments with diameters less than 5 mm offer reduced shaft rigidity, making them more flexible and fragile .Standard instrument lengths range from 34 cm to 37 cm, while longer 45 cm instruments are preferred in bariatric cases or single-port procedures.

They have various viewing angles—0°, 30°, or 45°. Each laparoscope is marked near the eyepiece with its corresponding viewing angle.

- In angled-view scopes, the direction of vision diverges from the axis of the light source.

- The 0° telescope provides a straight-ahead view and is preferred by most gynaecologists for its alignment with the natural approach, especially when assisted by less-experienced personnel.

- The 30° scope allows rotational adjustment to expand the field of view, proving advantageous in complex procedures.

- The 45° telescope is primarily used in single-incision laparoscopy but is less commonly available.

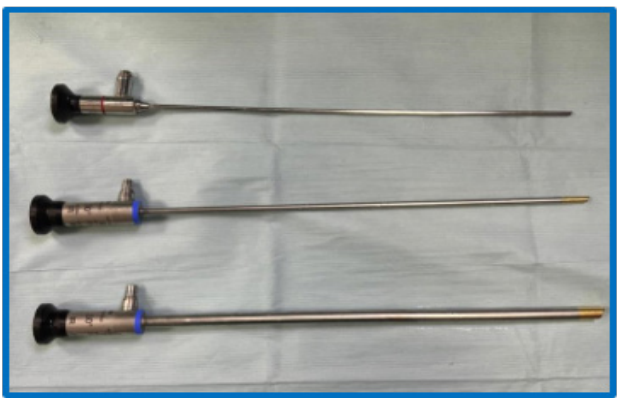


Fig 4.7 Telescopes (0,30,45 degree telescopes from top to bottom)

LAPAROSCOPY ACCESSORY INSTRUMENTS

Most laparoscopic instruments provide four primary degrees of freedom of movement: insertion/retraction, up/down, left/right, and axial rotation.

Graspers and scissors -They consist of an insulated sheath, a central working shaft, a handle, and a rotating mechanism at the working end. Handles may be variable. Ring handles resemble the conventional design used in open surgery needle holders and may be aligned in line with, or positioned at 90°

to, the working axis. A pistol grip handle enables integration of multiple functions, while a co-axial handle aligns directly with the instrument's axis. Handles may feature different types of ratchet mechanisms for secure locking.

-Grasper jaws can be single-action, with one fixed and one movable jaw, or double-action, with both jaws articulated. Single-action jaws provide greater closing force, making them ideal for instruments such as needle drivers, whereas double-action jaws allow a wider opening, which is more suitable for dissection. Grasper's jaw surfaces are of commonly of two types:

- **Traumatic:** deep serrations or toothed tips for secure grasping of tough tissue.
- **Atraumatic:** fine serrations for delicate tissue handling.

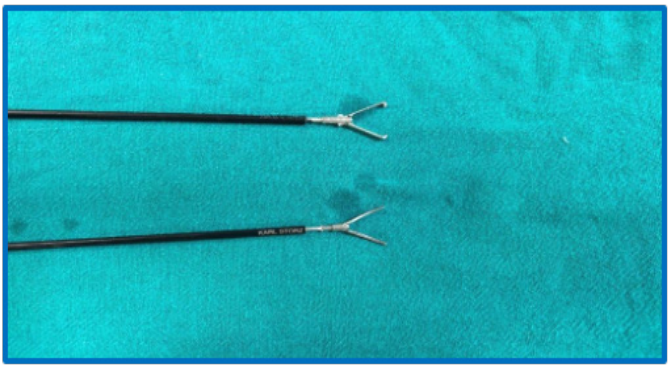


Fig 4.8 A laparoscopic graspers

Scissors with curved tip analogous to Metzenbaum scissors are commonly used, and can be connected to an electrosurgical unit.

