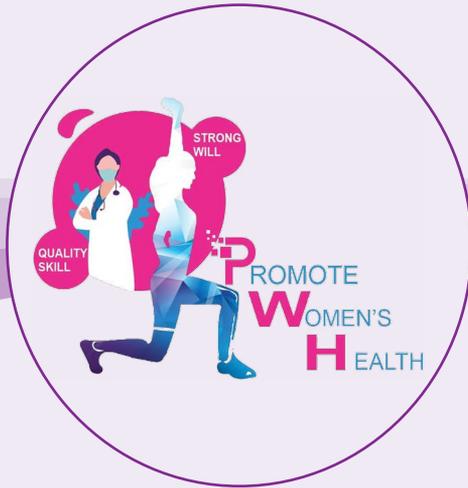




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# AOGD BULLETIN

Volume 21 | August 2021 | Monthly Issue 4



***Dedicated Issue:***

**"Basics in Minimal Access Surgery"**



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## Foreword



It gives me immense pleasure to write the foreword for this month's issue. The ongoing pandemic has been very challenging for the global scientific community and has completely changed our way of learning, so I feel proud that despite all odds AOGD has switched to the virtual platform very quickly and effectively enabling us to stay updated by interactive yet distant learning in the form of various webinars, CMEs, monthly meetings, online quizzes! I am also glad to learn about the participation in huge numbers in these various events. The editorial board has done an excellent job in promoting the status of the bulletin by including original articles. These bulletins are very helpful to our young residents to keep themselves updated with the latest evidence based practice in the field.

The current issue is in line with AOGD theme for 2021-2022 - "**Promote women's health by strong will and quality skill**". Laparoscopy is an art with a long learning curve. So it becomes imperative that those who are skilled in this art impart the training to our future generations.

"**Minimal Access surgery**" has gained widespread use over the past several decades and is now the prevailing surgical approach within gynaecology through the utilization of hysteroscopy, cystoscopy, laparoscopy, and vaginal surgery. There is huge controversy on the use of morcellator, many surgeons in the west have stopped doing morcellation and prefer taking out specimen by little extension of laparoscopy port incision or through the vaginal route. In spite of the controversies regarding few procedures, laparoscopy offers a number of benefits to patients, including improved postoperative recovery and superior cosmetic outcomes, and is becoming an increasingly recognized essential skill for all gynecologists. Robotic surgery is a revolution in minimal access surgery. It provides better control to the surgeon, there is minimal blood loss, pain-free postoperative recovery and hardly any hospitalization is required.

The current issue covers all topics relevant to building the basics in laparoscopy including equipment knowledge, electrosurgical instrument use, abdominal access tips, and finishing with hysteroscopy and robotic basics along with an annexure on change in laparoscopy practices in COVID era.

Hopefully the bulletin resonates with consultants and residents alike and helps them with a better understanding of the field.

I congratulate committee members and editorial board for the good work done so far and wish them the best for the future. Stay safe and stay healthy.

A handwritten signature in black ink that reads "Sheila Mehra". The signature is written in a cursive, flowing style.

**Dr Sheila Mehra**  
Patron, AOGD

## From the President's Pen



Greetings to all

Let us celebrate our Independence Day with the colors of the Tricolor which symbolizes our freedom. Let us aspire to gain the strength (orange) to peacefully (white) accomplish all the designated tasks, so as to contribute in the growth of our nation (green). This year we have another reason for celebrating with acquiring seven medals in the Tokyo Olympics 2021. The athletes have personified the best of skill, teamwork and dedication. The medals won have certainly made the nation proud and elated.

Our Delhi team has also won laurels by being declared winner from North Zone in the breast feeding week celebration events. The preparations for Annual conference have begun, registration forms, competition paper, free paper and poster forms are out, so just click and register on line

Through this issue on "**Basics in Minimal Access Surgery**" we have accessed an area which is a must know area for anyone venturing into minimally invasive surgery. The foreword to this issue is aptly given by the pioneer of gynecological endoscopy Dr Sheila Mehra.

The journal scan has brought forth important issues being researched currently. The authors have worked hard immensely on their manuscripts to provide an immaculate review on the topics and must be congratulated for their efforts. I hope this bulletin maintains the momentum gained as adjudged by your response to our previous edition and keeps you gripped. The prospects of improving will be enhanced by your comments and suggestions

***"Independence is loyalty to one's best self and principles and this is often disloyalty to the general idols and fetishes."- Mark Twain***

**Dr Achla Batra**  
President, AOGD (2021-2022)

August 2021, Monthly Clinical Meeting has been Postponed to 3<sup>rd</sup> September 2021, due to Annual NARCHI Conference.

## From the Vice-President's Pen



Dear Friends,

Warm wishes to all of you from the pen of Vice President AOGD and a very Happy Independence Day!

We are immensely satisfied to see the active participation of all our Members in the activities of AOGD. Last month saw the celebration of the World Population Day and the enthusiasm with which you all conducted the activities and events to commemorate this important day was really heartening.

We hope that you are all enjoying the power packed AOGD Bulletins which are being tirelessly compiled and edited by Dr Rekha Bharti and the Editorial Teams. This issue brings for you another very important and contemporary topic- **"Basics in Minimal Access Surgery"**.

Knowledge is power; so, keep Reading and assimilating these gems which have been contributed by stalwarts in their fields.

Stay well and safe

***Knowledge grows exponentially. The more we know, the greater our ability to learn, and the faster we expand our knowledge base. -Dan Brown***

**Dr Jyotsna Suri**

Vice President, AOGD (2021-2022)

### Starting Soon

Hands-on Practical Workshop (3 hours)  
on **"Obstetrics Critical Care"** from October 2021.

Interested candidates to contact

**Ms Sarita**, AOGD Office: Mobile No- 9211656757

## From the Secretary's Desk



Warm greetings to all !

I once again thank our AOGD members for their constant support and appreciation for all our endeavours.

After successful celebration of World population fortnight in July, we embarked upon August month with a bang in celebrating '**World Breastfeeding week**'. And, I am glad to share with all AOGD members that **Delhi Society stood first in North Zone** in a nation-wide competition held by **FOGSI** regarding fruitful activities conducted in this week. I want to convey my heartfelt thanks to all those who contributed to make it possible for us.

Apart from all our continued scientific activities of webinar CMEs and public forums, we have also been able to reach out to our most precious **YUVA Members** i.e. postgraduates from various institutes of Delhi. We have specially constituted an "**AOGD PG Forum**" which will cater to comprehensive academic case specific discussions for postgraduate students from various institutes, facilitated by eminent faculty from teaching institutes across Delhi. In the well-designed schedule on monthly basis, residents can keep abreast with the latest evidence based knowledge in field of Obstetrics and Gynaecology.

As regards this month's bulletin, I congratulate the editorial team for yet another interesting and useful issue on "**Basics in Minimal Access Surgery**". It aptly covers all the basic principles of laparoscopy, hysteroscopy and Robotic surgery. Various aspects of laparoscopic instruments and electro-surgical energy devices used in current times have been comprehensively described to benefit our budding endoscopic surgeons. I am sure these practical tips and latest evidence on basics of endoscopic surgery will be thoroughly useful for our readers.

Happy reading,



**Dr Monika Gupta**  
Secretary, AOGD (2021-2022)

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## From the Editor's Desk



Greetings from the editorial board!

We welcome you all to the fourth issue of AOGD bulletin. The theme of this issue is **"Basics in Minimal Access Surgery"**. Minimal access surgeries have the advantage of shorter hospital stay, early postoperative recovery, less pain which means lesser need for analgesics and early return of activity in addition to better cosmesis. The complication rate is less than that with open surgery but when complications happen they are more severe. Therefore, it is important to have in-depth knowledge of this surgical technology.

We are grateful to **Dr Sheila Mehra** for taking out time from her busy schedule and writing the foreword for this issue. In order to extend maximum benefit of this technology to the patients, it is important to know the **"basic principles of the laparoscopy"**. Major complications can be avoided if the surgeon has in-depth knowledge of **"Laparoscopic Equipments"**, **"Principles of Electrosurgery"** and **"Laparoscopic Instruments and Energy Devices"**. Entry into the abdominal cavity can be difficult and risky in patients with previous surgical scars, **"Tips and Tricks of Abdominal Access in Laparoscopy"** can help preventing major complications and help in smooth completion of the procedure. **"Robotic surgery Assisted Laparoscopic Surgery"** is a newer advancement in the MAS that provides better control to surgeon with less dependence on the assistants for focusing the operative field. It has further reduced the blood loss during complicated surgeries and reduced the duration of hospital stay. Due to the introduction of liquid distention medium and improvement in the visual resolution many diagnostic and therapeutic procedures can be performed using hysteroscope. Knowledge of **"Basics in Hysteroscopy"** allows completion of many procedures and decreased need for hysterectomy.

Along with two original articles, an informative section on COVID-19 Mitigating the 3<sup>rd</sup> wave in India: Adapting to New Norms is added.

Hope you enjoy reading this issue!

**Dr Rekha Bharti**

Editor, AOGD (2021-2022)  
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# Basic Principles of Laparoscopic Surgery

Kanika Jain<sup>1</sup>, Ila Sharma<sup>2</sup>, Kajal Baleja<sup>3</sup>

<sup>1</sup>Senior Consultant, Gynae Endoscopic and Robotic Surgeon, <sup>2</sup>Associate Consultant, <sup>3</sup>Postgraduate Student

<sup>1,2</sup>Gynae Minimal Access Surgery Unit, Sir Gangaram Hospital, <sup>3</sup>VMMC & Safdarjung Hospital

Laparoscopic surgery was first introduced by a Gynaecology surgeon and later adopted by other surgical branches. Still, most Gynaecologists are not comfortable with Laparoscopic surgeries. One should know the advantages of Laparoscopic surgeries over open surgery and always remember their principles to stay motivated so to accomplish the maximum number of surgeries via minimal access approach.

## How is Laparoscopy different from Open Surgery?

Laparoscopy involves different ergonomics and needs different kinds of training. It requires fine-tuning of faculties for good Hand-eye coordination. However, it is time-consuming and requires a lot of patience, physical stamina, and extra precautions. It is associated with an absence of tactile feel and depth perception. Moreover, the art of endosuturing needs to be mastered. Another advantage is its expensive nature and a long learning curve.

The success of Minimal Access Surgery (MAS) is laid on a foundation of a team-based approach. Complicated procedures are performed with complex equipment that requires constant maintenance. In addition, during a procedure, multiple intraoperative adjustments of the equipment (e.g. camera, monitors) are required which demand a skilled and collaborative theatre team working in a coordinated fashion to ensure patient safety and excellent outcomes.

Increasing familiarity with the laparoscopic approach has led to its use in many situations that were previously considered as contraindications to MAS. Minimal access surgery aims to decrease the anatomical, physiological and psychological trauma to the patient. In recent years, patient expectations have increased with the new technology which has led to profound changes in patient selection, consent, and management.

**Physiological consequences of Laparoscopic surgery** are secondary to mechanical effects of pneumoperitoneum, increased intra-abdominal pressure, chemical effects of CO<sub>2</sub> insufflation, head

low/ Trendelenberg's position, lower limb ischemia, and prolonged operative timings.

## Advantages and Disadvantages of MAS

### Advantages

1. One of the most important advantages of minimum access surgery is improved diagnosis.
2. It allows a proper magnified view of the operative field for the whole surgical team including trainees and students.
3. It requires smaller incisions and hence is associated with lesser postoperative pain and disability.
4. There is less incidence of wound infection due to an anti-bacterial acidic internal milieu (CO<sub>2</sub> used for pneumoperitoneum gets converted into carbonic acid and decreases the pH of the peritoneal cavity to 5), lesser secretion of immunosuppressant-CRP and IL6 from damaged tissue due to minimal tissue destruction and faster metamorphosis and transmigration of single layer peritoneum (completed in 100 hours) in laparoscopy than in open surgery (300-400 hrs).
5. Decreased chances of contact with pathogens such as human immunodeficiency virus (HIV) and hepatitis B virus (HBV) for the surgical team.
6. Fewer chances of adhesion formation and paralytic ileus as the port wound is away from the target wound, peritonisation (single layer) occurs within 100 hours and optimum humidity is maintained due to an interior milieu.
7. Early mobilization in the postoperative period, significantly reduced hospital stay and three times faster return to work due to lesser pain secondary to small port wounds improves overall cost-effectiveness.
8. Video recordings aid in communication with patients and their families and can be reviewed anytime.
9. Other advantages include decreased chances of hernia and improved cosmesis.
10. It is the preferred mode of surgery in retrovirus-

positive patients, Sick cell anemia, hepatic cirrhosis, and ectodermal dysplasia.

### Disadvantages

1. Loss of tactile feedback from tissues and instruments.
2. Potential difficulty in controlling major bleeding may be associated with a rapidly deteriorating visual field.
3. Long procedure timings, especially during initial learning curves.
4. Requirement for specialist instrumentation and appropriate surgical skills.
5. Greater potential for iatrogenic damage either through surgical disorientation (e.g. ureteric injury) or unrecognized visceral injury (e.g. electrical or thermal injuries).
6. Relatively expensive.
7. Technically difficult especially in inexperienced hands.

### Contraindications to MAS

- Severe Chronic Obstructive Pulmonary Disease (COPD) and cardiac diseases- Pneumoperitoneum causes a decrease in venous return to the heart, decreases the respiratory minute volume and tidal volume leading to hypercarbia and secondary bradycardia as it stimulates the cardiac inhibitory center. These factors can precipitate and worsen cardiac disease and COPD.
- Grade 2 and grade 3 shock.
- Generalized peritonitis-
  - Cardboard rigidity cannot be resolved using muscle relaxants and forceful trocar insertion may result in bowel perforation.
  - Poor visualization of the field.
  - More chances of hypercarbia- Inflamed peritoneum is congested and hyperemic which increases CO<sub>2</sub> absorption resulting in hypercarbia.
  - Fibrous exudation may cause inter-bowel loop adhesions.
  - Increased chance of septicemia and bacteremia.
- Hyper/hypocoagulable states: Chances of bleeding(uncontrolled) and deep vein thrombosis increases with MAS.

### Points to Remember

- 'Expertise comes with Experience'
- Better to learn from other's mistakes than your own.

- Good knowledge of pelvic anatomy is a must.
- No escape from learning endosuturing- It is a must.
- Learn from seniors step by step.
- Do not jump to operate. Be a good assistant first.
- Follow your learning curve at your own pace. Seek perfection and not speed.
- Have a sound knowledge of Energy sources so that they can be an asset and not a risk factor.
- Energy sources should always be kept under vision.
- Stay focused on the monitor.
- Teamwork is very important.
- Masterly inactivity of Assistant- Do just as asked.
- Never hesitate to call for help.
- In high-risk cases, take an experienced surgeon with you to expedite surgery and prevent complications.
- Operate comfortably and maintain good ergonomics
- Always respect tissues.
- Dissect parallel to tubular structures.
- Try to identify complications within the theatre.
- Identify and dissect in the correct plane. Fat never belongs to the uterus whether anteriorly or posteriorly.
- The light in Operation theatre should be kept at a minimum.
- The art of maintaining a good endoscopic eye-avoid touching viscera by the tip of the telescope; Prevent leakage of CO<sub>2</sub> from the cannula ports; Insufflator cable should not be attached to the camera port.
- Prevent fogging of the telescope- Use an antifogging device, warm the telescope, clean the scope with betadine or use a CO<sub>2</sub> warmer.

### Ergonomics of Laparoscopy

Ergon means labor, nomog means natural law. Ergonomics means knowledge concerning the law of human labor.

Ergonomics are a crucial aspect of Endoscopic surgeries especially laparoscopy, because laparoscopy may prove detrimental to the physical health and long-term wellbeing of surgeons if proper ergonomics are not followed. It is all about Equipment, Environment, and Efficiency.

Drawbacks of laparoscopic surgery when not using proper Ergonomics include development of Carpel tunnel syndrome, eye strain/dry eyes, cervical spondylosis, shoulder pain, trapezitis, thenar neuropathy, Neck pain, fatigue, cardiovascular stress, surgical fatigue syndrome, mental exhaustion leading to irritability, impaired surgical judgment, reduced manual dexterity, more static posture and accumulation of lactic acid and toxins in muscle and tendons.

**Table 1:** Difference between open and laparoscopic surgery

Open surgery	Laparoscopic surgery
• Faster	• Slow & fine
• Hand feel is as good as eyes	• Stop when you don't see
• Ergonomic is optional	• Ergonomics is vital
• Work in line with the visual axis	• View is not under the control of surgeon. Magnification is inversely proportional to the field size.
• 3-D image	• 2-D image (No depth perception)
• Force transmitted is 3:1	• Force transmitted is 1:3 from handle with a hand-held haemostat to tip. Six times more force required.
• Fulcrum effect is absent	• Fulcrum effect is present (Tremors are enhanced)
• Degrees of freedom 36	• 4 in laparoscopic surgery and 7 in Robotic surgery
• If the surgeon says, 'Come closer' it means to move closer to the operating field	• It means to 'Zoom in'

### Ideal Laparoscopic Angles (Figure 1)

The **azimuth angle** is the **angle** between the instrument and the optical axis of the endoscope. The **elevation angle** is the **angle** between the instrument and the horizontal plane. **Manipulation angle** is the angle formed between the tips of two operating instruments. Manipulation angle of 90 degrees has maximum muscle workload by Deltoid and Trepezus. Manipulation angle of 30 degrees should have elevation angle of 30 degrees for better ergonomics. Correct port placements can maintain proper angles. (**Ports should be placed as per surgeon's convenience**).

### Ideal Relaxed Position (figures 3,4,5)

Ideal position while performing laparoscopy

- Head straight on the axis of the trunk.
- Shoulders relaxed in neutral positions.
- Arms alongside the body.
- Forearms in horizontal or slightly descending axis.
- Hands pronated.
- Grip the instruments with the hand-piece resting on the palm with fingers lightly gripping the handles when required (to avoid thenar neuropathy).
- Comfortable positioning of foot pedals as per the surgeon's choice.