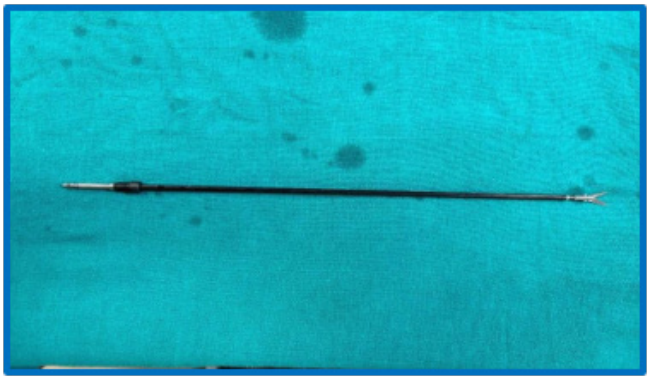


Fig 4.8 B Laparoscopic scissors

Laparoscopic Needle Holder -Various styles of needle drivers are available.The jaws may be straight or curved, with flat or finely serrated surfaces to securely hold the needle in multiple orientations. Needle drivers may have finger grip, palm grip, or pistol grip handles, as previously described.

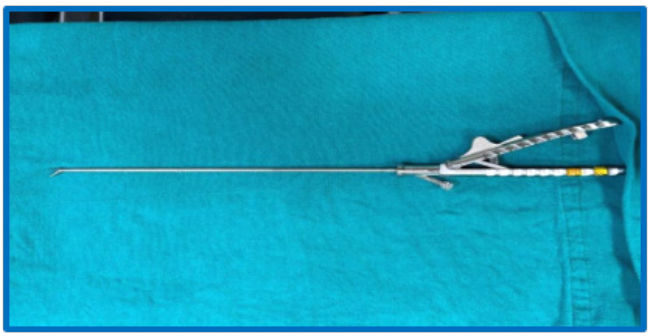


Fig 4.9 laparoscopic Needle holder

-Myoma screws, shaped like a probe with a corkscrew tip, are commonly used during myomectomy to manipulate fibroids.

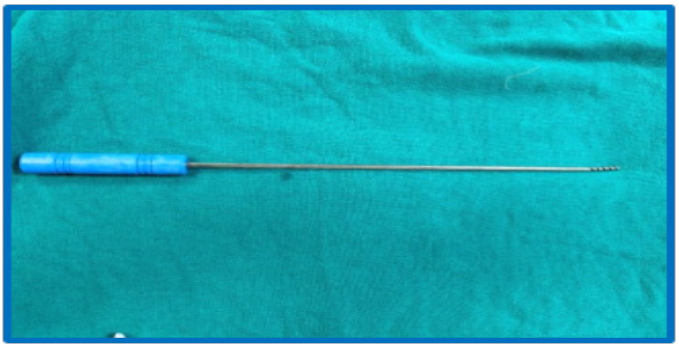


Fig 4.10 myoma screw

-The suction–irrigation device is operated via a trumpet valve, although some models use a sliding valve. Irrigation may be driven by a pressure bag or pump system.

Care must be taken during suctioning to avoid drawing in structures such as the omentum, fallopian tube, or bowel; any tissue caught must be released gently to prevent injury.

Fig 4.11 Suction irrigation device

Aspiration needles, usually 16- or 22-gauge, are used for aspirating or injecting fluids intraoperatively.

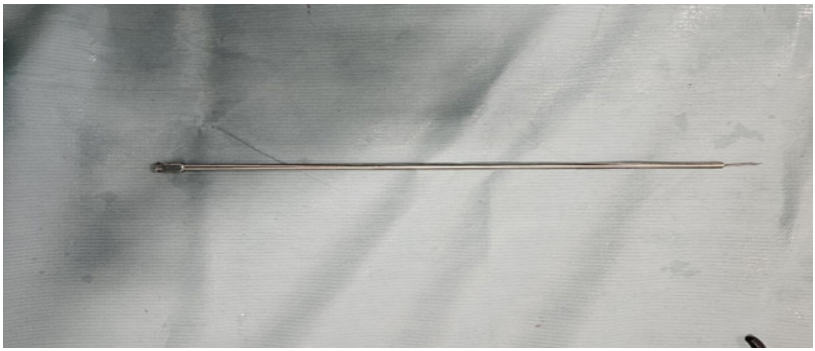


Fig 4,12 Aspoiration needle

ENERGY DEVICES

Energy sources in laparoscopy include monopolar, bipolar, advanced bipolar, ultrasonic(harmonic), combination devices, and morcellators.

- **MONOPOLAR DEVICES** are widely used for tasks such as endometriosis excision and vaginal cuff incision during hysterectomy. Various monopolar hooks and spatulas are available, and most laparoscopic scissors can connect to a monopolar lead.

Fig 4.13 monopolar hook

• **BIPOLAR DEVICES** pass electrical current between the forceps jaws, minimizing collateral tissue damage. They achieve haemostasis by thermal coagulation but generally do not cut tissue.

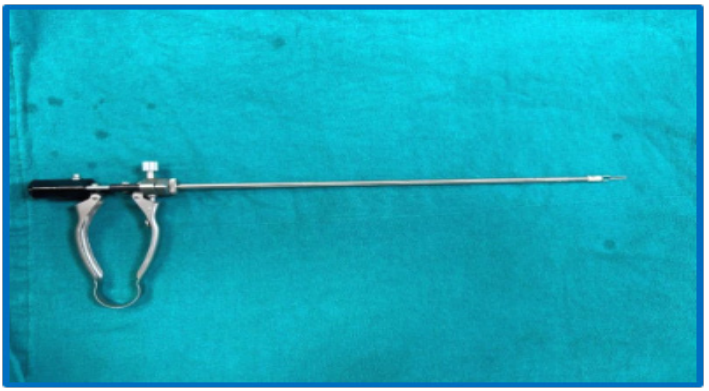


Fig 4.14 bipolar cautery

• **ADVANCED BIPOLAR INSTRUMENTS** (e.g., LigaSure, Gyrus PKS™, EnSeal®,bipolar shearer's) seal vessels up to 7 mm by delivering low-voltage energy with real-time feedback to control tissue temperature, usually below 100 °C. Advanced bipolar systems denatures collagen and elastin, sealing vessels through coaptive coagulation while reducing thermal spread, charring, and sticking. Some advanced bipolar devices also cut tissue, but they may require dedicated electrosurgical units and are relatively expensive.

LigaSure (Covidien): continuous bipolar waveform with integrated cutting.

Gyrus PKS: pulsed bipolar waveform to allow cooling but does not cut.

- **ENSEAL (Ethicon):** uses nanometer-sized conductive particles to direct energy and temperature; includes an I-Blade™ for cutting.

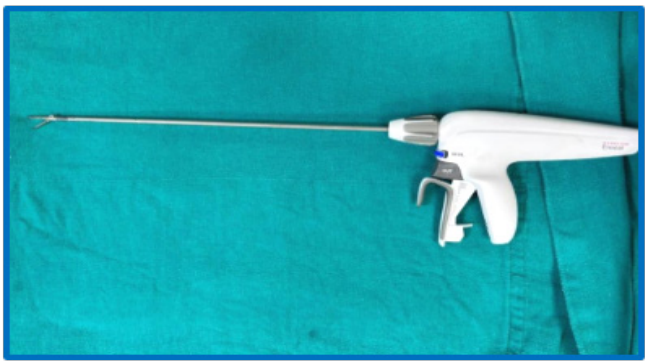


Fig 4.15 Enseal device

• **HARMONIC DEVICES** convert electrical energy to ultrasonic vibrations (around 55 kHz) via a piezoelectric crystal. The vibrating blade cuts tissue mechanically with some thermal coagulation for haemostasis. Compared to other energy sources, they generate lower temperatures (<80 °C), minimizing thermal spread and charring. They are FDA approved for sealing vessels up to 5 mm. The blade tip can remain hot after activation, so care is needed to avoid injury to adjacent structures.

Fig 4.16 Harmonic device

- **THUNDERBEAT (OLYMPUS)** combines ultrasonic and advanced bipolar energy in a single instrument, potentially reducing operative time.

- **MORCELLATORS** facilitate removal of bulky tissue specimens, such as fibroids during myomectomy. The morcellator tip should remain close to the abdominal wall, pulling tissue in rather than pushing the device forward, to minimize injury. Ports larger than 5 mm are required. Concerns about tissue dissemination led the FDA to recommend in-bag morcellation to reduce this risk.

ENDOBAG

A laparoscopic endobag, also known as a specimen retrieval bag, is a sterile, disposable bag used in laparoscopic surgery to safely contain and remove tissue or organs from the patient's body. It helps prevent contamination of the abdominal cavity during the removal process and ensures the specimen is retrieved intact.