### Why is Ergonomics More Important in Laparoscopic than Open Surgery?

- **Lack of Tactile Feedback** -Laparoscopy takes away much of the tactile sensation surgeons are intuitively conditioned with open surgery.
- **Two-dimensional Vision** resulting in limited depth perception
- Most laparoscopic cameras often do not display the true color of tissues that surgeons rely heavily on during open procedures.
- **Long graspers** maneuvered through trocars get substituted for the surgeon's hand and this reduces efficacy and increases the time of dissection.
- **Fulcrum Effect of Instruments** where the surgeon has to train their mind to map movement of their hand in one direction to the movement of the instrument tip in the opposite direction results in a steep learning curve as well as continued physical strain.
- **Decoupling of Visual and Motor Axis** - In laparoscopic surgery one has to overcome the spatial separation of the axis of vision and the axis of the physical aspect of the procedure.
- **Decreased Degrees of Freedom of Movement**- Compared to the high degree of freedom available in open surgery due to the utilization of the human wrist and fingers, laparoscopic surgery has only 4 degrees of freedom. This greatly decreases the efficiency of surgical maneuvers and poses an ergonomic risk.
- **Static Posture**- More pain is caused due to the fact that muscles and tendons build up lactic acid and toxins when held for prolonged periods in the same posture.
- **The poor ergonomic posture** adopted by surgeons during the procedures can result in pain in the back, neck, and shoulders and, in turn,

injury. Additionally, during laparoscopic surgery, the upper limbs are frequently positioned in an excessive excursion or abduction in order to use the long laparoscopic instruments, which further creates additional musculoskeletal stresses compared with the equivalent open surgical procedure.

- **Crowding in OT, Floor Space & Poor Cable Management-** If the OT is small to house all the Laparoscopic equipment, it can increase the chances of potential injury to the surgical staff and surgical inefficiency.
- Laparoscopic instruments work on **reduced efficiency**. For example, the laparoscopic grasper transmits force with a ratio of only 1:3 from the handle to the tip as compared to 3:1 with the hand-held haemostat. Hence, a laparoscopist has to work six times harder for similar results.

## Optimizing the Environment & Overcoming Ergonomic Challenges

The goal of adjusting ergonomics during laparoscopic surgery is to ensure proper comfort, the efficacy of the movements and minimize musculoskeletal injuries to the surgeon.

The factors affecting the ideal ergonomic posture of the surgeon are:

### 1. OT Table Height (Figure 6)

Similar to open surgery, the recommended **angle at the elbow joint should be between 90 to 120 degrees**. The height of the table should be adjusted in such a way that laparoscopic **instrument handles are slightly below the level of the surgeon's elbows**. The operating surface height is raised by the insufflation of carbon dioxide. The ergonomic **operating surface height (HO)** should lie between **70% and 80% of the surgeon's ground to elbow distance (HE)**.

### 2. Monitor position

- The monitor is often placed on top of the laparoscopy tower and is mounted to it, limiting the possibility for any adjustment. It should be placed **directly in front of the surgeon in the horizontal plane and also in line with the forearm-instrument motor axis**.
- In order to avoid neck extension, the most ideal viewing direction is approximately **15 to 25 degrees downward**.<sup>2</sup> Viewing distance is highly dependent on the monitor size. Van Det

et al suggested a **distance of 80-120 cm** to avoid excessive accommodation, convergence and staring. It should be far enough to avoid extensive accommodation of the eyes and contraction by the extraocular muscles, and close enough to avoid eye staring and loss of detail. The monitor, target quadrant and the surgeon should be in a same axis for maximal ergonomic posture. A **Second monitor for assistant** reduces strain on neck

### 3. Foot Pedals and wires

- In laparoscopic surgery, foot pedals are normally utilized to control diathermy equipment. Poorly positioned foot pedals may result in instability of the surgeon's posture. The wires of all Energy devices, their foot pedals, suction and irrigation tubings should be tucked on the surgeon's side of the table and the Urobag, light cable, camera cable and insufflator tubing should be placed on the assistant's side.

### 4. Laparoscopic Port Placement (Figure 7)

- There is no universal consensus about placement of ports for advanced laparoscopic procedures. The placement of ports is currently determined by the **surgeons' preference** based on individual experience. Placement of trocars in a triangular fashion facilitates smooth instrument manipulation along with adequate visualization during laparoscopy. This port placement technique is called 'triangulation'. **The target organ should be 15–20 cm from the centre port used for placing the optical trocar**. Ideally, the two remaining trocars are placed in the same 15–20 cm arc at a distance of 5–7 cm on either side of the optical trocars. This allows the instruments to work at a 60°–90° angle with the target tissue (angle between them should not be less than 30 degrees). This way the instrument would be half to two-third inside the peritoneal cavity. This method of placing the ports minimizes instrument interference, creates less strain to the surgeon and gives them a comfortable position to perform the surgery. When necessary, traditional retracting ports can be placed in the same arc but more laterally, to ensure that the instruments do not clash.
- Trocars should be placed **without tunnelling** into the abdominal wall to avoid strain to the surgeon and muscular pull and bruising over the patients' abdominal wall.

## 5. Choosing Laparoscopic Instruments which:

- Enable the surgeon to keep **wrist in neutral position** and not in a bent position
- Permit surgeon to keep both arms at the side of their body
- Avoid pressure point on the hands
- Allow surgeon to **apply force with a powerful grip when required**

### How to hold the instruments?

#### The 'in-grip method' and 'over-grip method'

- In the 'in-grip method' the thumb is placed in the back-hole, the ring finger is placed in the front hole, the index finger rotates the wheel and the little finger opens and closes the ratchet.
- In the 'over-grip method' the back hole rests over thenar eminence and the four fingers wrap around the front hole. It is less tiring than

the finger-in-ring grasp since it significantly reduces the muscle force required to grasp an instrument and avoid strain on thenar eminences and teno-sinovitis.

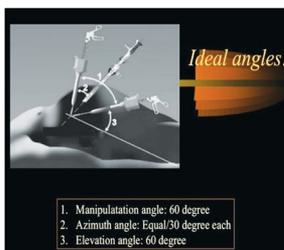
Hence, all instruments should be held gently with the 'over-grip' method till dissection or suturing is required.

Laparoscopic instruments with axial handle lead to a more ergonomic posture for the wrist compared to a ring handle.

- 6. Arm Support** A study reported that support of the shoulder, elbow and wrist significantly improves the accuracy of laparoscopic manipulations<sup>4</sup>.

#### 7. Integrated OR & Cable Management

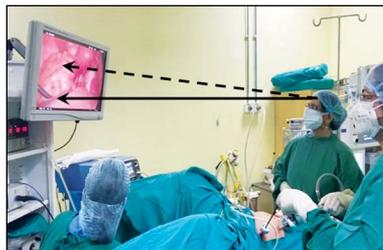
When possible, it is recommended that the OT equipment be ceiling boom-mounted, enabling easy and versatile positioning of monitors relative



**Fig 1:** Ideal laparoscopic angles



**Fig 2:** Azimuth Angle



**Fig 3:** What is wrong in this? - The Surgeon's gaze is 25-30 degrees upwards from horizontal plane

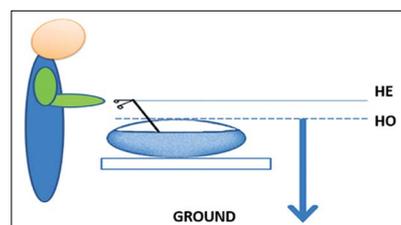
\*Don't be hasty when it comes to ergonomics and safety



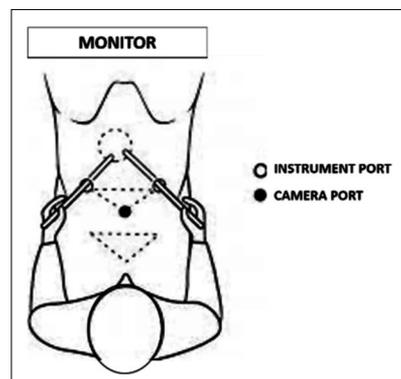
**Fig 4:** This is the correct angle of gaze- 15-25 degrees downwards from horizontal plane



**Fig 5:** Extremely torted neck of 2nd assistant. Very poor ergonomics



**Fig 6:** OT Table adjustments



**Fig 7:** Port placement

to the operating team with no trailing cables on the floor.

**'Ergonomics: Because prevention is better than cure'**

## Summary

- Laparoscopic surgery is highly beneficial for patients with reduced post-operative pain and faster recovery but is more demanding for a surgeon.
- Over the years, the high technological complexity and at times poorly adapted equipment and environment have led to alarming complaints of fatigue and discomfort from surgeons during laparoscopic surgery.
- Promoting better understanding of ergonomics can not only make the work of a surgeon more comfortable in the operating room but also reduce physical strains on the surgeon, avoid long term musculoskeletal injuries and increase productivity intraoperatively.

**"One Should Take Tips from Experts, Learn from Other's Mistakes, Adopt Tricks of Experienced Endoscopists and Carve One's Own Learning Curve to Perfection"**

## Suggested Reading

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### Winners of Contraception Quiz Held on 21<sup>st</sup> July, 2021

**1<sup>st</sup> Dr Sana Ansari**

Lady Hardinge Medical College & Smt Sucheta Kriplani Hospital

**2<sup>nd</sup> Dr MDS Vathsalya**

Vardhman Mahavir Medical College & Safdarjung Hospital

**3<sup>rd</sup> Dr Parul Jaiswal**

All India Institute of Medical Sciences, Delhi

# Laparoscopic Equipment: Know the Stack

**Neema Sharma**

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Minimally invasive surgery was introduced as early as 1901 but due to the lack of adequate light sources the progress in the laparoscopic surgery has been limited to date. Improvement in the laparoscopic devices is responsible for rapid advancement of minimally invasive surgery. In this article a brief description of laparoscopic devices is presented.

## Endo Cart

It is a stand which has a space for necessary equipment used in endoscopy. It has a monitor, a light source, a camera head processor, an insufflator, an electrosurgical unit, an irrigation suction device and a video recording system (Figure 1)

## Monitor & Camera

With the advent of highly sensitive television cameras, endoscopy is revolutionizing. Traditionally we had been using conventional full HD imaging systems. The new LCD Monitor provides four times more information than the conventional full-HD imaging systems (Figure 2). In recent years 4K resolution monitors and Televisions have become increasingly common as they have a resolution four times higher than the standard full HD.

Because 4K resolution is four times denser than the full HD resolution, small objects such as sutures and blood vessels which are blurry on full HD, will appear much clearer with a greater depth perception on a monitor of similar dimension. Furthermore, because the pixel size is reduced, individual pixels are not seen even when the monitor is viewed closely. This means that where a full HD monitor can only be comfortably used at a distance, a 4K monitor can be comfortably viewed at much closer distances without noticing individual pixels.

Cameras may either be 'single-chip' or 'three-chip'. Each coupled device in a single-chip camera is arranged in groups of three so that one will be sensitive to red, one to blue and one to green stimuli. A three-chip camera does not split the incoming light into three primary colours and each chip builds a more accurate composite picture of the colours than the image built up by a single-chip camera.

The camera includes the camera head with its cable and the camera control unit (CCU) or camera controller) (Figure 3). Camera head has buttons to perform white balancing, zooming, picture taking which activates the video printer and the video recording device. Most cameras have an automatic iris control and a manual focus. Unfortunately, the quality of the image is reduced greatly if there is a significant quantity of blood in the operative field. It is therefore important to aspirate blood to improve the view and reduce light absorption.

The clarity and detail of the video image depends on the number of horizontal lines of resolution, which are detected by the number of distinct vertical lines seen in a picture. Resolution is set forth by the cameras pixel count and by a formula used to achieve the resolution number. Companies are constantly working to improve the resolution and pixel count. Each line of resolution is composed of pixels, and the more the number of pixels per line, the better is the image.

## Light Source and Light Cord

All internal body cavities are completely dark and require high levels of illumination. The majority of laparoscopies use a 300 watt Zenon light source, which is transmitted to the endoscope along a fibre optic cable, which is vulnerable to breakage, Figure 4. The end of the light cable becomes very hot when used and should not be placed in direct contact with the patient or the drapes. Light is lost during transmission from the light source to the tip of the laparoscope. 7% of the available light is lost at every glass air interface.

The light cord is as important as a high resolution camera and a precision scope. If light does not move properly from the light source to the scope through the cord, the value of the camera is limited and images are poor. Light cords are either fiberoptic or liquid filled. Fiberoptic cables are available in varying lengths (6, 8 and 10 ft) with a little light loss. Light cords are fragile and should not be wound up into small bundles. Liquid -filled light cables transmit more light and are more durable than the fiberoptic cables. However, they are more expensive

and produce more heat at a standard 6 ft length.

Many light cords have a clear sheath, through which breaks in the light cord can be seen. This can help the surgeon and operating room staff to know if the light cord needs to be replaced.

## Insufflator

A pneumoperitoneum must be created so that the organs and tissues are separated from each other and rendered accessible to surgery. In surgical laparoscopies compensation for considerable volume losses of CO<sub>2</sub> must be made in a relatively short period of time, for example during frequent suctioning of irrigation solutions using high performance irrigation/aspiration units. High flow CO<sub>2</sub> insufflators are a basic prerequisite for surgical laparoscopy, as they offer an option to reduce operating timings to minimum (Figure 5).

The insufflator's display, which the surgeon should always be able to see, gives continuous information on the following data:

1. The patient's intraabdominal pressure (the actual value). The pre-selected maximum intraabdominal pressure should never exceed a value of 15 mmHg.
2. Flow rate: The required set value for the patient's intraabdominal pressure must be pre-selected. The maximum flow rate (set value) must be pre-set.
3. Total CO<sub>2</sub> insufflated volume
4. Gas reserve

Some of the state-of-art insufflators are equipped with an integrated preheating element which keeps the insufflated gas at body temperature to prevent the patient from cooling down. They also prevent endoscope fogging. A moisturizing system may be added to prevent dehydration of the pneumoperitoneum and subsequent postoperative shoulder pain.

## Electrosurgical Equipment

Electrosurgical units (ESU) are key pieces of equipment in endoscopy suites required for achieving haemostasis during the surgery (Figure 6). They create high frequency, alternating electric currents for both cutting and coagulation. An ESU should include mono and bipolar generators with all the necessary attachments and instruments. Safety feedback circuits are mandatory to prevent

intraoperative thermal injury to the patient.

It is important to test the bipolar instruments before the operation. Several types of bipolar forceps are available. Fine tips are used for coagulating small blood vessels during delicate handling of the tubes, bowel and ureter. Flatter jaws are appropriate for usage on large blood vessels or pedicles, including the uterine artery and the infundibulopelvic ligaments. The main advantage of bipolar energy over monopolar energy is that the bipolar energy has a more controlled spread and grounding of the patient is not necessary. The thermal spread of bipolar forceps has been reported to be between 2.0 and 3.5 mm when sealing arteries and 4.0-6.0 mm when sealing veins.

New plasma coagulators have become available for the treatment of superficial endometriosis. New development in Bipolar technology have now produced a new generation of bipolar generators that can safely coagulate large pedicles (Ligasure).

## Suction / Irrigation Units

Within the framework of diagnostic and surgical laparoscopy, it is often necessary to drain fluids and irrigate wound surfaces until they are clean and can be viewed adequately. In addition, good suction will allow a "smoke free" and clear operating field. Sometimes, effective irrigation can also be used for adhesiolysis (hydrodissection). Suction is performed either with an additional suction pump or by means of a central vacuum supply system. It is important that these solutions are used at body temperature.

## Morcellator

In the past, laparoscopic surgeons were faced with difficulty of extracting tissue from abdomen and were often obliged to perform a suprapubic mini laparotomy or a transvaginal extraction for the same.

In collaboration with Storz, R Steiner developed the electromechanical morcellator consisting of a motor driven cutting tube. Now it is possible to extract even large amounts of tissue from the abdomen using 11 mm trocar in a short period of time (Figure 7). With the 15 mm and 20 mm trocars, large quantities of tissue can be extracted even faster. Because of the good cutting quality of the rotating morcellator, the tissue structure is minimally damaged and it enables a reliable histological examination to be carried out.

Morcellators have been developed in reusable (Karl



**Fig 1:** Endo Cart



**Fig 2:** LCD (LED) Monitor



**Fig 3:** The camera control unit (CCU) & the camera head.



**Fig 4:** Karl Storz Xenon light source



**Fig 5:** CO<sub>2</sub> insufflator, 20 Litres High Flow



**Fig 6:** Electro-surgical units



**Fig 7:** Morcellator

Storz) and disposable forms (Gynecare-Johnson and Johnson).

The surgeon must be aware of the location and advancement or retraction of the blades at all times while using a morcellator. Thorough examination of tissue to be morcellated is necessary to ensure that no bowel or other unintended tissue is trapped within the grasper. Morcellation should be avoided in cases of confirmed or suspected malignancy. Furthermore, care must be taken to remove all tissue pieces, as cases of iatrogenic parasitic fibroids, endometriosis and even disseminated leiomyosarcoma have been reported following morcellation during hysterectomy and myomectomy.

## Telescope

Telescopes used in laparoscopy are available with different viewing directions, either with or without an instrument channel. Telescope without instrument channels are used in the majority of cases as they give a better overview and offer better image resolution.

1. 0° Straight-Forward Telescope- These telescope have the greatest application range as they facilitate correct orientation and convey an impression of the area inspected.
2. 30° Forward-Oblique Telescope- These can be rotated to enlarge the field of vision. They are particularly advantageous while dissecting in the Douglas pouch. They can be 5 mm or 10 mm telescopes. The 10mm telescope provides a better optics. A Hopkins rod lens system with the

laparoscope shaft harbouring quartz rods with concave ends provides excellent clarity. Modern high definition systems are currently available in the market. They have excellent picture quality

### 3. 45° Telescope

## Harmonic Scalpel: Ultracision (Ethicon Endo -Surgery)

The fully equipped endoscopic suite should have a harmonic scalpel available. It is complimentary to the electro-surgery.