Fig 4.17 A and B Laparoscopic tissue retrival system with Endobag

CHAPTER 5

Hysterscopy Instruments

Dr. Vidhi Chaudhary
Professor Obstetrics & Gynaecology, LHMC

5.1: HYSTEROMAT

- It consists of system with Tubing which is used to distend the uterus by filling the uterine cavity with a liquid(more common) or gas

Key features and uses

- Provides pressure-controlled dilation of the uterine cavity for diagnostic and operative procedures.
- **Irrigation and Suction:**

These devices are designed for both irrigation (introducing fluids) and suction (removing fluids) during endoscopic procedures.

- **Pressure Control:**

The pumps allow for precise pressure control of irrigation fluids, ensuring optimal conditions for the procedure .which is displayed on device.Intrauterine pressures should be kept around 100- 120mm Hg.

Figure 5.1: Hysteromat

5.2: DIAGNOSTIC HYSTEROSCOPE

A hysteroscope is a thin, telescope-like instrument used to examine the inside of the uterus during a procedure called hysteroscopy. Hysteroscope is inserted through the vagina and cervix, and it transmits images to a monitor, enabling the surgeon to visualize the uterine cavity to diagnose structural abnormalities like polyp, septa and fibroids. Telescope can be 0* or 30*

- Hysteroscopes typically range in outer diameter from 2.7 to 5.0 mm.

can be further categorized:

- **Standard rigid hysteroscopes:** Have a diameter greater than 5 mm.
- **Mini telescopes:** Range from 1.2 to 3 mm.
- **Diagnostic sheaths:** Typically range from 2.7 to 5.0 mm in outer diameter. A diagnostic sheath is required to deliver the distention media into the uterine cavity. The telescope fits into the sheath and is secured by means of a watertight seal that locks into place. The sheath is 4 to 5 mm in diameter, depending on the outer diameter of the telescope, with a 1 mm clearance between the inner wall and the telescope, through which the distention media is transmitted.
- **Flexible hysteroscopes:** Can be very thin, with some models as small as 1.2 mm in outer diameter.

Fig 5.2 Rigid diagnostic hysteroscope.
(A) Channel For Inserting Telescope
(B) Telescope

5.3: OPERATIVE HYSTEROSCOPE

Operative sheaths have a larger diameter than diagnostic sheaths. They range from 7 to 10 mm and average 8 mm in diameter. The operative sheaths allow space for instillation of medium, for the telescope, and for the insertion of operating devices. The hysteroscope is equipped with a camera and light source, allowing the surgeon to view the uterine lining on a monitor (which is similar as laparoscopic camera and light source)

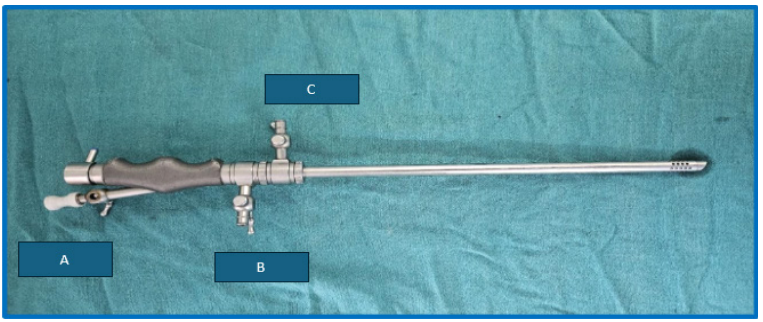


Fig 5.3: Operative Hysteroscope With
A. Operating Channel
B. Inflow
C. Outflow

Standard hysteroscopy accessories include

- **Grasping forceps:** Used to hold tissue for manipulation or removal during surgery.
- **Biopsy forceps:** Designed to obtain tissue samples for examination under a microscope.
- **Scissors:** Used to cut tissue during operative hysteroscopy.
- **Monopolar electrodes:** Deliver energy to tissue through a single point, often used for coagulation.
- **Bipolar electrodes:** Utilize a closed circuit to deliver energy, minimizing the risk of burns to surrounding tissue.

• **Monopolar and bipolar balls, needles, and loops:** Different shapes designed to target specific tissues depending on the procedure

Operative Accessories

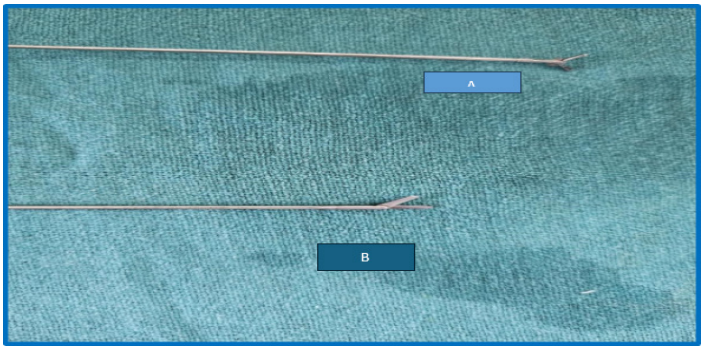


Fig 5.4 Graspers & Scissors
A. Grasper
B. Scissors

5.4: RESECTOSCOPE

A resectoscope is a specialized surgical instrument used for minimally invasive procedures to remove tissue from within the body, particularly in the urethra, prostate, or uterus. It features a thin, tube-like structure with a light source, lens for visualization, and a cutting/coagulating loop or electrode. The loop is used to cut tissue, while the electrical current also helps to control bleeding.

Key Components and Function:

• **Telescope:** Provides visualization of the surgical site.

• **Inner Sheath:** Encases the telescope and other working parts, allowing for continuous flow of irrigation fluid to clear the surgical field and remove tissue fragments.

• **Working Element:** Contains the cutting/coagulating loop or electrode that is used to resect tissue.

• **Cutting/Coagulation:** The electrical loop or electrode can cut tissue and also coagulate blood vessels to minimize bleeding

• **Outer sheath for Irrigation and Suction:** The sheath allows for the continuous flow of irrigation fluid to clear the surgical area and remove resected tissue.

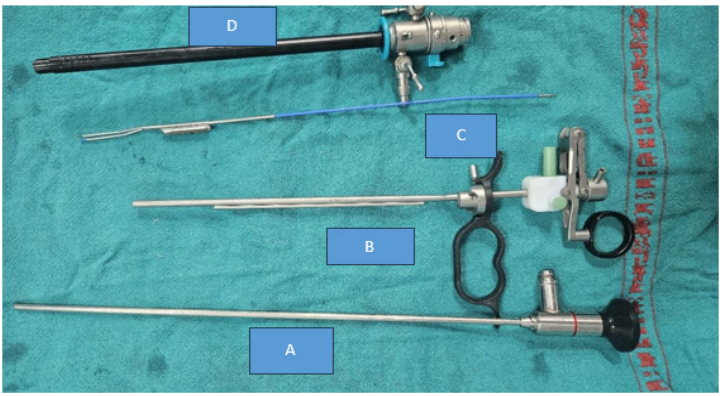
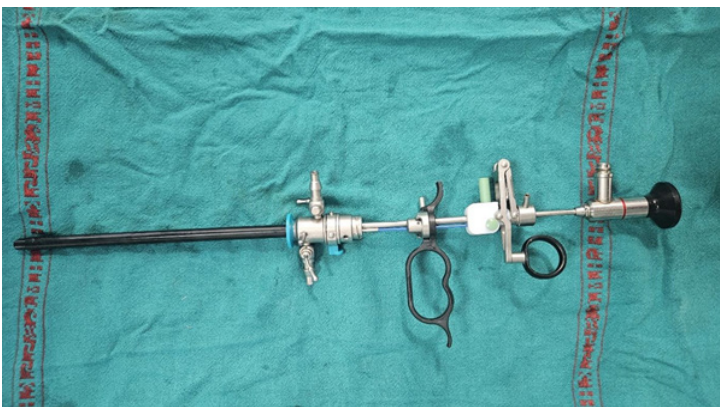


Fig 5.5: (A) Telescope
(B) Inner Sheath with groove for working element
(C) Working Element for cutting/coagulation (loop electrode)
(D) Outer sheath



Complete assembly: Resectoscope with electrodes (drawn inside outer sheath)

CHAPTER 6

Sterilisation and disinfection in hospital pertaining to obstetrics and gynaecology department

Malini.R.Capoor, Sheetal Sharma
Professor, Microbiology, Senior Resident, Microbiology,
VMMC & Safdarjung Hospital, New Delhi 110029
malinicapoor@gmail.com

Sterlisation: The process of destroying or removing all living microbes, including viable spores, from an object, surface, or medium. Reduction of their spores/ microorganisms by at least 10^6 CFU..