## Equipment Problems and Troubleshooting

Once all the components of the endoscopic system have been connected and plugged in, the surgeon should verify that the picture on the screen is present and is clear. If that is not the case, the following steps will reduce chances of unexpected events.

1. Look at the monitor, check the buttons, turn on the light source, and check the light cord for damaged light bundles.
2. Look through the scope before it is hooked up and illuminated because light hides defects.
3. Hold the scope with the distal end pointed at a normal ceiling light and then look through the eyepiece to ensure the scope is clear.
4. Check both the distal end and the eyepiece for cracks or other visible damage.
5. Do the white balance

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If a problem with the image occurs during an operation the scope should be checked initially, followed by the light cord, and lastly the camera. If the picture is poor, colour and light levels should be examined to search for the cause. If there is no picture, the operator should be certain that the light source is turned on. If none of the preceding steps can solve the problem, the camera should be detached from the scope and focused on an object in the room. If the picture is good, the camera is functioning properly then the scope or the light cord is at fault. If the picture is poor, the camera may

be defective or the lens may be fogged, a button on the CCU may have to be changed, or a new camera may be required.

An organized and well-equipped operating room is essential for successful laparoscopy and makes the surgeon comfortable.

### **Suggested Readings**

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AORN Recommended Practices for Electrosurgery, 2003.

# Principles of Electrosurgery

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## Introduction

The origin of electro-surgery dates back to 1877, when P. Bozzini described the construction of a device for electro-cauterization. In 1928, Bovie organized a production of electrosurgical equipment and described three different effects of this energy type: desiccation, dissection, and coagulation, which led to the establishment of fundamentals in modern electro-surgery and converted diagnostic laparoscopy into operative.<sup>1,2</sup>

## Principles of Electro-surgery

In electro surgery, heat is generated in the tissue by the flow of radio frequency (RF) electric alternating current. The frequency used in the electrosurgical generator is very high (range of 300 to 500 KHz) than what is used in the domestic electric circuit. This high frequency doesn't give electric shock because such high frequency (above 100 KHz) ceases to stimulate the neuromuscular junction. When the RF electrical energy is made to concentrate in a very small area by applying the energy through a pointed or hooked tool tips, the resulting high concentration of current flow in a narrow area increases the cellular temperature leading to various effects on the tissue including coagulation, desiccation or dehydration and carbonization depending upon the waveform used.

## Understanding The Waveform

The tissue response is determined by the type of waveform used. A proper knowledge of the waveform is a must for adequate outcome during surgery. There are three main waveforms used in electro-surgery: Cutting, coagulation and blend. The

electro-surgical generator has 'cut', 'coag' and 'blend' settings.

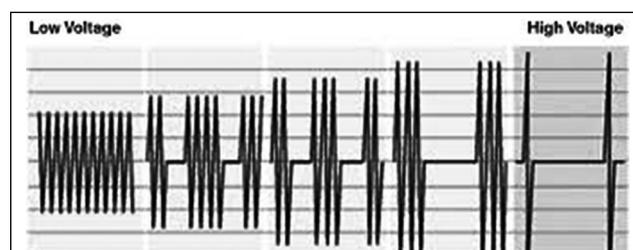


Fig 1: Different types of waveform

### A. Cutting Waveform

Cutting waveform is sinusoidal, unmodulated and utilizes high frequency continuous current with minimum voltage. This leads to a sudden rise in temperature (over 100°C) resulting in vaporizing of intracellular fluid, generation of a steam bubble and finally rupture of cell membranes which causes cutting of tissue with great precision. The depth of tissue necrosis with this waveform is minimal due to negligible coagulation effect, thus causing minimal smoke production.

### B. Coagulation Waveform

Coagulation waveform is low frequency, high-voltage, modulated current with periods of activation and de-activation. In between the intermittent bursts of current, heat dissipates into tissues, causing alteration of cellular proteins. A temperature of 60°C to 95°C results in protein denaturation, dehydration and finally leads to coagulum formation. The heating effect is wide with considerable tissue damage, as almost all the electrical energy is delivered to the tissue by direct contact. Thus leading to more smoke production when compared with cutting waveform.

Table 1: Different types of available energy sources and tissue effect produced by them

Type	Examples	Tissue effect
Monopolar		Vaporization, fulguration, desiccation, coaptation
Bipolar		Desiccation, coaptation, tissue transection
Ultrasonic technology	Ultracision harmonic scalpel, Harmonic ACE,	Desiccation, coaptation, mechanical tissue transection
Hybrid device	Thunderbeat	
Laser energy	Nd: YAG laser, Argon laser, CO2 laser	
Argon beam coagulator	System 7550TM ABC, Cardioblade	

### C. Blended Waveform

A blended waveform is a modification done to the cutting waveform for situations wherein haemostasis is needed along with cutting. It consists of a combination of both cutting and coagulation waveforms. Blend settings can be customized to deliver a combination of cutting and coagulation currents.

## Monopolar Electro-surgery

This is the most popular form of electro-surgical technique employed in laparoscopy due to its efficacy and versatility. The current from the generator passes through the active electrode, spreads through the body tissues and comes out of the patient's body through the return electrode and returns back to the electro-surgical generator, which completes the circuit.<sup>3-6</sup> The active electrode has a small surface area which causes a high current density production at its tip and the resultant tissue effect. This density of electrons diminishes with an increase in distance from the electrode. Current abandons the path of body tissue resistance, and flows down to the path of least resistance. A return electrode provides that path of least resistance to the current. It is recommended that the dispersion pad be attached as close to the surgical field as possible in order to reduce the length of the circuit. As the dispersion pad has a large surface area, the current density at the attachment site is low, therefore minimizing the risk of skin burns. As surgical scars, metal implants, hairs etc., increase the risk of burns, the dispersion pad should be carefully placed in a well perfused, dry and hairless area of skin. Latest electro-surgical generators have sensors to measure pad-to-skin contact and current density. So in case of any contact failure, the circuit gets interrupted, preventing the flow of current and thus avoiding any thermal injuries to the patient.

## Disadvantages of Monopolar Electro-surgery

The most dreaded complication with monopolar electro-surgical techniques is arcing of the current resulting in severe undiagnosed injuries. They can also result in extensive diathermy burns if the return electrode is not properly applied. Monopolar electro-surgical techniques can interfere with pacemaker function and care should be taken to avoid them in such patients.

## Bipolar Electro Surgery

In Bipolar electro-surgical devices, the active and return electrode are formed by the two jaws of the instrument which are in close proximity to each other unlike monopolar in which current travels through patient body. As current passes between tips of the instrument, it only affects tissue grasped between the electrodes. Bipolar is relatively safe and more useful as compared to monopolar as it causes minimum collateral spread; reduced risk of interference with other devices and better coagulation<sup>7</sup>. The disadvantage of using conventional electro-surgery are that it cannot cut the tissue and requires more time to coagulate, therefore causing more charring and adherence of tissue. This may lead to tearing of adjacent vessel and more bleeding. These shortcomings were overcome by advanced new generation bipolar and ultrasonic.

## Advanced Bipolar Devices

Newer Bipolar devices combine the principle of thermo-fusion, with application of optimal mechanical pressure to ensure that the denatured protein forms a coagulum and a strong seal is achieved. Large vessels, up to a diameter of 7 mm, and large tissue bundles can now be surgically sealed.

Advanced electro-generators are available which sense tissue impedance and automatically stop the current flow when adequate sealing is achieved. This guards against prolonged device activation, decreases tissue charring and tissue adherence to the instrument. It also reduces lateral spread of current, which makes these devices extremely safe to use, especially in pelvic dissection.

## Advanced Bipolar Devices

Both are advanced bipolar devices with tissue feedback mechanism. One of the main differences between them is that Enseal is articulating. It can bend up to 66 degrees. This is extremely helpful, especially for ipsilateral surgeons while sealing big vessels on the opposite site.



**Fig 2:** Enseal (Ethicon Endo-surgery, US, LLC)



**Fig 3:** LigaSure Vessel Sealing Technology (Medtronic)

## Ultrasonic Devices

The harmonic scalpel is a surgical instrument that uses ultrasonic vibrations to cut and cauterize tissue. The mechanical vibrations are produced by the piezoelectric transducers embedded in the tools which convert the applied electrical energy to mechanical vibrations which are then transferred to the active blades for cutting or coagulation.

The system typically is composed of a hand-held ultrasonic transducer, generator, hand switch, foot pedal, and scalpel that serve as the cutting instrument. Whereas a Surgical diathermy performs its action via an electrical current, the Harmonic scalpel cuts via vibration. The scalpel surface cuts through the tissue by vibrating in the range of 20,000 Hz to 60,000 Hz, and seals it using protein denaturisation, instead of heating.



**Fig 4:** Harmonic Ace 7+

## Harmonic [Ethicon, Johnson & Johnson, Us, L.L.C.]

The Harmonic Scalpel Shears was introduced in 1998 (Fig. 4). It is a hemostatic scalpel which works at a temperature of 50 to 100°C to tamponade blood vessels and seals it with a protein coagulum. The original shears could coagulate vessels up to a diameter of 5 mm. It can also be used for fine dissection and cutting of tissue simultaneously. Harmonic Shears have minimal lateral spread of current which allows the instrument to be used in areas where lateral spread can be critically damaging to tissues (for example in the vicinity of ureter).<sup>8</sup> The latest offering by Ethicon, hailed as

a major advancement to the Ultrasonic devices is Harmonic ACE+7 Shears. The makers claim that the median burst pressures in Advanced Haemostasis mode are much higher than other devices, and it can coagulate vessels up to 7 mm in diameter (FDA Approved).

## Thunderbeat (Olympus Medical Systems Corp., Tokyo, Japan)

Thunderbeat was the first device to integrate both advanced bipolar energy and ultrasonically generated frictional heat energy in one instrument (Fig. 5). There are two modes in the generator, level 1 seal (bipolar technology) for vessel sealing and, level 2 seal and cut (ultrasonic technology) for precise dissection and cutting. It can seal vessels up to 7mm in diameter.



**Fig 5:** Thunderbeat

## Complications of Electrosurgery

Injury from inadvertent energy transfer has a reported incidence of 1 to 5 recognized injuries per 1,000 cases<sup>9,10</sup>. Mechanisms of electrothermal injuries include;

- Defective insulation
- Direct or capacitive coupling
- Alternative site burns
- Mistaken target application
- Smoke generation; hampering visibility
- Lateral thermal spread

## Insulation Failure

Insulation failure is considered the most important cause of electrothermal injuries. In usual case, presence of minute breaks or holes in the insulation coating provides an alternate pathway for current flow. As current follows the path of least resistance, it arcs over the electrode to complete the circuit and in this process damages an adjacent tissue. Sometimes this tissue is outside the surgeon's field of vision leading to burns that remain undetected

during the surgery. Reusable instruments become prone to insulation failure after prolonged usage, especially due to repetitive passage through trocars and sterilization.<sup>11</sup>

## Direct Coupling

Accidental activation of the active electrode while in close proximity to another metal instrument can cause current to flow from the active electrode, through the adjacent metal instrument. This phenomenon is termed as Direct Coupling and can lead to unintentional damage to tissue in direct contact with the secondary instrument. To prevent this injury, the electrosurgical unit should not be activated till the electrode is in clear vision and in direct contact with the target tissue.

## Capacitive Coupling

This term is used for the phenomenon where electrical current is established in the metal instrument running parallel to the active electrode, and not in direct contact with it. There is transfer of current from one conductor (active electrode), through intact insulation, into adjacent tissue without any actual contact with the tissue, finally leading to trauma. The use of metal trocars can reduce this risk by allowing stored energy from a capacitor to dissipate over the large surface area of the patient's skin.

## Burns

Burns to patient and perioperative personnel can occur when the cautery tip is not placed in its insulated container on the surgical field. Patients can also get burns at the site of placement of the dispersive pad. Alternative site burns occur when the patient's skin is in contact with metal or other conductive material and the electric current returns to the ground or the electrosurgical unit through this site.

## Surgical Smoke

The National Institute of Occupational Safety and Health (NIOSH) and the Centres for Disease Control

(CDC) have studied electrosurgical smoke at length. They state, "Research studies have confirmed that that surgical plume can contain toxic gases and vapours, such as benzene, hydrogen cyanide, formaldehyde, bioaerosols, dead and live cellular material and viruses."

The Occupational Safety and Health Administration recommend that smoke evacuation systems be used to reduce potential acute and chronic health risks to patients and personnel.<sup>12</sup>

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# Laparoscopic Instruments - Basics for the budding Laparoscopists

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Laparoscopic surgeries are also known as *Minimal Access Surgeries*, as they are performed through small key-hole incisions made far from the operating site.

Equipment and instrumentation have greater importance in laparoscopic surgery as the surgeon's eyes and hands work as the camera and instruments, respectively. The surgeon must be sufficiently acquainted with the equipment in order to make use of it, and troubleshoot the inherent problems.

## A. Instruments of access to the peritoneal cavity/ creating pneumoperitoneum:

### Veress needle

It has an outer sharp end and an inner blunt end. It creates pneumoperitoneum before insertion of the trocar. It should be placed with the patient in horizontal position. The needle selected should be of appropriate size according to the build of the patient. It comes in three lengths, 80mm, 100mm and 120mm, respectively. Check Veress needle each time before using it for its patency and spring action. As soon as the peritoneal cavity is reached, the blunt end of the needle is automatically released. Veress needle should be held like a dart at the time of insertion.



Fig 1: Veress' needle

### How to check for the correct placement of the Veress needle

- Double click test- Sound and feel when rectus sheath and peritoneum are penetrated.
- Hanging drop- When a drop of saline is placed on the open end of the needle, it is sucked-in if the placement of the needle is correct.
- Aspiration test- First aspirate, then put in saline, then aspirate again. Fluid will not be aspirated back if the needle is inside the peritoneal cavity.

- Intraperitoneal pressure test- The most reliable test. Intra-abdominal pressure with CO<sub>2</sub> flow should be < 10mmHg.
- Movement with respiration- The Veress needle should move with respiration if it is correctly placed.

**CO<sub>2</sub> insufflator**- CO<sub>2</sub> is delivered into the abdominal cavity via high pressure insufflator. CO<sub>2</sub> is preferred as it is non-combustible during electrocautery or LASER use. It is inert, colourless, has low risk of embolization (as solubility in blood is high), easily available and inexpensive. The pressure is generally set at 12-14 mmHg. Disadvantages: Hypercarbia and acidosis.

### Trocars

Techniques for insertion of trocar- Open entry method and closed entry method

Closed entry method- It is most commonly used for quick entry. The various methods are trocar entry following pneumoperitoneum, direct trocar insertion and optical access insertion

Open entry method- Using **Hasson's cannula (Figure 2)**

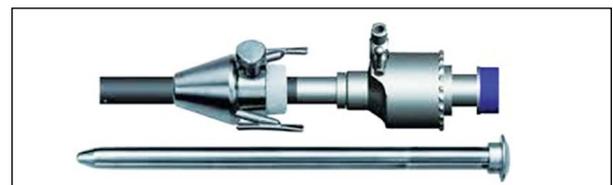


Fig 2: Hasson's Trocar and Canula

It is used to enter peritoneal cavity using an open cut down technique. It reduces the risk of vascular injury, bowel injury and consists of three pieces: a cone-shaped sleeve, a metal or plastic sheath with a trumpet or flap valve, along with a blunt-tipped obturator. About the sheath there are two struts for fixing fascial sutures on each side.

**Optical trocars (Figure 3)**- These are transparent bladeless trocars with a transparent fibre tip. It has an opening through which the telescope is put and locked. It allows the visualization of the layers as they are pierced.



**Fig 3:** Optical Trocars and Canulas- 5mm, 10mm

**Cutting metal trocar system-** The trocar has sharp conical, pyramidal or cutting blade tip. It punctures the layers during entry. The entry becomes easy but the risk of vascular and bowel injury is more.

**Conventional non optical trocars (Figure 4)-** They have blunt tip which separates the tissue during entry.

**Cannula**

It has a shaft, a flap valve and 2 washers to prevent gas leak

**How to hold trocar and cannula?**

They are held like a pistol. The head of the trocar rests over the thenar eminence, index finger points towards the sharp end, middle finger wraps around the air inlet.



**Fig 4:** Non optical trocar, canula and Reducer

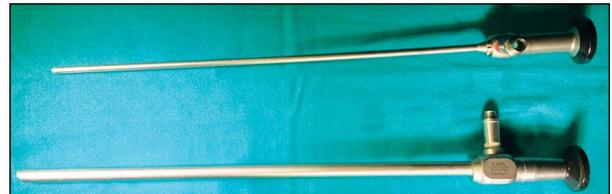
**B. Reducers**

These are of two types- Top mounted reducers are used with reusable cannula. Long reducer are mainly used for tissue retrieval as they go inside and come out with the instrument. They are also used for suturing and placing knots.

**C. Laparoscopes (Figure 5)**

The telescope is made up of stainless steel and has an optical lens. These are available in various sizes of 2-3mm, 5mm and 10mm.

They also have various visualization angles (zero degree, 30 degrees and 45 degrees). The scope is attached with light cable.



**Fig 5:** Laparoscopes- 5mm 0 degree, 10mm 30 degrees with light cable attachment

**D. Operative instruments**

They are also known as hand instruments. They mostly have three detachable parts (Figure 6, 7).

- a. Handle
- b. Insulated outer tube or sheath with cap
- c. Insert which makes the instrument.

They are available in various sizes (20, 28, 30, 37 and 45).

To assemble the hand instrument, the insert is put inside the sheath, the ball and socket joint in the sheath and handle are articulated and closed, respectively. Finally, the handle is attached.

Any insert and any handle can be used with any sheath. The majority of the laparoscopic instrument handles have attachments for unipolar electro-surgical lead and rotator mechanism to rotate the tip of the instrument. Some multifunctional laparoscopic handles have an attachment for suction and irrigation.

*The insulation of sheaths MUST be checked before starting surgery.*



**Fig 6:** Lap instrument with insert, sheath with cap, handles with and without ratchet

**Atraumatic grasper**

It has double action jaw, i.e. both the jaws are movable. It has low serrations to reduce the

trauma to the tissue held and is fenestrated. It can be held by either in-grip method or the over-grip method. In the in-grip method surgeon holds the instrument with ring finger in front and thumb at the back, in the two slots at handle and index finger is used for rotating the knob to change the direction of the instrument and the little finger is used to open and close the lock. The assistant holds the hand instrument by over grip method with four fingers in front and thenar eminence towards the back.



**Fig 7:** Laparoscopic Instruments with handles

**Semi traumatic grasper-** It is also fenestrated and has double action jaw but the serrations are deep.

Disadvantage- It causes indentation on tissues.

**Traumatic grasper-** It has single action jaw, is toothed and there are no serrations—or fenestrations.

It should be used with caution as it can cause injury to the tissue held. They are used for sharp dissection and cutting of tissues. They can be straight or curved, serrated, hooked or micro-tipped type.

**Laparoscopic insulated curved scissors with monopolar lead attachment (Figure 8)**



**Fig 8:** Scissors

**Maryland dissector**

It has long curved jaws with fine tips for dissection.

**E. Suction Irrigation Canula (Figure 9)**

Irrigation and suction are necessary during laparoscopic surgeries specially to maintain clear visual field and to clear blood, irrigation fluids and smoke. Suction irrigation canula comes in 5 mm and 10 mm reusable sizes. The suction

tip is helpful for intermittent suction and blunt dissection



**Fig 9:** Laparoscopic Suction and Irrigation Canula

**F. Myoma screw (Figure 10)**

Laparoscopic myoma screw is used to extract fibroids from the myometrium during myomectomy. The instrument is a coiled spring like structure that is attached to a handle with working length of 30 cm and 5mm diameter.



**Fig 10:** Laparoscopic Myoma Screw

**G. Needle holder (Figure 11)**

These are 05mm in Diameter, with 300mm length, with straight, right or left curved tipped jaws.

Ergonomically designed axial handle with continuously tightening Ratchet allows for a variety of jaw pressures for firmer grip. They have single click release mechanism.



**Fig 11:** Laparoscopic Right Handed Needle Holder

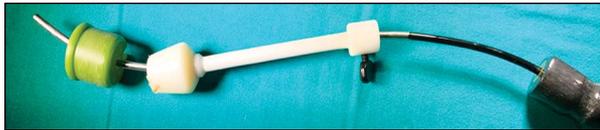
**H. Laparoscopic endosuturing made easy: Proxisure (Figure 12)**



**Fig 12:** Proxisure for easy endosuturing

**I. Uterine manipulator (Figure 13)**

It's an 'S' shaped stainless steel, insulated Uterine manipulator with a plastic adjustable sheath with screw to tighten according to uterocervical length. A plastic cervical cup is placed on top which is used as a colpotomiser



**Fig 13:** Uterine manipulator with vaginal colpotomiser cup

## J. Energy Devices

- **Haemostasis** is basic in all surgical procedures
- **Electrosurgery** is the application of alternating current to biological tissue to achieve effects like cutting, coagulation, desiccation, fulguration etc.
- By the to and fro movements of electrons , kinetic energy is converted to thermal energy

Types of energy sources:

- **Electrosurgical Energy**
  - Monopolar
  - Bipolar
- **Ultrasonic Energy**
- **LASER**

Type of electrosurgical waveforms in laparoscopy

- **Cutting cautery- low voltage + high frequency**
- **Coagulation- high voltage+ low frequency**
- **Cutting** – Divides the tissue with electric spark with intense heat at surgical site
- **Fulguration/spray coagulation-** High voltage interrupted coagulation current; No tissue contact; Coagulates/ chars tissue over wide area and vessels with diameter <1 mm.
- **Desiccation-** Cutting current touches tissue leading the cells to dry out, protein denaturation and coagulum formation. No cutting with maximum lateral thermal damage
- **Vaporisation-** Rapid spread of high heat causes vaporisation. Continuous cutting current with no tissue contact and moderate smoke.
- **Coaptation-** Sealing of small or medium sized vessels with cutting or coagulating current by compression of vessels and direct contact. Proteins inside the cells are coagulated. Lateral spread is significant.
- Using same frequency, we can generate more heat and thermal damage by
  - Increasing current output
  - Decreasing surface area
  - Increasing resistance
  - Increasing time

- Less surface area–More kinetic energy- Cutting
- More surface area- Less kinetic energy- Coagulation

Type of Blend	Cutting waveform (%)	Coagulation waveform (%)	Effect
Blend 1	80	20	Predominantly cutting
Blend 2	60	40	Predominantly cutting + Hemostasis
Blend 3	50	50	Cutting with good hemostasis

## Monopolar Vs Bipolar Instruments (Figure 14, 15)

Monopolar instruments- They can cut, blend, and desiccate but the drawback is that they can create remote injury. Hook has a L shaped tip.



**Fig 14:** Monopolar Hook

Bipolar instruments- They can only fulgurate the tissue.

Disadvantage- Only few instruments can be bipolar; Overcooking of the tissue.

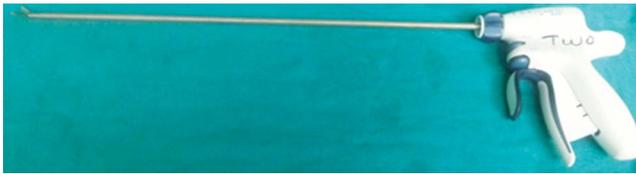


**Fig 15:** Roby Bipolar Forceps

## Ultrasonic Energy (Figure 16)

- Blade comes into contact with tissue; Pressure causes **coaptation of blood vessel**.
- Aminoacids unwind and reshape; H<sup>+</sup> bonds are broken; Protein in cells are denatured. Denatured protein forms a **sticky coagulum**.
- This allows for simultaneous **cutting and coagulation** to take place at a **lower temperature** than electrosurgery.
- **Minimal lateral thermal spread.**
- No electricity to or through the patient.
- Minimal smoke for better visualization.
- Multifunctionality.
- **Motion of blade causes vaporisation. Vapor**

expansion causes layers to separate and enhances tissue planes of dissection.



**Fig 16:** Harmonic Ultrascission with Ace showing insulated and active blade

### Harmonic Scalpel (Figure 17)

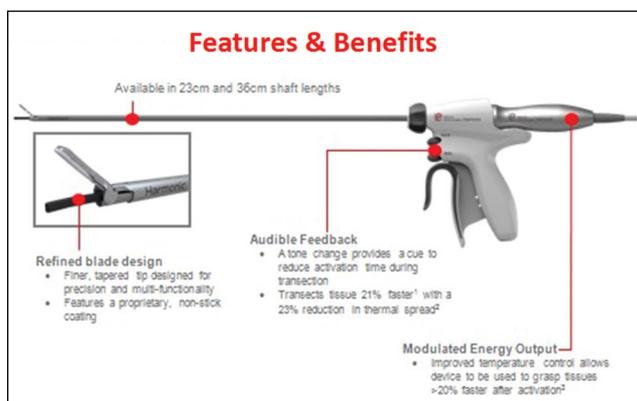
It has two jaws, moving jaw and the vibrating jaw, respectively. The moving jaw brings the tissue near the vibrating jaw.

**Assembly-** The transducer is fixed with the probe and tightened. Probe is attached to the machine. The machine is switched on and the instrument is activated.

It has two markings, max and min. Max is for cutting and min is for coagulation. Max is always set at 5, which means 55000 vibrations per second, whereas min can be anywhere between 1 to 5 (more haemostasis at lower numbers).

**Precaution-** The vibrating jaw/active blade should always be kept under vision as it gets heated and can traumatize vital structures.

- Up to 5mm Vessels are sealed together.
- No current-induced neuromuscular stimulation.



**Fig 17:** Harmonic HD 1000 i

- Rarely, acoustic energy coupling leads to overheating and bending of laparoscopic blade.
- Tissue sticking is a known disadvantage leading to increased electrical resistance. It hampers the energy delivery to targeted tissue making the sealing less effective, more time consumption and leads to inadequate haemostasis.

### Ligasure: Advanced Bipolar Device (Figure 18)

It is tissue response electrosurgical generator i.e. can generate current according to the response of the tissue with the help of the microprocessor inside.

**Principle-** Impedance technology- Change in impedance of the tissue is sensed, leading to liquification of the elastin and collagen fibers which ultimately results in sealing of the vessel.

Hand instrument consists of-

Jaw with a groove and a blade

Shaft which is 37 cm long

Switch to coagulate

Whip to lock and unlock the jaw

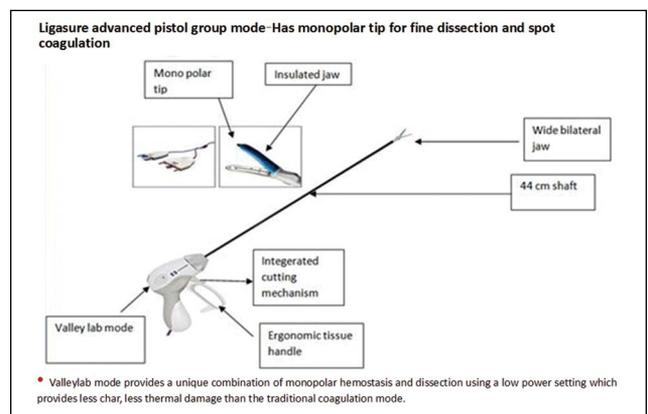


**Fig 18:** Advanced Bipolar Device- Ligature

**Complications-** Bleeding and charring of the tissue.

**Drawback-** It is a single use device. If the probe is used repeatedly, the sensitivity is lost.

Cannot coagulate small vessel and capillary bleeds as they lack collagen.



## Enseal (Figure 19): Advanced bipolar

Advantage- It can bend in any direction.

Disadvantage- Sealing effect is not as good as ligasure.

- Uses a bipolar electrode to concentrate energy on tissue within the plastic jaws of the instrument.
- It offers improved efficacy by utilizing a temperature sensitive matrix (**nanopolar thermostats**) embedded within the jaws of the device that **controls the energy delivered to the electrode-tissue interface**.
- Instrument can seal vessels between 1 to 7-mm in diameter. Uniform compression along the length of the jaw is mandatory to produce strong vessel seals.
- Proper use of the Enseal, requires a certain level of surgical skill as compared to the Ligasure, Gyrus and Harmonic scalpel and is thus is surgeon dependant.
- Temperature regulating PTC (positive temperature coefficient) material designed to minimize sticking.
- Offset electrode configuration designed to minimize lateral thermal spread.
- Has high burst pressures (can stand pressures up to 7 times SBP).
- This bipolar electro-surgical device uses plasma kinetic technology to deliver a high current and a very low voltage to the tissue.
- A series of rapid pulses allows a **cooling phase during coagulation** thereby decreasing lateral thermal spread.
- The vessel is sealed by denaturing the protein within the vessel walls, forming a coagulum which occludes the lumen.
- Important advantage of this device is its ability to hold onto the tissue being desiccated without slipping because of **serrated surface**.
- 5-mm and 10-mm versions are available. A Gyrus spatula is also available and can be used as both a cutting and coagulating instrument.



Fig 19: Enseal

## Thunder Beat

It is a combination of Bipolar and Ultrasonic technology.

Advantage- No need of the two instruments separately; Sealing and cutting of the vessels up to 7mm diameter with minimal thermal spread.

Disadvantage- It is costly and cannot be used again.

- It has two modes-
  - **Seal & Cut Mode:** Utilization of both bipolar energy and ultrasonic energy (**Figure 20**)
  - **Seal mode:** Utilization of only bipolar energy



Fig 20: Advanced bipolar and ultrasonic energies put together

- This advanced bipolar electro-surgical device uses plasma kinetic technology to deliver a high current and a very low voltage to the tissue.

## Use of Appropriate Energy Source-

- Harmonic energy source to lyse adhesions, dissection of UV fold, skeletonizing of Uterine vessels, retroperitoneal dissection, dissection around ureters and lymphadenectomy (with Harmonic 1000 I HD).
- Bipolar to secure small blood vessel bleeding, oozers, desiccation and surgery for endometriosis.
- Monopolar for colpotomy, fulguration, for cutting and coagulation in myomectomy.
- Advanced bipolar energy for securing vascular pedicles and ligaments.
- Energy devices should not be used near bowel, Ureters and in cases of severe endometriosis.

## Precautions While Using Electrocautery

- Grounding pad for return electrode should be placed over a wide, well vascularized area close to surgical field.
- Inspect insulation.
- Use lowest power settings.

- Use contact mode of coagulation current for desiccation.
- Use brief intermittent and not continuous prolonged activation.
- Stop coagulation at the end of visible vapour phase.
- Charring to be avoided.
- Do not activate in close proximity to another instrument.
- Identify source of bleeding. Never do blind cautery.
- Clean blades of instrument with stuck tissue.

### Lateral Thermal Spread of Devices

<b>Traditional monopolar devices</b>	2 to 22mm
<b>Bipolar devices</b>	Up to 13mm
Advanced bipolar devices	
Enseal	1.1mm
Harmonic scalpel	0 to 2mm
Thunderbeat	1 to 2mm
Ligasure	2.8mm
P K Gyros	3.9mm

### Light Amplification by Stimulated Emission of Radiation (LASER)

**Photochemical effects of LASER**– Cells have 80% water which evaporates instantly leading to explosion of cells.

Depth of tissue penetration is very precise with minimum lateral effect. **Smaller the spot size, greater is the power density.**

### Types of LASER

**Nd YAG LASER** – Precise control of the depth and amount of tissues penetrated (0.6-4.2 mm).  
**CO2 laser- Invisible beam.** Penetration is 0.1 mm.  
**Argon Beam Coagulation-** Argon gas blows away blood and debris and clears surgical field. Thermal spread is 2-3 mm. Penetration is 0.2mm.  
**KTP532 LASER**-Penetration is 0.4-0.8mm.

### Uses of LASER

Conisation of cervix

Laparoscopy- Fulguration in endometriosis, fibroids, condylomas, presacral neurectomy and salpingostomy

Hysteroscopy-LASER ablation of endometrium and uterine septal resection

### Disadvantages

- Very expensive
- Increased operating timings
- Risk of air embolism
- Requires sufficient training
- Can be used for coagulation not cutting
- Strict guidelines need to be followed
- Special spectacles required
- Possibility of corneal/retinal damage

### Summary

- A Bipolar device is a must in all laparoscopic trolleys.
- Energy device should be chosen and used judiciously depending upon the need of the situation.
- Avoid monopolar cautery near vital structures like ureters, bowel and great vessels.
- Ultrasonic energy devices are good for dissection of tissue planes as their-vaporization effect helps separate tissue planes. It's the preferred instrument for adhesiolysis. It is not recommended for vessel sealing though.
- Harmonic HD 1000i shears fusion energy source is excellent for dissection around vessels, ureters, bowel, mesentery and for lymph node dissection.
- Advanced bipolar devices are good vessel sealers.
- In Endometriosis bipolar shears should be avoided as 60-65 watts current can cause major lateral thermal damage. Monopolar devices should be avoided. Cold scissors, blunt dissection and simple bipolar for haemostasis are sufficient.
- Advanced energy devices are good for vessel sealing and cutting. They save time and are safe in the hands of an expert surgeon.
- Learning endo suturing is a must before starting to operate laparoscopically.
- Preference for a surgical device depends upon the nature of surgery to be performed, a surgeon's own experience with the instruments, availability, efficacy, safety and the cost of device.
- The conventional **monopolar** and **bipolar electrosurgery** are widely used due to their wider range of tissue effects, cost effectiveness, and ease of availability and maintenance.
- Vascular endosuturing is the most reliable and the best vessel sealer. It uses mechanical energy, has no lateral spread, produces no smoke and has the ability to securely seal larger vessels.

# Abdominal Access in Laparoscopy: Tips and Tricks

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Accessing the peritoneal cavity and creating a space for operating laparoscopically is arguably the most challenging and skill demanding step as majority of untoward events results from wrong selection of entry method, entry site and poor entry technique. Still today there is no clear consensus as to the optimal method of laparoscopic entry into the peritoneal cavity (Figure 1). Literature review inferred that an open-entry technique is associated with a reduction in failed entry when compared to a closed-entry technique, with no evidence of a difference in the incidence of visceral or vascular injury. An advantage of direct trocar entry over Veress needle entry was noted for failed entry and omental injury. Surgical skill, experience and proper training forms the backbone for a safe entry. Aim of this article is to discuss the finer points in the abdominal access methods and ways to stop catastrophic injuries.

Dr Camran Nezhat, in the early days of laparoscopy, had said “wherever in the body a cavity exists or can be created, minimally invasive surgery is possible and probably preferable.” It is this creation of cavity that is an acid test for surgeons’ skill and experience. More than 50% of laparoscopic complications occur during the entry.

Peritoneal access can be defined as creating a potential space in the peritoneal cavity (a closed system), by means of a gaseous interphase to separate the parietal from visceral peritoneum, that will provide with an interface for operating.