Disinfection: Process that eliminates or removes the majority, if not all, harmful organisms but may or may not kill bacterial spores. Most microorganisms are reduced by ≥103 log CFU, however spores remain unaffected. Achieved by a physical or chemical agent. Some disinfectants, known as chemical sterilants, can kill spores after extended exposure (3-12 hours). High-level disinfectants, with shorter exposure durations (e.g., 2% glutaraldehyde for twenty minutes), effectively destroy all microorganisms except bacterial spores. Low-level disinfectants may effectively kill most vegetative bacteria, fungi, and viruses within 10 minutes. Intermediate-level disinfectants may kill mycobacteria, vegetative bacteria, viruses, and fungus, but not always bacterial spores. Germicides range significantly in their antibacterial properties and speed of action.

Decontamination: Refers to the lowering of the pathogenic microbial population to a point where products may be regarded safe without protective equipment. Most microorganisms are reduced by at least 1 log CFU, although spores are not affected.

Antiseptic: Disinfectants that are safe to use on bodily surfaces (skin and mucosa) and destroy organisms present on them.

Spaulding proposed categorizing instruments and patient care items as critical, semicritical, or noncritical based on the risk of infection associated with their usage to better understand disinfection.

Category	Level of disinfectant required	Type of disinfectants	Example
Critical	Sterlisation, as they enter sterile body cavities and vascular tissue.	steam sterilized if feasible. Heat-sensitive items can be sterilized using EtO, hydrogen peroxide gas plasma, or liquid chemical sterilants if other techniques are not effective.	surgical (Teale's vulsellum, ovum forceps etc) equipment, urinary/cardiac catheters, implants.
Semicritical	High level disinfectants, as Contact nonintact skin or mucous membranes	Hydrogen peroxide, glutaraldehyde, peracetic acid with hydrogen peroxide and orthophthalaldehyde.	endoscopes, SIMS speculum, Cusco's speculum, diaphragm fitting rings, cystoscopes, Hysteroscope etc
Noncritical	Low level disinfectants, Contact with intact skin	Isopropyl alcohol, Chlorhexidine	Ultrasound probe, thermometer, stethoscope.

Laparoscopes and hysteroscopes that enter sterile tissue ought to be sterilized after each patients. Although in the US, this equipment may only be disinfected at a high level amongst patients. Because of their delicate design, some equipment, like laparoscope can be difficult to clean and disinfect or sterilize. So prior to high-level disinfection or sterilization, meticulous cleaning is essential. A research found that disassembling, cleaning, and reassembly of laparoscopic equipment used in gynecologic operations before steam sterilization poses minimal risk of infection. Perfusing high-level disinfectant into the channel of scopes, such as cystoscopes, hysteroscopes, and ureteroscopes, is crucial, according to one study. This study found that disinfection, defined as a decrease in bacterial burden of more than 7-log10 CFU, only occurred when the lumen was vigorously infused with glutaraldehyde. Inability to perfuse the conduit resulted in minimal, if any decrease in bacterial infection. Active perfusion of the channel resulted in full inactivation of 10^8 CFU of VRE and CRE.

Immersion did not diminish the level of microbiological contamination, indicating that high-level disinfectants only reached the channel when vigorously filled with a syringe. Although sterilization is desirable, there have been no reports of outbreaks caused by high-level disinfection of these scopes when thoroughly cleaned and disinfected. Newer variants of these devices may tolerate steam sterilization, making it preferred for critical instrument over high-level disinfection methods.

To disinfect or sterilize an endoscope/hysteroscope with a liquid chemical sterilant, follow these five procedures following leak testing:

1. Clean both internal and exterior surfaces thoroughly, including brushing internal passages and flushing with water, detergent, or enzymatic agents. (should be tested for leaks before immersion).