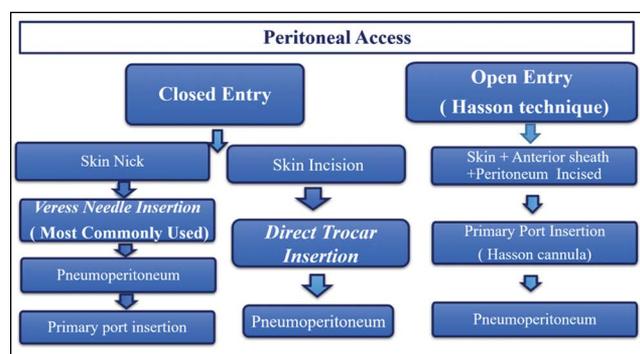


Fig 1: A brief overview of peritoneal access techniques

The following group of patients forms high risk group for encountering complications during entry:

- Scarred abdomen
- History of abdominal Tuberculosis
- Extremes of BMI
- Pregnancy
- Large Pelvic or abdominal mass

## Entry Site

In an ideal scenario, base of the umbilicus is the preferred site for entry for its superior cosmesis and anatomical advantages. At the base of the umbilicus, the thick muscle layer and overlying subcutaneous fat is absent and abdominal fascial layers are fused along the midline, making the distance from skin to abdominal cavity the shortest. It has increased port mobility owing to absence of lateral resistance from adipose layers.

The major disadvantage is the relatively high rate of adhesions found in this area in patients with prior incisions involving the umbilicus (Table 1). A prior umbilical hernia repair with mesh is a contraindication to umbilical entry so as to prevent disruption of the integrity of the mesh, and to avoid the risk of adhesions.

Table 1: Incidence of periumbilical adhesions

Adhesion	Percentage
In all laparoscopic surgeries	10%
No previous abdominal surgery	0% - 0.68%
Prior laparoscopic surgery	0% - 15%
Previous laparotomy with horizontal suprapubic incision	20% - 28%
Previous laparotomy with longitudinal incision	50% - 60%
Midline incision for gynaecological surgery	42%
All types of incisions for surgeries with obstetric indication	22%

Source: J Obstet Gynaecol Can 2017;39(7).

## Preoperative Evaluation

History of intraabdominal sepsis, peritonitis, abdominal tuberculosis, previous intraabdominal/

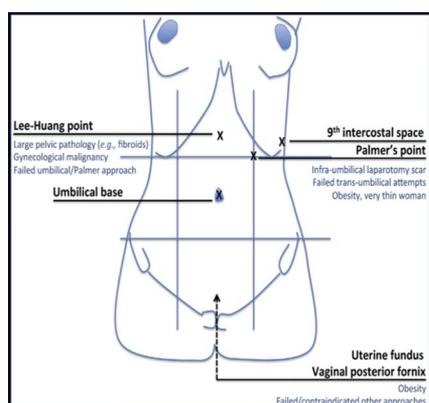
pelvic surgeries, difficult entry in the past are the warning signs of possible entry site adhesions. Proper evaluation of the site and type of scar is mandatory. Review of previous operative reports can provide useful insight into this matter.

## Patient Positioning

Patient should be supine during the Veress or direct trocar insertion to minimize risk of injury to the retroperitoneal major vessels. The patient's anterior abdominal wall should be at the waist level for the surgeon to relieve the strain on the surgeon's shoulder and elbow joint. Bladder should be drained and an orogastric tube placed, especially if Palmer's point is accessed.

## Alternative sites (Figure 2)

**Palmer's point:** It is situated 3 cm caudal to the left costal margin, in midclavicular plane. This site is suitable for patients who have had multiple previous laparotomies, in failed attempts at Veress needle insertion at the umbilicus and in very thin or morbidly obese patients. Left upper quadrant entry offers a more direct entry in patients who are morbidly obese in the presence of an abdominal pannus. This area is usually free of underlying intraabdominal adhesions. Contraindications for accessing this site are splenomegaly, hepatomegaly, left upper quadrant masses, previous upper left quadrant laparotomy for gastric or splenic pathology, portal hypertension, and an insufflated stomach from a misplaced endotracheal tube. One disadvantage to this approach is that the point is quite distant from the pelvis making manipulation of the operative port difficult. However, it can be advantageous in the cases of significantly enlarged uterus.

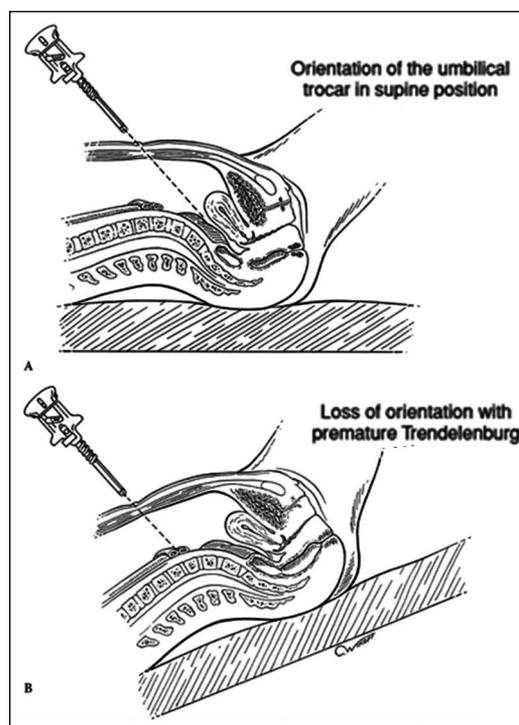


Source: Johnathon D et al. JMIG. 2020;(Special article)00:1-8.

Fig 2: Alternative port sites

The Veress needle is to be inserted perpendicular to

skin, 15° cephalad from the long axis of the patient (Figure 3). When entering there are 3 “pops” as the needle or trocar passes through the aponeuroses of the internal and external obliques, the aponeuroses of the internal oblique and transversus abdominis, and the peritoneum. A 2.9mm or 5mm trocar may then be inserted after creating pneumoperitoneum. Intraabdominal adhesions are assessed around the proposed port sites. Adhesiolysis is done with an energy source/scissors passed through a secondary port. Port sites are next planned according to the target location and then the 10mm primary trocar is inserted at the desired location.

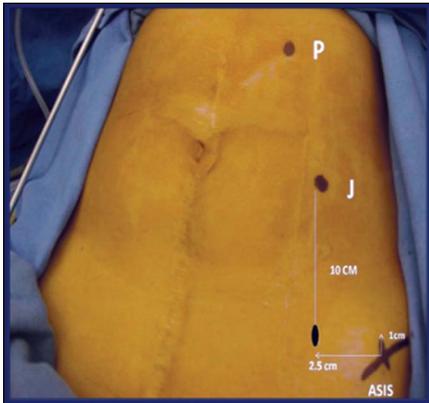


Source: Nezhat's Operative Gynecologic Laparoscopy and Hysteroscopy, Third Ed.

Fig 3: Angle of trocar insertion with operating table in flat (A) and Trendelenburg (B) positions

**Ninth intercostal space:** It is situated between the ninth and tenth rib along the anterior axillary line. The Veress needle is inserted grazing the top of the tenth rib to avoid injury to the intercostal neurovascular bundle. The indications are the same as that of the Palmer's point.

**Jain point:** It is an alternative for patients where there are contraindications to Palmer's point entry. It is located directly lateral to the umbilicus, and 2.5 cm medial to a line drawn vertically from the left anterior superior iliac spine (Figure 4). A mirror reflection of Jain point on right side can be an option for patients with previous left paramedian incisions, colostomy or drain sites, burns and keloids on left side.



**Fig 4:** Jain point

**Lee Huang Point:** Located at the midpoint between the xiphoid and umbilicus, this can be the primary port location for an enlarged uterus, huge myoma, large ovarian cyst. After palpating the upper margin of the mass, primary port can be placed 5 cm above the margin.

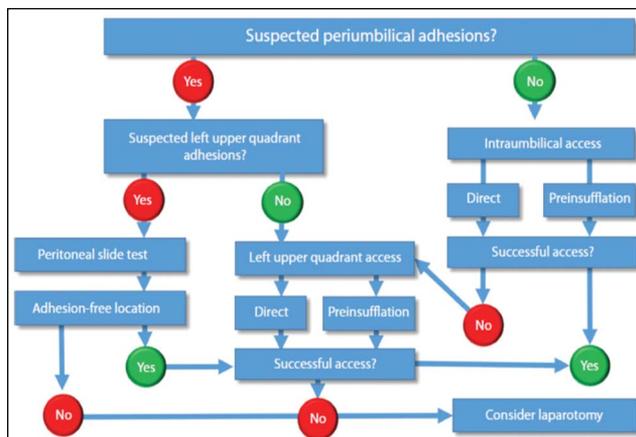
## Role of Imaging

### • Visceral slide test

A 7.5 MHz USG probe is used preoperatively to map the abdomen in high-risk group (previous multiple laparotomies and history of abdominal tuberculosis). In a non-restricted abdomen, on maximal respiration, the viscera move 2 to 5 cm in the longitudinal direction and >1 cm in the transverse direction. Restriction in this movement as a consequence of abdominal wall adhesions is defined as movement of the viscera <1 cm during visceral slide or no movement at all.

### • Preoperative periumbilical ultrasound-guided saline infusion (PUGSI)

On injection of a small amount of sterile saline into the area of laparoscopic entry, the obliterating



**Fig 5:** Algorithm for peritoneal access in case of suspected adhesions

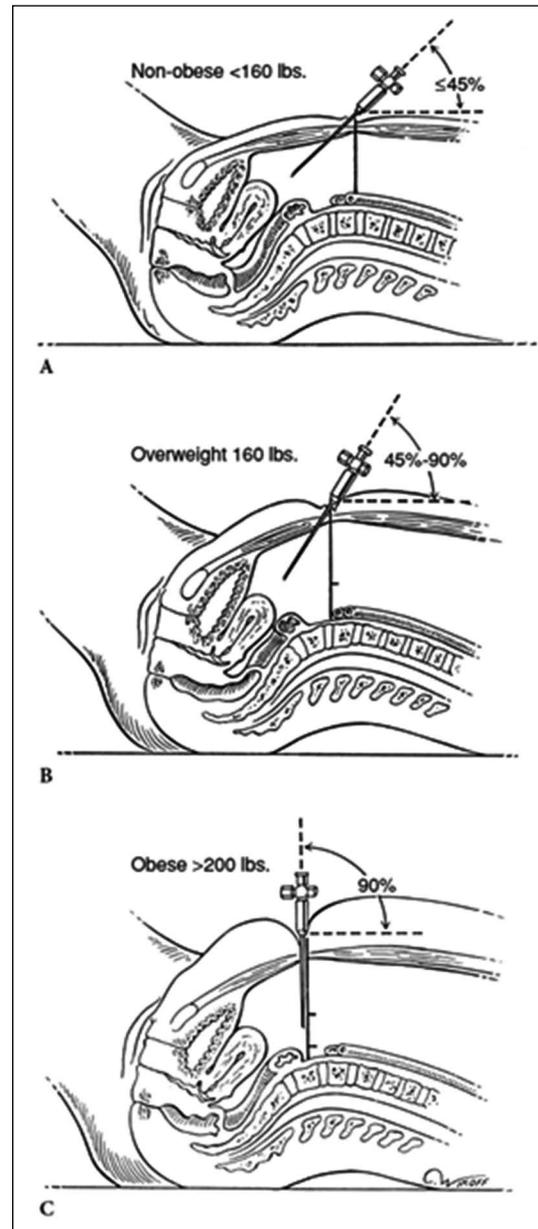
(dense) sub-umbilical adhesions will lead to loculation formation / lack of dispersion of injected fluid. This method demonstrates a sensitivity reaching up to 100%.

## Entry Technique

### Closed entry by Veress needle

Preinsufflation method with Veress needle remains the commonest technique to date. Certain important points regarding this method are highlighted here.

- Injuries with the Veress needle or trocars may occur when the skin incision is not large enough



**Source:** Nezhat's Operative Gynecologic Laparoscopy and Hysteroscopy, Third Ed.

**Fig 6:** Anatomic location of the umbilicus and abdominal aorta in non-obese (A), overweight (B), and obese (C) patients.

to accommodate the cannula's diameter and the surgeon exerts excessive thrust to overcome the hindrance.

- Lifting the abdominal wall during Veress insertion is associated with a significantly higher rate of failed entry. Displacement of the umbilicus caudally by the assistant's hands grasping and pulling the skin and subcutaneous layer of the lower abdominal wall displaces the umbilicus by an average of 6 cm (2–9 cm) caudally minimizing the risk of injury to retroperitoneal structures.
- The average distance between the umbilicus and the position of the aortic bifurcation is 0.4 cm, 2.4 cm and 2.9 cm in women with body mass index (BMI) of < 25, 25–30 and > 30 kg/m<sup>2</sup>, respectively. The umbilicus is placed caudal to the bifurcation in obese women. Thus, the insertion angle of the Veress needle should vary between 45° in non-obese women to 90° in morbidly obese women (Figure 6).
- Lateral movement of the introduced needle must be avoided, since it may enlarge an inadvertent visceral puncture wound of 2 mm to an injury of up to 1 cm or more.
- Injuries associated with the Veress needle insertion increases with the number of successive attempts (0.8–16.3% for one, 16.3–37.5% for two, 44.4–64% for three and 84.6–100% for four or more attempts).
- Intraoperative/intraabdominal pressure (IAP) of < 10 mm Hg on Veress needle insertion is the most reliable indicator of correct intraperitoneal placement of the needle. Therefore, it is appropriate to attach the CO<sub>2</sub> source to the Veress needle on peritoneal entry. High intraperitoneal pressure after Veress insertion can be due to kinked gas tubing, contact with a large uterus, an extraperitoneal placement, proximity to an underlying omentum/gut and interference by intraabdominal adhesions.
- IAP for primary trocar introduction should be 25 mmHg in healthy women with an immediate IAP reduction to 12–16 mmHg post introduction (high intraperitoneal pressure technique). This pressure increases distance between the anterior abdominal wall and the underlying structures by 6cm.
- After introduction of the laparoscope, a 360° visual inspection is carried out to identify any inadvertent injury during initial entry.

### **Direct Trocar Insertion (DTI)**

It is a single blind step without prior pneumoperitoneum. Recognizing abdominal entry can be technically challenging due to difficulty in distinguishing between the similar-appearing preperitoneal fat and omentum. Evidence suggests that rates of failed abdominal entry are reduced with DTI as compared to closed entry by Veress needle (64 vs. 10–20 per 1000 laparoscopic surgeries). Evidence is insufficient to suggest differences in rates of vascular injuries (8 vs. 5 per 1000 patients), visceral injuries, or solid organ injuries when DTI is compared to closed entry. Reductions in rates of both, extraperitoneal insufflation and omental injury are definite advantages of DTI.

### **Open Entry Technique/Hasson Technique**

In 1971, Hasson introduced the concept of open laparoscopy to eliminate the risks associated with blind insertion of the Veress needle in closed entry and DTI. Literature suggests that the open (Hasson) technique is associated with a reduced rate of failed abdominal entry, extraperitoneal insufflation, and omental injury, without significant differences in the rates of visceral or vascular injuries when compared to closed techniques. The disadvantages include greater leakage of CO<sub>2</sub>, larger fascial defect and increased operative time in those not versed with the procedure.

### **Trocar Type**

Trocars fall into two broad categories on the basis of the type of tip: cutting and dilating. Cutting trocars have a sharp blade at the end of the obturator that allows the trocar to be advanced directly through tissue with less force. Dilating trocars have blunt tips, which separate the tissue layers using a twisting motion causing less tissue trauma but requires additional entry force.

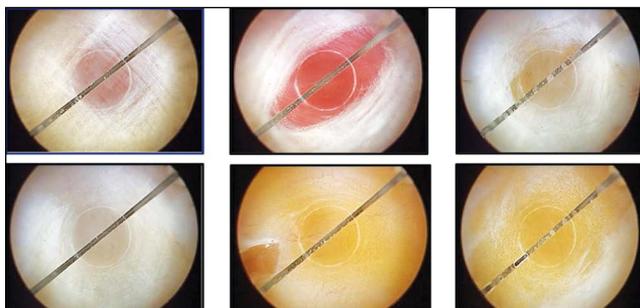
### **Special Trocars**

**Optical trocars:** The level of penetration into fat, anterior sheath, muscle layer, posterior sheath, and peritoneal layer, is transmitted as a real-time image on the monitor, theoretically eliminating the complications of blind entry. Optical trocar can be reusable (Endotip) or disposable (Visiport, Endopath Xcel Trocar system).

On entry layers encountered are:

1. Dull yellow subcutaneous fat.
2. Silvery-white anterior rectus sheath.

3. Red rectus muscle (if outside of the midline).
4. Silvery-white posterior rectus sheath.
5. A typically much thinner layer of dull yellow preperitoneal fat.
6. The grey, weblike peritoneum.
7. The bright yellow of the omental fat (Figure 7).



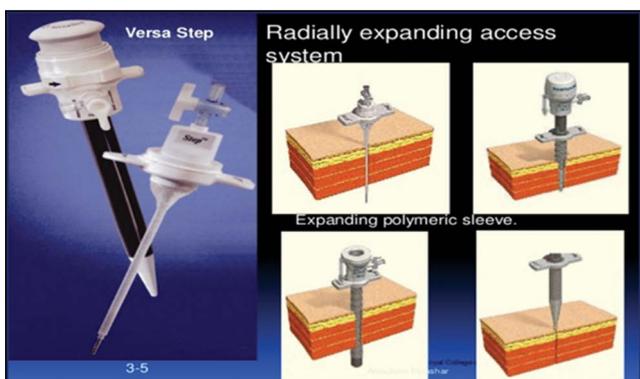
(1-6): top left to bottom right

**Source:** Bernante, Paolo & Foletto, Mirto & Toniato, Antonio. (2008). Creation of Pneumoperitoneum Using a Bladed Optical Trocar in Morbidly Obese Patients: Technique and Results. *Obesity surgery*. 18. 1043-6. 10.1007/s11695-008-9497-8.

**Fig 7:** Images transmitted by optical trocar

The visual entry cannula trocars have the advantage of minimizing the size of the entry wound and reducing the force necessary for insertion. According to a Cochrane review published in year 2019 visual entry trocars were non-superior to other trocars since they do not avoid visceral and vascular injury.

- **Radially expanding trocar** (Figure 8)- It consists of a 1.9 mm Veress needle surrounded by an expanding polymeric sleeve which acts as a tract through the abdominal wall that can be dilated up to 12 mm by inserting a blunt obturator with a twisting motion. The force required to push this trocar is more. Radially expanding trocars are not considered superior to the traditional trocars.