2. Submerge it in a high-level disinfecting agent or chemical sterilant and permeate it into all accessible channels, including

the biopsy/suction and water/air channels. Expose it for the recommended time for the specific product.

3. Rinse the endoscope and channels with sterile water, or high-quality tap water that fulfills federal clean water standards.

4. Dry: the inside of the tube and inner channels, clean with alcohol and use pressurized air after disinfection and prior to storage.

5. Proper storage: Hang the endoscope vertically to prevent contamination and facilitate drying.

The drying process reduces the risk of recontamination from microorganisms in rinse water. A study found that reprocessed endoscopes, including air/water and suction/biopsy channels, remained bacteria-free after 24 hours and 90% after 7 days when stored vertically in a ventilated cabinet.

Vaginal probes used for sonographic scanning comes under Semicritical devices, such as vaginal and endocavitary probes without covers, come into direct touch with mucous membranes (e.g., vagina, rectum) The CDC recommendation suggests employing a fresh condom/probe cover for each patient and to avoid risk due to tear, high level disinfectant should also be used to prevent failure. It corroborated by research indicating that sterile transvaginal ultrasonography probe coverings had a significant risk of perforation even before use (0%, 65%, and 25% breaches from three vendors). A research revealed that endovaginal probe coverings from two vendors had a significant risk of perforation following oocyte extraction (75% and 81%, respectively). further studies indicated a decreased risk of perforations after using condoms (2.0% and 0.9%). Condoms outperform commercially available probe coverings for ultrasound probe coverage (1.7% vs. 8.3% leakage). These investigations highlight the importance of regular probe disinfection between testing. Ultrasound manufacturers propose using 2% glutaraldehyde for disinfecting contaminated transvaginal transducers, although this substance may limit the transducer's life and be

hazardous to embryos and gametes. Alternatively disinfect the vaginal transducer, remove the gel, clean it with soap and water, wipe it with 70% alcohol or soak it in 500 ppm chlorine for 2 minutes, rinse it with tap water, and air dry it. Efficacy of these methods have not been demonstrated in laboratory or clinical settings. To protect staff, patients, probes, and retrieved cells, high-level disinfection with a non-toxic product, such as hydrogen peroxide, until alternative procedures against significant microbes at the cavitary site are proven effective through well-designed scientific studies.

The Ministry of Environment Forests and Climate Change, Govt. of India notified the Bio-Medical Waste Management Rules, 2016 on 28th March 2016, under the provisions of Environment Act 1986. These Rules were amended in 2018 and 2019. Central Pollution Control Board released guidelines in 2022. BMWM rules ensure the safety of the staff, patients, public and the environment.

These rules shall apply to all persons who generate, collect, receive, store, transport, treat, dispose, or handle bio-medical waste in any form including hospitals, nursing homes, clinics, dispensaries, veterinary institutions, animal houses, pathological laboratories, blood banks, Ayush hospitals, clinical establishments, research or educational institutions, health camps, medical or surgical camps, vaccination camps, blood donation camps, first aid rooms of schools, forensic laboratories and research labs. The Obstretics and Gynaecology generates BMW like any other major Dept in the hospital.

Definition of BMW

Bio-medical waste means any waste, which is generated during the diagnosis, treatment or immunisation of human beings or animals or research activities pertaining thereto or in the production or testing of biological or in health camps, including the categories as mentioned in BMWM rules, 2016 and amendment 2018, 2019.

Serial.no	Color coded bag	Type of waste
1	yellow	a) Human Anatomical waste: Fetus below viability (under MTP Act) will go in yellow bag (b) Animal Anatomical Waste C)Soiled Waste D)Expired or Discarded Medicines E)Chemical Waste: solid discarded chemicals F)Chemical Liquid Waste: G)Discarded linen: F) PVC Blood bags & Lab waste in respective category H) Masks (including triple layer mask, N95 mask, etc.), head cover/cap, shoe-cover, disposable linen Gown, non-plastic or semi-plastic cover all
2.	Red	Contaminated Waste(Recyclable) Plastics
3.	White (Translucent) Blue	Sharps waste
4.	Blue	Metal guns etc implants/ metal Glass: Medicine glass vials or broken or discarded and contaminated glass

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