**Fig 8:** Versa Step

## Complications

### 1. Failed entry

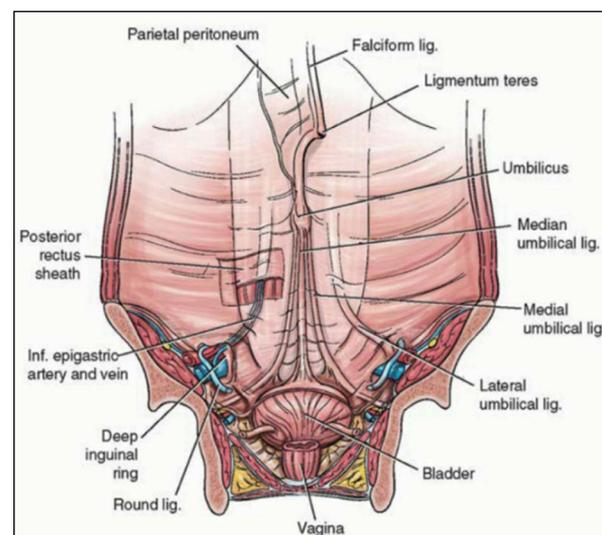
Underestimation of preperitoneal fat, skiving

through the tissue at an angle, insufflation of the preperitoneal space, and encountering unanticipated adhesions leads to failed entry. No more than 2 to 3 attempts should be made at the umbilicus.

### 2. Vascular injury

75% of vascular injuries occur at the time of entry. Factors responsible for vascular injury are failure to sharpen the reusable trocar, perpendicular insertion of the needle or trocar in a normal BMI patient, inadequate pneumoperitoneum, use of excessive force, failure to identify anatomical landmarks, inadequate incision size.

Transillumination with a laparoscope delineates the superficial epigastric vessels (84% in normal weight and 23% in obese women). Inferior epigastric vessels can be identified laparoscopically between the insertion of round ligament laterally and medial umbilical ligament (Figure 9).



**Source:** Te Linde's Operative Gynecology, 12th Edition.

**Fig 9:** Intraperitoneal view of anterior abdominal wall

Safe zone where ports can be inserted with a low likelihood of injuring the inferior epigastric artery (Figure 10):

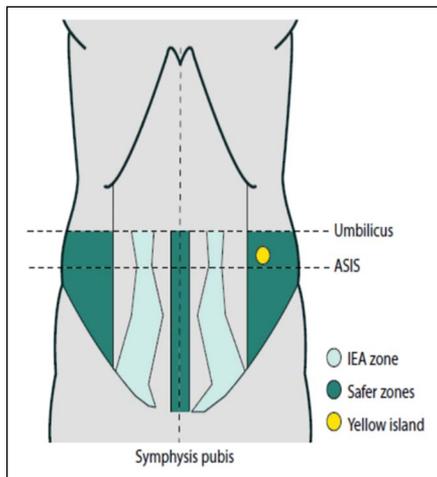
- <1 cm from the midline
- >8 cm from the midline
- >2/3 along the line between the midline and the anterior superior iliac spine

### 'Yellow Island':

- 1/3 of the way from the anterior superior iliac spines to the umbilicus
- Identified easily in patients with increased BMI

The superficial circumflex iliac vessels can be protected by lateral ports placement 2-3 cm medial

and 2-3 cm superior to the anterior superior iliac spine, at least 5 cm above the pubic symphysis.



ASIS= anterior superior iliac spine; IEA= inferior epigastric artery.

**Source:** Brierley G et al. Vascular injury during laparoscopic gynaecological surgery. *The Obstetrician & Gynaecologist* 2020.

**Fig 10:** Areas likely to contain the inferior epigastric artery, safer areas and Tinelli's 'yellow island'.

### 3. Bowel injury

Diagnosis of gastrointestinal injuries intraoperatively is possible in only 35.7% of cases. The signs of bowel injury include leakage of bowel contents, difficult-to-localize bleeding, bubbling noted in the irrigation fluid, foul smell of gas vented from the abdomen, unusually high insufflation pressures, or local distension of the bowel (as air enters the bowel). Surgeon should have a high index of suspicion in patients who required multiple attempts with Veress needle or other difficult entry. A through-and-through injury to a loop of bowel at entry time may be detected while removing the laparoscope at the end of procedure. Veress needle/ trocar causing injury should be kept in place for easy identification during repair and limiting tissue injury. Laparoscopic repair/resection anastomosis may be attempted if expertise is available.

### 4. Bladder injury

Perforation of bladder dome at entry is seen with suprapubic trocars. Risk factors for bladder injury are previous laparotomies resulting in bladder adhesion to the anterior abdominal wall, previous caesarean sections, patent urachus and myoma in lower segment. Omission of preoperative bladder draining is the most important preventable risk factor.

### 5. Nerve injury

Placement of trocar sites 2 cm above the level of the ASIS, at any point medially, would avoid injury

to the iliohypogastric and ilioinguinal nerves resulting from lateral placement of the trocars.

### 6. Subcutaneous emphysema

Dissection of CO<sub>2</sub> may occur along the anterior chest wall, neck and face. Factors leading to subcutaneous emphysema are use of high gas flow and high gas pressure settings, intra-abdominal pressure of  $\geq 15$  mm hg, multiple attempts at abdominal entry, procedures lasting  $\geq 3.5$  hours, preperitoneal insufflation, loose skin/fascial seal around the cannulas and usage of  $> 5$  cannulas.

**Extraperitoneal insufflation** is one of the most common complications of laparoscopy, frequently leading to abandoning of the entire procedure as further attempts to achieve pneumoperitoneum are usually unsuccessful.

## Abdominal Entry in Pregnancy

Pregnancy can be complicated with non-obstetric emergencies like acute appendicitis, cholecystitis and dermoid cyst torsion. Patient should not be denied the benefits of laparoscopy in such cases. The location of the primary port will depend on the level of the uterine fundus, location of pathology and the operator experience. It has been suggested that in the late second and the third trimesters primary port sites should be 1-2 cm below the costal margins in the left (Palmer's point) or right mid-clavicular line or 3-6 cm above the umbilicus in the midline. Both open and closed approaches are reported in the literature.

## Principle of Planning Port Location

The ideal manipulation angle (angle between the active and assisting instrument) is between 45- 60 degrees which is accomplished by correct port placement. Triangulation is achieved when target organ is 15-20 cm from the center port harboring the optical trocar and two remaining trocars are placed in the same 15-20 cm arc at 5-7 cm on either side of the optical trocars and retracting ports are placed in the same arc but more laterally.

## Conclusion

Surgeon experience, patient characteristics, and suspected pathology are important considerations when evaluating potential entry options. There is no single safe technique in low-risk patients. The surgeon should select the technique with which they

*to be continued..... on page 39*



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continued from ..... on page 36

are well-versed and confident. The open (Hasson) technique and Palmer's point pneumoperitoneum should be considered in the obese patient and those with suspected peri-umbilical adhesions. Complications can occur even in the best of hands but the skill lies in recognising them promptly and managing expeditiously.

### Suggested Reading

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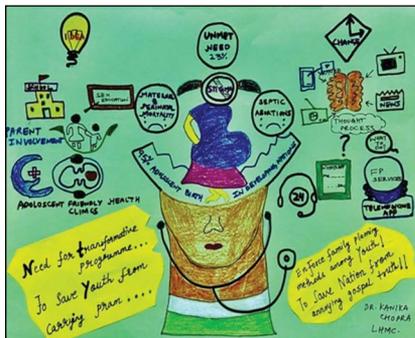
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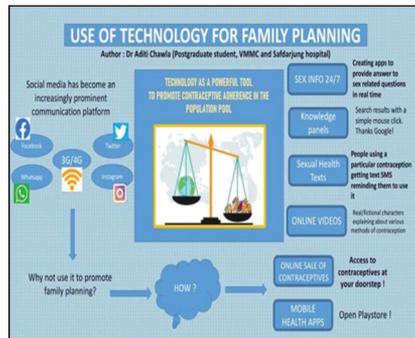
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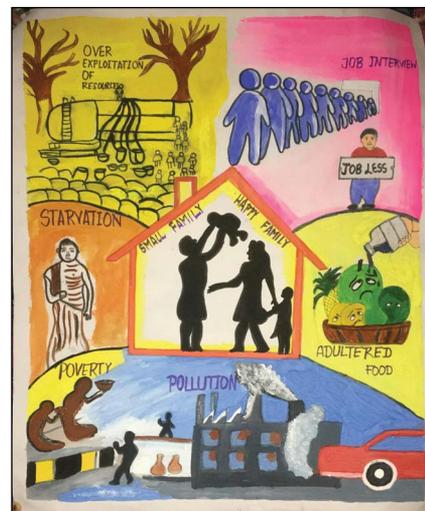
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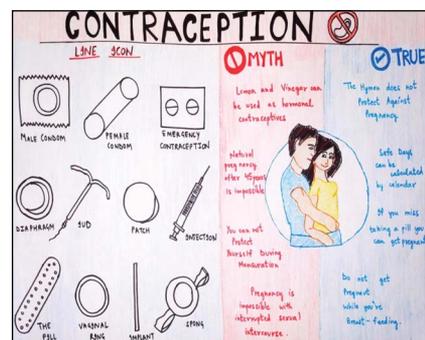
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**3<sup>rd</sup>, Seema Chaudhary**  
 PUHC Ph-5 Shiv Vihar

# Robot Assisted Laparoscopic Surgery

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## Introduction

Robotic surgery is the latest advancement in the field of minimally invasive surgery (MIS). It is based on a computer-based MIS approach. The technological and ergonomic benefits of robotics surgery were introduced to overcome the difficulties encountered with conventional laparoscopy, augment a surgeon's skills, achieve accuracy and high precision during complex surgical procedures and facilitate widespread use of MIS. In this surgery, movements of instruments are facilitated by haptic interfaces that replicate and filter hand movements. Robotically assisted surgery offers advantages that include an improved three-dimensional high definition vision camera, instruments with endowrist to improve dexterity, and tremor cancellation software to refine precision in surgical dissection.

## Robotic System

Da Vinci Surgical System was approved by FDA for use in Gynaecology in the year 2005. Presently among all the various surgical specialties, Gynaecology is supposed to be using the robot to the maximum. The surgeon controls the robot as the latter translates the former's hand movements into smaller and more precise instrument movements inside a patient's body.

## Parts of Robot

A Robot is comprised of three components: A surgeon's console, a patient-side cart with four robotic arms which are manipulated by the surgeon, and a high-definition three-dimensional (3D) vision system.

### Surgeon Console (Figure 1, 2, 3)

It has 3 components: A pair of master controllers, the footswitches, and a stereo viewer. The Gynecologist surgeon sits at the console away from the patient's cart comfortably and doesn't need to scrub. They use the master controller to perform movement which is then replicated in real-time at the surgical field through robotic hands and instruments. The stereo viewer gives a clear high definition, magnified, and three-dimensional view of the surgical field to the

surgeon. The footswitch panel has two groups of pedals on each side, one for cautery use and the other for camera control. In addition to these, a touchpad is located on the armrest to control and do system adjustments like modulation of telescope angle, light intensity, and cautery settings. Each surgeon can fix these settings for an optimum ergonomic position to avoid muscle sprains.



Fig 1: Surgeon Console



Fig 2: Foot pedals for camera and cautery controls



Fig 3: Hand controllers

### Patient Cart (Figure 4)

It is the operational component of the robot and has four arms, three instrument and one camera arm. These arms can perform a wide range of sophisticated movements.



**Fig 4:** Patient Side Cart with Robotic arms

### **The vision Cart**

The vision cart consists of an endoscope, cautery generators, a Firefly system, camera, recording system, and vision cart illuminator. The video images are high definition and magnified. Endoscopes are available in 0 degree and 30 degrees' configurations.

### **Docking of the Robot (figure 5)**



**Fig 5:** Docking of robot

All the three parts are connected digitally. To begin with the procedure, surgeon must establish a pneumoperitoneum and insert the ports. The ports are usually three to four 8 mm ports and one assistant port. Ports are to be inserted perpendicular to the body surface. Markings over the ports should be within the abdominal wall. Next the theatre team 'docks' the robotic platform by correctly positioning the platform relative to the patient (Figure 5). Side docking or center docking may be utilized. Side docking is preferred if a vaginal assistant is required during the surgery. Patient must be in steep Trendelenburg position before docking. A sand bag or bolster at lower back is helpful. Shoulder rests and strapping of chest allows steep Trendelenburg

position without the chances of patient slipping in upward direction. Once the system is docked, OT table cannot be moved. A bedside scrubbed assistant inserts the telescope in second arm and targets at the main anatomy site for surgery. All other robotic arms take position automatically. The bedside assistant surgeon inserts instruments into the ports under vision and connects cautery cables.

The main surgeon comfortably sits at the surgeon's console. They can scroll and change to their ergonomic settings. Thumb and a finger are inserted in both loops of master controllers. The instruments and their tips follow the hand movements. A fenestrated bipolar grasper in left hand and a hot shears scissors with monopolar energy in right hand are the most commonly used instruments in first and third robotic arms, respectively. The second arm is meant for telescope. The fourth arm may be used for holding a tenaculum or force bipolar grasper. The third and fourth arms can be interchanged with the help of a toggle pedal. The instruments remain fixed in position whenever the camera moves or whenever the surgeon takes their head out of the console. The arms can be repositioned with the help of a hand clutch or a foot clutch to a comfortable position. All the specifications and feedback features help in making the surgery safe.

The camera control is completely under the main surgeon's command and it can be taken very close to the desired anatomical structure for a magnified vision. This is especially helpful in difficult to reach places like the recto-vaginal plane, the space of Retzius, retroperitoneum and the para-aortic region. The intensity of light, cautery adjustments, telescope angulation and Firefly can be activated through the touch pad located at the surgeon's console. During surgery instructions to the OT staff are given over a microphone at surgeon's console.

The presence of an experienced table-side assistant and surgical staff to potentially streamline robotic procedure times and cost are imperative. The operating table assistant surgeon also helps in supplemental actions like suction, retraction, uterine manipulation and providing sutures. Whenever required the assistant can change an instrument or clean it.

### **Clinical Considerations**

Robotic-assisted surgery is safe and feasible in gynecological surgery procedures.

*Benign Hysterectomy*-Hysterectomy is one of the most commonly performed gynaecological surgical procedures. Previously hysterectomies were commonly performed abdominally, but now there is an increasing trend towards minimally invasive approaches. Collectively, abdominal hysterectomies are performed in 66% of cases, vaginal hysterectomies in 22% of cases, and laparoscopic hysterectomies in 12% of cases. The aim is to convert an abdominal hysterectomy into a MIS. Surgeon's preference may be a factor in determining the mode of surgery. Many surgeons are not well trained in laparoscopic and vaginal route surgeries and may prefer robotics due to their short learning curves. Additionally, in comparison to conventional laparoscopy, the endo-wrist instrument articulation provides surgeons with greater dexterity, precision and control to suture the vaginal cuff. Specifically, benefits of robotic assistance over conventional laparoscopy is evident in obese women, in cases of large sized uterus, and pelvic adhesions secondary to endometriosis or multiple pelvic surgeries.

*Pelvic Organ Prolapse Repair*- Sacrocolpopexy (SCP) is the gold standard treatment for apical vaginal vault prolapse with demonstrated long-term success. However, due to high morbidity associated with an open approach and difficulty in visualizing deep pelvic structures, a minimally invasive approach is always preferred. However, laparoscopy has not gained widespread acceptance due to its lengthy endosuturing learning curve. Robot has made this technically difficult procedure easy. Surgeons find suturing and exposure less challenging. Thanks to the dexterity of robotic instruments tips.

*Myomectomy*- Minimally invasive management of fibroids is one challenging surgery in Gynecology. The robotic system may prove helpful in cases of obesity and difficult large and unfavourably located myomas. The procedure of myomectomy requires rigorous suturing to obliterate dead space to give a strong uterine scar. The assistance with robotic arms makes suturing simple and easy and allows surgeons with limited or no laparoscopic experience in suturing technique to perform the procedure through MIS. Hence, the robotic approach has gained widespread popularity with the surgeons.

*Endometriosis*-When performed by traditional laparoscopy, surgery for endometriosis is technically the most complex. This is due to dense adhesions and loss of texture of adnexal structures. The surgeon has to restore the anatomy by removing endometriotic

implants and has to improve patient's fertility and quality of life. Robotic assistance gives detailed and magnified 3-D surgical view and hence can greatly improve the quality of dissection in complex cases. Robotic-assisted surgery is potentially a safe alternative to achieve a result-oriented surgical treatment in cases of endometriosis. It may also be helpful in cases of redo surgeries for endometriosis.

*Tubal Recanalization*-Robotic surgery has an important role in the management of reversal of tubal sterilization. Microsurgical dissection, display of immaculate tissue details and fine suturing required for tubal reanastomosis is greatly assisted by a robot. This is due to 360-degree dexterity of the instrument tips and the 3-D high definition camera vision.

*Gynecologic Oncology*-Robot-assisted surgery has changed forever the surgical management of gynecologic malignancies. The 3-D visualization and magnification (up to ten times) combined with wristed instruments allows surgeons to perform comprehensive and radical dissection to achieve desired margins. 95% of gynecologic oncology fellows have a robotic platform at their institutions, and 95% are being trained to use it.

*Endometrial cancer*- Endometrial cancer is the most common indication for robotic platform in gynecologic oncology. MIS has become the accepted standard of care for surgical staging of endometrial cancer. Benefits of robotic surgery have been observed in trials evaluating surgical approaches in obese patients. The blood loss was found to be lesser for robotic surgery than for laparoscopic surgeries or laparotomy. The rate of conversion to laparotomy was 4.9% for robotic assistance and 9.9% for laparoscopic surgery.

Sentinel lymph node mapping along-with ultra-staging is fast becoming a new norm for staging of early endometrial carcinoma. This technique has not only provided upstaging by 18% but has also reduced operative timings and decreased peri-operative complications. This being crucial in endometrial cancer patients who commonly have associated obesity and other comorbidities. Despite the initial higher costs of robotic surgery, long-term cost reductions are indisputable in form of lower complications rates.

*Cervical Cancer*-Abdominal radical hysterectomy (ARH) has been the standard management for patients with early disease. Conventional laparoscopy

has not received widespread acceptance due to its complexity. By contrast, radical hysterectomy can be made less challenging by robotic platform and can be considered as an ideal surgery. Hence, robotic-assisted radical hysterectomy has been gaining popularity. Robotic assistance is associated with less blood loss, fewer operative complications, better surgical margins, higher lymph node yields and a shorter length of hospital stay. Post-operative complications (lymphoedema, lymphoceles, wound infections and ileus) are also fewer.

Multiple studies have evaluated the surgical convenience, the safety, and the outcomes of robotic-assisted radical hysterectomy (RRH). The recently published Laparoscopic Approach to Carcinoma of the Cervix (LACC) trial, a phase 3 multicenter non-inferiority study, that investigated patients with FIGO stage 2019 -IA1 with lymph vascular space invasion, IA2, IB1 or 1B2 cervical cancer (squamous or adenocarcinoma histologies) undergoing total laparoscopic radical hysterectomy/total robotic radical hysterectomy versus ARH called into question the utilization of MIS in this setting. Nevertheless, the trial has been challenged by many experts of MIS including Dr Shailesh Puntambekar and Dr PC Lee.

## Learning Curve

Precision of instrument control and a 3-D HD stereoscopic vision enables faster surgical learning as compared to conventional laparoscopy. The latter involves two-dimensional imaging and counter-intuitive hand movements.

Various studies have shown that the learning time plateaus after 20 to 30 robotic-assisted cases whereas double the numbers were needed when procedures were performed by laparoscopy. Robotics may enable less experienced laparoscopic surgeons to perform minimally invasive procedures that otherwise would require laparotomy.

## Training

The skills simulator has surgical exercises that allow users to improve their proficiency in surgeon console controls. The simulation set-up enables users to practice independently or under supervision. Built-in metrics helps trainees to assess their skills, receive real-time feedback and observe their progress. Various steps that are fine-tuned include endowrist manipulation, camera and clutching, fourth arm integration, system settings, needle control and

driving, and energy and dissection. These exercises allow surgeons to get conversant to the footswitch panel by allowing them to learn swapping between monopolar and bipolar energy while working on various dissection tasks.

Hands-on training using the new technology is paramount. Training on animal or human cadavers is very helpful. Dual surgeon console is a great asset during these didactic mentored programs.

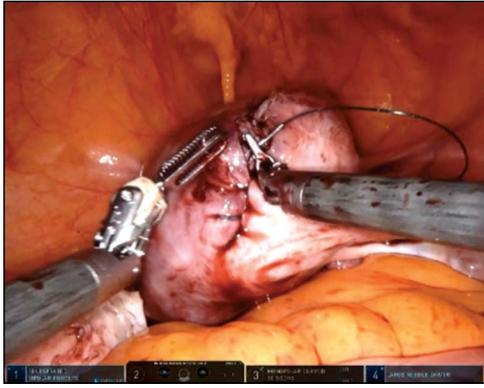
## Benefits of Robotics over Open Surgery

This includes all the benefits of minimally invasive surgery

1. Quicker recovery.
2. Shorter hospital stay (one day in many cases).
3. Small incisions and minimal scarring.
4. Fewer incidences of perioperative complications and postoperative ileus.
5. Less blood loss and transfusions.
6. Reduced pain and discomfort.
7. High BMI patients: In this group of patients, operator's convenience and decreased number of complications have been observed in surgeries for benign and malignant causes.
8. In malignancies, decreased overall cost when various factors like prolonged admission cost including ICU stay, loss of working hours and delay in adjuvant therapy in cancers is considered.

## Possible Benefits Compared to Traditional Laparoscopy

1. Superior dexterity: The robotic instrument exceeds the dexterity and range of motion of the human hand. The arms can rotate full 360 degrees. Endowrist movement of robotic instrument allows better precision in suture intensive surgeries against the traditional straight sticklike movements in laparoscopy (Figure 6). This allows the surgeon to operate in a way that would be impossible without a robot.
2. Robotic assisted surgery has also shown to decrease fatigue and muscle strain among surgeons especially during prolonged surgeries and when multiple surgeries are performed in a single day. This further increases precision and potentially may decrease the number of medical errors as the surgeon sits in an ergonomically comfortable position at the console separate from the patient.



**Fig 6:** Endowrist movements of Robotic instruments for ease of suturing

3. Access to hard-to-reach places: The enhanced flexibility and precision of the robot allows the surgeon to access hard-to-reach areas with the help of a telescope that can be focussed closer to the target tissue. This is in contrast to the unstable camera held by a human assistant in laparoscopy.
4. Control of camera and all the three operative arms give excellent surgical autonomy and efficiency to an operating surgeon.
5. An enhanced visual field: Surgeon has superior view of the operating area leading to a more precise surgery. Thus, it facilitates better removal of endometriotic tissue and better surgical margins in cases of cancer patients.
6. Learning curve: The curve is shorter in Robotic surgery as compared to the traditional laparoscopic surgeries.
7. Similar or fewer complications (including major complications) as compared to laparoscopy.
8. Fewer conversions to open surgery.
9. Less blood loss and transfusions.
10. Less pain and discomfort due to dexterity of instrument tips that helps avoid excessive leverage and exertion of force at the incision sites.
11. Shorter hospital stay.
12. Quicker recovery.
13. Fewer complications except among low-volume (defined as 1 to 5 hysterectomies per year) surgeons.
14. The surgery is a sheer delight with robotic assistance even in prolonged and difficult cases involving huge amount of dissection and suturing. This is contrary to the excessive strain and difficulty experienced in laparoscopy.
15. The system's ability for automated troubleshooting decreases the number of

ancillary staff needed in the operating room. It thus minimizes interruptions to the operating surgeon.

## Disadvantages of Robotic Surgery

1. The Expense of Surgery: The cost of initial installation, later maintenance and cost of disposables is too high. Increased operative timings also adds up to the cost of surgery. Hence it may not be the first choice for simple benign gynaecological conditions.
2. Movement Latency: One significant concern is the latency of movement in case any problem arises during surgery. The team should be trained for quick emergency undocking in such cases.
3. Increased duration of surgery as compared to laparoscopy especially for initial few cases. As the surgeon gains experience this duration rapidly plateaus.
4. Bulky machine habitus and need for additional staff and training.
5. Robotic assembly timings: Only nine minutes of difference in time is noticed in high volume centers. Robotic surgery is more efficient with a trained surgical team. This includes bedside assistants, circulating nurses, and scrub technicians who are familiar with turnover of the specific equipment.
6. Operating room efficiency can be achieved only with an experienced table-side assistant and surgical staff who can potentially streamline the robotic procedure duration and thus the cost.
7. Lack of haptic feedback: This disadvantage is well compensated by the superior tissue details obtained for the same. The microscopic details and the tissue movements may help in understanding the finer tissue texture.
8. Lack of direct access to the patient.

## Conclusion

Robotic platform is the next revolutionary step forward in the era of MIS, and if cost considerations are met, it may become a more acceptable method among gynecological surgeons. Robotic costs will surely decrease with market competition and system refinement. Robotics have an extra edge in highly complicated procedures where extensive dissection and optimal anatomic re-establishment is required. V-Notes surgery is a new step forward in the line of Robotics surgeries. Efforts should be focused

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on determining patients who would benefit from robotic-assisted techniques over other methods.

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# Basics of Hysteroscopy

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Hysteroscopy is the visual examination of uterus, endo- and ectocervix, tubal ostia, and vagina with an endoluminal endoscope. The word "Hysteroscopy" is derived from the Greek words, *hystera* (meaning uterus) and *skopeo* (meaning 'to view'). It is used for both diagnostic and therapeutic purposes.

## History of the Procedure

Pantaleoni performed the first hysteroscopy in the year 1869 using a tube with an external light source to diagnose a polypoidal uterine growth.<sup>1</sup> In the year 1925, Rubin and Gauss first used CO<sub>2</sub> and fluids, respectively to distend the uterus.<sup>1</sup> The use of liquid distention media came into routine by the 1980s. Hysteroscopy had nearly replaced dilatation and curettage (D & C) for diagnosing intrauterine pathology.<sup>2</sup> With refinements in fiberoptic technology and improved visual resolution, office hysteroscopy became popular.

## Indications of Hysteroscopy

- 1. Abnormal uterine bleeding (AUB)-** Hysteroscopy has almost replaced standard D&C for the management of AUB these days. It allows for direct visualization, diagnosis and treatment of intrauterine abnormality and focal uterine pathologies in the same setting. Abnormal bleeding may be treated with polypectomy, myomectomy or endometrial ablation
- 2. Infertility** may be treated by hysteroscopic removal of polyp, myoma, intrauterine adhesions (Asherman's syndrome), or a septum. Obstructed tubal ostia may be unblocked or dilated.
- 3. Recurrent pregnancy loss-** Submucous myoma resection and correction of Müllerian anomalies (uterine septum resection) using hysteroscopy may lead to successful pregnancy outcomes in patients of recurrent pregnancy loss.
- 4. Amenorrhoea-** Hysteroscopic adhesiolysis remains the gold standard treatment for Asherman's syndrome.
- 5. Retained intrauterine devices** and other foreign bodies can be removed hysteroscopically after sonography-guided retrieval fails.
- 6. Retained products of conception** may be removed under direct vision.

## Contraindications of Hysteroscopy

Hysteroscopy is avoided in patients with:

- a. Continuing intrauterine pregnancy** (absolute contraindication)
- b. Active Cervical or pelvic infection**
- c. Recent Uterine perforation**
- d. Known cervical or uterine cancer-** In suspected cases of endometrial cancer, there is a theoretical risk of seeding of the peritoneal cavity with cancer cells. Hysteroscopy and directed endometrial sampling is considered gold standard for diagnosing endometrial cancer.
- e. Severe medical conditions** precluding surgery.
- f. Active bleeding** (relative contraindication) as it may limit visualization
- g. For hysteroscopic endometrial ablation-** Desire for future fertility, atypical endometrial hyperplasia or endometrial cancer are considered contraindications.
- h. For hysteroscopic polypectomy and myomectomy,** the size of the lesion and glycine complications will limit the procedure.

## Preoperative Evaluation

It includes a thorough history taking, general and pelvic examination, pap smear, pregnancy testing, cervical cultures (if cervicitis is suspected), pipelle sampling (when indicated) and preoperative imaging.

## Informed consent

Ethically two types of consents are advised.

- Anaesthesia consent
- Procedural consent- Benefits and limitations of the procedure are to be explained.

## Instrumentation

The hysteroscope system include -

1. Telescope
2. Operating sheaths
3. Camera
4. Light source and fiberoptic cable
5. Video monitor

Hysteroscopes are classified as

- Rigid or flexible
- Diagnostic or operative

#### A. Telescopes

The telescope consists of three parts; the eyepiece, the barrel, and the objective lens. The focal length and angle of the distal tip of the instrument are important for visualization. A 4-mm telescope is most commonly used. The 3 and 2.8 mm telescopes with viewing angles of 0-degree (straight-on) provide a panoramic view. The 30-degree fore-oblique angle view, facilitates visualization of the tubal ostia. Other angle options include 12, 15, and 70-degrees.

*Rigid hysteroscopes* cause more intraoperative pain, but offer better optical quality, are easily inserted and are less costly. *Flexible hysteroscopes* are most commonly used for office hysteroscopy. They have a tip that deflects over a range of 120-160 degrees. This helps to negotiate an irregularly shaped uterus and navigate around intrauterine lesions.

#### B. Light source

The Xenon light source is most commonly used. Fiberoptics allow transmission of bright light without heat.

#### C. Diagnostic and Operative Sheaths

A **diagnostic sheath** is 5 mm in diameter, which accommodates a 4 mm telescope. The 1-mm space in between the sheath and the telescope allows transmission of gas or liquid media.

**Operative sheaths** size ranges from 7 to 10 mm. They harbour a 4 mm telescope, inflow- outflow channels and operating channel. The operating channel allows 2-3 mm flexible or semirigid instruments (scissors, grasping forceps, biopsy forceps, and punctate electrodes) to pass.

#### Resectoscopes

Resectoscopes typically consist of a 7 to 9 mm sheath. They are powdered by radiofrequency electrical energy (monopolar or bipolar).

#### Hysteroscopic Morcellators

They are an alternative to the resectoscopes for operative removal of submucosal myomas and polyp. They are suction based and are powered by mechanical energy (rotating tubular cutter systems) in contrast to the high-frequency electrical energy used by resectoscopes. Their

advantage lies in an improved visual field as resected "fibroid chips" are continuously removed.

#### Laser Techniques

Several fiberoptic lasers are available for gynaecologic use, including Potassium-Titanyl-Phosphate (KTP), Argon, and Nd:YAG lasers.

#### D. Distension Media and Fluid Management

The uterine cavity is a potential space, with the anterior and posterior walls in close apposition. The thick musculature of the uterine wall requires a minimum distension pressure of 40 mmHg for visualisation. At about 70 mmHg the distending media may be propelled into the peritoneal cavity through the oviducts. An intrauterine pressure of 125 to 150 mmHg may be required if there is uterine bleeding.

Over dilation of the cervix with loosely applied hysteroscopic sheath results in media leakage, suboptimal pressure, and poor expansion of the uterine cavity.

Liquid distension media should be warmed to room temperature prior to use to avoid hypothermia.

The ideal distension media should be nontoxic and hypoallergenic. It should clear rapidly and allow clear visualization.

An optimal surgical drape for hysteroscopy is a urologic pouch with a plastic reservoir pocket which allows the outflow fluid to be collected and quantified. The most important point is that the surgeon, anaesthetist and an assistant should work collectively to monitor the fluid deficit.

Any fluid, can produce pulmonary edema when excessive volumes are administered via the hysteroscope since the pressure gradient to maintain uterine distension is 60 to 70 mmHg, which is much higher than the subendometrial venous pressure of 4 mm Hg.

Low-viscosity distension media can be delivered by hanging a 2- to 3-L bag or a bottle of fluid, 6 to 8 feet above the operating table allowing the fluid to infuse by gravity feed. Use of an automated fluid pump and a monitoring system which provides a real-time fluid deficit is recommended.

#### Liquid Media

##### Low Viscosity

Low-viscosity fluids must be continuously flushed through the uterine cavity to obtain a

clear view. The safest distension media will be *iso-osmolar* with an electrolyte content of 300 mOsm. Additionally, the sodium content of the fluid should be approximately 140 mEq/L.

## Normal Saline and Ringer Lactate

Normal saline (*iso-osmolar* 0.9% sodium chloride) is the safest hysteroscopic media. Because saline is a conductor of electrons, it does not permit the use of current. However, it is safely used with the bipolar electrode, laser, and mechanical devices.

## Glycine 1.5%, Sorbitol 3%, and Mannitol 5%

Glycine (1.5%) and sorbitol (3%) solutions were first used in urology. Since these solutions are *hypo-osmolar* (sorbitol 178 mOsm/L; glycine 200 mOsm/L), they are associated with excessive vascular absorption, acute hyponatraemic and hypo osmolar state. The surgeon should assess serum sodium in the operating room and 4 hours later when using these medias.

Hyponatremia is of concern because this condition produces a gradient between the circulating blood and the brain cells. The brain cells respond by pumping cation out to diminish the positive infusion of water into the brain. This cation-pumping mechanism is decreased in women, due to progesterone, and hence they are at greater risk for developing life threatening cerebral edema. An additional unique risk of glycine is that it can be metabolized to ammonia and cause neurological damage.

## Patient Preparation

- a. **Antibiotic prophylaxis & VTE prophylaxis** are not generally indicated
- b. **Timing of hysteroscopy:** To optimize visualization and to rule out an early pregnancy, hysteroscopy is best performed optimally between day 6 to day 10 of menstrual cycle. For postmenopausal women, hysteroscopy may be performed at any time.
- c. **Endometrial preparation:** Thinning agents (progestogens) may be used prior to hysteroscopic myomectomy or endometrial ablation. GnRH agonists and Danazol are used infrequently due to adverse effects.<sup>3-6</sup>
- d. **Cervical preparation and dilation:** This is an important step in hysteroscopy, as nearly

50 percent of hysteroscopic complications are associated with difficult passage of the hysteroscope through the cervical canal.<sup>7</sup> Cervical dilation can be done mechanically at the time of the procedure (half dilators) or preoperatively with cervical ripening agents (misoprostol or dinoprostone).

## Intraoperative Considerations

### 1. Anaesthesia

The type of anaesthesia used depends upon the procedure, patient's level of anxiety, and the anaesthesiologist's expertise. Simple diagnostic procedures may be completed without anaesthesia, using a paracervical block or mild sedation. For extensive procedures or for patients with a low pain tolerance, general or regional anaesthesia is indicated. If Electrosurgery is to be performed, sufficient anaesthesia must be given to ensure that the patient does not move with uterine stimulation to prevent risk of uterine perforation and intraperitoneal injury.

### 2. Patient Positioning and Cervical Exposure

Hysteroscopy is performed in a modified dorsal lithotomy position i.e. the patient is supine, with her legs are held up in stirrups. Bladder should be emptied. Accurate knowledge of the position of the uterus is critical to safely facilitate the procedure. Cervix may be accessed with or without (*vaginoscopic technique*) using a speculum.

### 3. Vaginoscopic technique

The vaginoscopic, or "no touch," technique is performed without a speculum or tenaculum and without anaesthesia.<sup>8</sup> Women with cervical stenosis are not the candidates for this approach. To perform the vaginoscopic technique, perform a bimanual pelvic examination first with the patient in the dorsal lithotomy position. Prepare the vaginal introitus with saline or povidone iodine.<sup>9</sup> Without using a speculum, introduce a rigid or semi-rigid, narrow calibre (< 4 mm) hysteroscope into the vaginal introitus. Infuse normal saline at a pressure of 150 mmHg.<sup>10</sup> Close the labia minora manually if needed to contain the distending medium. Visualize the cervix and direct the hysteroscope through the cervical canal into the uterine cavity.

### 4. Diagnostic Hysteroscopy Technique

Patient is placed in the dorsal lithotomy position.

Parts are painted and draped. A Sims speculum is placed in the vagina. The cervix is grasped at the 12 o'clock position with a tenaculum. The telescope is checked by the surgeon. The telescope is inserted into the diagnostic sheath, and the selected medium is flushed through the sheath to expel any air within it.

For diagnostic hysteroscopy, routine dilatation of the cervix may be avoided, to prevent trauma. If the hysteroscope is inserted into the canal under direct vision, we can avoid false passage or perforation.

Typically, the endocervical canal shows longitudinal folds, papillae, and clefts. The internal os appears as a narrow constriction at the top of the endocervical canal. The isthmus is a cylindrical extension above the os, and the corpus is a capacious cavity above the isthmus. The tubal ostia are visible at the upper extremities of the fundal cornua. The endometrium is smooth and pink-white in colour with white dot like glands during the proliferative phase and pink and velvety appearing glands in the secretory phase.

**5. Operative Hysteroscopy Technique**

The fully loaded operative hysteroscope is flushed with distension media. Careful dilatation with half size dilators should be performed until the operative sheath negotiates a tight passage through the cervix. With the medium flowing, the hysteroscope can be inserted into the uterine cavity under visualization. The uterine cavity is visualized and any pathology is picked up.

The operating device (e.g., electrode or scissors) is now inserted into the cavity and advanced to make contact with the target tissue. The outflow can be controlled to distend or clear the uterine cavity. In certain operative hysteroscopic surgeries like excision of a septum, lysis of uterine adhesions, and excision of large submucosal myomas, concomitant laparoscopy may be done.

**Complications**

The risks of operative hysteroscopy are related to one of the five aspects viz. anaesthesia related, distension media related, perforation, bleeding and energy source related.

The primary potential risks of cervical trauma, uterine perforation, infection, excessive bleeding, false passage and complications related to the distention media are extremely uncommon

when the procedure is short and does not involve instrumentation of the myometrium (0%–1%).<sup>11</sup>

**1. Anaesthetic complications**

Complications of intravascular injection or anaesthetic overdose include allergy, neurologic effects, and impaired myocardial conduction.

**2. Fluid Overload**

The low-viscosity fluids (1.5% glycine, 3% sorbitol, and 5.0% mannitol) can create serious fluid and electrolyte disturbances which can result in pulmonary edema, hyponatremia, heart failure, cerebral edema, and death. So, it is best to use normal saline, wherever possible. Fluid deficit should be carefully monitored. Table 1 shows fluid deficit at which procedure should be abandoned.

**Table 1:** Fluid deficits at which hysteroscopy should be abandoned

Type of Fluid	Low risk / Uncompromised patient	High Risk/ Compromised patient
Iso-osmolar fluids	2,500 ml	1,500ml
Hypo-osmolar fluids	1,000ml	750 ml

**3. Perforation**

Perforation may occur during dilation of the cervix, positioning of the hysteroscope, or because of the intrauterine procedure itself. The risks of perforation can be reduced by paying careful attention to the technique used to access the endometrial cavity, and by careful use of energy-based systems.

With complete perforation, the endometrial cavity typically does not distend, and the visual field is generally lost. When perforation occurs during dilation of the cervix, the procedure must be terminated. However, because of the blunt nature of the dilators usually there are no other injuries. If the uterus is perforated by the activated tip of a laser, electrode, or an activated electromechanical tissue removal device, there is a risk for bleeding or injury to the adjacent viscera. Therefore, the operation must be stopped, and laparoscopy or laparotomy should be performed.

**4. Bleeding**

The risk of bleeding may be reduced by preoperative injection of diluted vasopressin solution into the cervical stroma.<sup>12</sup> When bleeding is encountered during resectoscopic procedures, the ball electrode can be used to desiccate the

vessel electro surgically. Foley's catheter may be used to tamponade the vessel and should be left in situ for 12 hours.

#### 5. Gas Embolization

Gas embolism is suspected when a patient's vital signs deteriorates (e.g., hypotension, tachycardia, tachypnoea, desaturation, decreased end-tidal CO<sub>2</sub> value) and dysrhythmias or a "mill wheel" murmur appears.

Surgeons can minimize the risk of gas embolism by avoiding Trendelenburg position during hysteroscopy, ensuring that air bubbles are purged from all tubing prior to introduction of the hysteroscope into the uterus, maintaining intrauterine pressures of < 100 mmHg, minimizing the effort needed to dilate the cervix, avoiding deep myometrial resections, and limiting multiple removals and reinsertions of the hysteroscope in and out of the uterine cavity. Treatment of gas embolization: The hysteroscope should be removed. Patient should be positioned on her left side. This aids movement of the air from the right outflow tract to the apex of the right ventricle, where the embolus may be aspirated. I.V. bolus of isotonic NaCl solution should be delivered as a first-line treatment. In addition, percutaneous aspiration of the embolus can be tried. Further evaluation with echocardiography may be needed. Cardiopulmonary resuscitation may be indicated.

#### 6. Infection

Infection is an unlikely complication of hysteroscopy. ACOG does not recommend usage of prophylactic antibiotics at the time of hysteroscopy. Hysteroscopy should be avoided in the presence of gross cervical infection, uterine infection, or salpingitis.

### Postoperative Considerations

Majority of patients after diagnostic or operative hysteroscopy experience an unremarkable postoperative course. They can resume regular diet and activity. Intercourse or tampons use should be avoided for a week. After extensive myoma resection, patient may experience cramping and light spotting or vaginal bleeding for 1 to 2 weeks.

In patients desiring fertility, conception attempts may commence in the next cycle following a polypectomy or excision of a pedunculated myoma. However, following resection of a myoma with an intramural component, conception should be deferred for 3 months.

After synechiolysis, a relook hysteroscopy should be performed to ensure a clear cavity. Simple antibiotics and NSAIDs may be given for 3-5 days.

### Conclusion

Hysteroscopy is a minimally invasive intervention that can be used to diagnose and treat numerous intrauterine and endocervical problems. Given their safety and efficacy, diagnostic and operative hysteroscopies have become standard in the gynaecologic practice. Hysteroscopy should be an armamentarium of every gynaecologist and all post graduates should be trained in hysteroscopy.

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# Comparison of Outcomes Between Vaginoscopy and Traditional Office Hysteroscopy: A randomised control study

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## Abstract

**Aim:** To compare the feasibility and tolerability of vaginoscopy technique of hysteroscopy with the traditional method of office hysteroscopy.

**Methodology:** This randomized controlled study was done on 100 patients who were planned for office hysteroscopy. After checking for their eligibility criteria, they were randomized by computer-generated sequences into two groups. The study group comprised 55 patients while the control group comprised 45 patients. In the study group, hysteroscopy was done without using a vaginal speculum or a cervix grasper while in the control group hysteroscopy was preceded by insertion of a vaginal speculum and grasping of the cervix. The outcomes were recorded in terms of procedure completion, pain scoring by VAS (on the scale of 1 to 10), procedure duration, and post-procedural complications. **Results:**

The success rate of vaginoscopy was comparable to that of a traditional hysteroscopy. The median pain score was significantly lower in the vaginoscopy group as compared to the traditional hysteroscopy group (3 vs. 5;  $p < 0.05$ ). The average duration of the procedure for the vaginoscopy method was significantly lesser than in the traditional hysteroscopy group ( $117.62 \pm 8.81$  vs.  $203.87 \pm 19.23$  seconds;  $p < 0.05$ ). While no complications were noted in the vaginoscopy group, most of the women complained of pain followed by bleeding in the traditional hysteroscopy group.

**Conclusion:** Vaginoscopy method has comparable success rates, causes less pain, and requires a shorter time for the completion of examination than the standard hysteroscopy method. Hence, the vaginoscopy method is a good option for office hysteroscopic examinations.

**Keywords:** Hysteroscopy; Infection; Success, Outcome; Pain; Vaginoscopy

## Introduction

Office diagnostic hysteroscopy, a safe and simple minimally invasive procedure, is the gold standard

for uterine cavity assessment which can be done in an outpatient setting without anesthesia.<sup>1</sup>

The safety profile of this procedure has led to a rapidly rising number of hysteroscopies over the last few years.<sup>2</sup> It has become a well-tolerated procedure with a high success rate. But still, most gynecologists and even patients consider hysteroscopy as an invasive and painful procedure. Pain associated with the procedure has been cited as the most common cause of procedural failure.<sup>3</sup>

A new technique of office hysteroscopy, utilizing a small diameter rigid hysteroscope and an atraumatic "no-touch" technique (vaginoscopy approach), has been advocated lately to increase success rates and mitigate patient's pain and discomfort. The small-diameter irrigating endoscope can be smoothly introduced into the vagina and cervix without using a vaginal speculum or a cervical grasper. This method can eliminate the use of premedication or analgesia and is hassle-free.<sup>4</sup>

The aim of this prospective, randomized, controlled study was to compare feasibility and tolerability between vaginoscopy and standard office hysteroscopy.

## Methodology

This was a prospective randomized controlled study done over one year at the outpatient Department of Gynaecology of the institute. A total of one hundred patients who were greater than 18 years of age and planned for office hysteroscopy were recruited in the study. The exclusion criteria were a demand for general anesthesia by the patient herself, anticipated cervical dilatation, diagnosed case of cervical stenosis, presence of vaginismus, severe lichen sclerosis, active vulvovaginal infection, active pelvic inflammatory disease, or virginal status.

Out of the total 165 patients meeting the eligibility criteria, 100 patients who consented to participate were randomized into the study and control groups

by computer-generated random number sequences. 55 patients were allocated to the study group where hysteroscopy was done by vaginoscopy approach and 45 patients were allocated to the control group where traditional hysteroscopy approach was followed.

Clinical details and hysteroscopy findings of patients were recorded under the subheadings of age, body mass index (BMI), parity, menopausal status, and indications of the procedure. The procedure of hysteroscopy was performed using either the standard or the vaginoscopy method. The latter was done without intraoperative anesthesia or sedation. All patients received pre-procedural analgesia in form of a tablet of 50 mg Diclofenac sodium given per-orally one hour before the procedure.

In the study group, after disinfecting the vagina and cervix, vaginoscopy was performed by introducing a hysteroscope into the vagina and uterus without using a retracting vaginal speculum or holding the cervix with grasping forceps. The external os was identified and the hysteroscope was advanced into the endometrial cavity under direct vision.

In the control group, standard hysteroscopy was done. After disinfecting the vagina and cervix, a retracting vaginal speculum was inserted and the cervix was grasped using a Vulsellum, Tenaculum, or an Allis forceps. The hysteroscope was then inserted directly into the uterine cavity through the external cervical os. We used a rigid 0° office hysteroscope (TEKNO) with a telescope of a diameter of 4 mm. Isotonic normal saline (0.9% solution) was used as a distension media. It was instilled under gravity.

The primary outcomes recorded were pain during the procedure (rated using a Visual Analog Scale-VAS-score on a scale of 1 to 10) and time taken for the procedure. The secondary outcomes which were noted were significant bleeding or excessive pain warranting analgesia usage. The presence of heavy bleeding or persistent bleeding per vaginum lasting several days after the procedure was considered as significant bleeding. Excessive pain was defined as a VAS score of  $\geq 7$  or such intense pain that lead to the abandonment of the procedure.

Categorical variables were presented in numbers and percentages (%). Continuous variables were presented as means $\pm$ SD and medians. Quantitative variables were compared using independent t-tests between the two groups. Qualitative variables were compared using Fisher's exact test. A p-value of <

0.05 was considered statistically significant. The data were entered in an Excel spreadsheet and statistical analysis was done using the Statistical Package for Social Sciences (SPSS) software version 21.0.

## Results

Out of the total 100 patients who underwent an office hysteroscopy, 55 (55%) patients were randomly recruited in the study group (vagoscopy group) and forty-five (45%) patients in the control group (traditional hysteroscopy group).

## Baseline characteristics

The two groups were similar in age, BMI, parity, and menopausal status. The most common indication for hysteroscopy was abnormal uterine bleeding (AUB) in the vaginoscopy group while it was AUB and infertility in the traditional hysteroscopy group. (Table 1)

## Outcomes

The procedure was completed in all (100%) of the patients in the study group. However, it could be completed in only 43 out of the total 45 patients (93.3%) in the control group. This difference was not found to be significantly significant. The cause of failure of completion of the procedure in the rest of the three cases who underwent traditional hysteroscopy was pain which led to abandoning the procedure. The pain scores in these patients were seven, seven, and eight respectively.

The vaginoscopy group had significantly shorter procedural timings (203.87 $\pm$ 19.23 seconds in the study group versus 117.62 $\pm$ 8.81 seconds in the control group) and lesser pain scores (median pain score of 3 in the study group versus 5 in the control group;  $p < 0.05$ ) than the traditional hysteroscopy group. No complication was observed in the study arm, while the most common complication in the control arm was pain (seen in seven women who required postoperative analgesia) followed by bleeding (seen in five patients).

## Discussion

In this randomized study, no significant differences were found in the procedure completion rates between the vaginoscopy and the traditional hysteroscopy groups. However, vaginoscopy was associated with shorter procedural timings and lesser pain than the traditional hysteroscopy group. In

**Table 1:** Comparison of clinical characteristics and indications for hysteroscopy in study and control group

Parameter	Study group (n=55)	Control group (n=45)	P value
Age (years)	37.96±8.13	39.1±7.43	>0.05*
Body Mass Index (kg/m <sup>2</sup> )	23.68±2.58	24.22±2.68	>0.05*
<b>Parity</b>	1.45±1.17	1.8±1.01	>0.05*
Nulliparous	20(36.3%)	14(31.1%)	
Parous	35(63.7%)	31(68.9%)	
<b>Menopausal status</b>			>0.05**
Premenopausal	43(78.1%)	30(66.7%)	
Postmenopausal	12(21.9%)	15(33.3%)	
<b>Indication</b>			
Abnormal uterine bleeding	30(54.5%)	10(22.2%)	
Infertility	10(18.2%)	10(22.2%)	
Retained conception products	1(1.8%)	0	
Hypomenorrhea	3(5.4%)	5(11.1%)	
Fibromyoma	8(14.5%)	3(6.7%)	
Thickened endometrium/polyp	2(3.6%)	16(35.6%)	
Other	1(1.8%)	1(2.2%)	

\*Independent t test; \*\*Fisher's Exact test P<0.05:significant

**Table 2:** Comparison of outcome variables in study and control group.

Outcomes	Study group (n=55)	Control group (n=45)	P value
<b>Completion of procedure</b>			>0.05**
Yes	55 (100%)	42 (93.3%)	
No	0	3 (6.7%)	
Time taken for procedure(seconds)	117.62 ±8.81	203.87±19.23	<0.05*
Median Pain (VAS)score(range)	3 (0-10)	5 (0-10)	<0.05*
<b>Complications</b>			<0.05**
Bleeding	0	5 (11.1%)	
Severe Pain	0	7 (15.6%)	
Infection	0	0	<0.05
Hysteroscopy findings	n=55(100%)	n=42 (100%)	
Endometrial hyperplasia	13 (23.6%)	8 (19.04%)	
Endometrial polyp	11 (20%)	8 (19.04%)	
Endometrial tumour	2 (3.6%)	3 (7.12%)	
Atrophic endometrium	3 (5.4%)	10 (23.8%)	
Submucosal fibroid	11 (20%)	3 (7.12%)	
Intrauterine adhesions	4 (7.3%)	3 (7.12%)	
POC	1 (1.8)	0	
Septum	3(5.4%)	0	
IUCD	1(1.8%)	1(2.4%)	
Endocervical polyp	3 (5.4%)	3 (7.12%)	
Normal	3 (5.4%)	3 (7.12%)	

\*Independent t test; \*\*Fisher's Exact test

addition, postoperative complication and infection rates were not increased in the vaginoscopy group.

Vaginoscopy was less painful compared to the traditional hysteroscopy group (standardized mean difference, -0.44; 95% CI: -0.65 to -0.22).<sup>5</sup> Thus, various authors have suggested making vaginoscopy a standard practice method for uterine cavity evaluation in outpatient hysteroscopy.<sup>6</sup>

The results of the present study in terms of pain

scores matched those published by Garbin et al. and others.<sup>2,7-9</sup> We reported lower pain scores in the vaginoscopy group as compared to the traditional hysteroscopy group (3 vs 5; p = <0.05). Garbin et al. reported that the VAS scores (out of a maximum of ten) were lower for the vaginoscopy group (0.5) than the standard hysteroscopy group (2)(p<0.001).<sup>7</sup> Smith et al., in a randomized trial, observed pain scores of 42.7 and 46.4 (out of a maximum of 100) for vaginoscopy and traditional hysteroscopy methods,

respectively ( $p = 0.02$ ).<sup>2</sup> Almeida et al. observed lower pain scores in the vaginoscopy group than in the traditional hysteroscopy group (1.60 vs 3.39;  $p=0.01$ ).<sup>8</sup> Sagiv et al. also reported lower pain scores with the vaginoscopy method (3.8 vs. 5.3;  $p=0.008$ ).<sup>9</sup> In contrast, Sharma et al. recorded no differences in pain scores between the two methods.<sup>3</sup>

We reported a significantly shorter time taken for procedure completion in the vaginoscopy group as compared to the traditional group (Table 2). In line with our study, Smith et al. and Sharma et al. also reported a shorter procedural time in the vaginoscopy group than the standard hysteroscopy group (2 vs 3 minutes,  $p<0.001$  and 5.9 vs 7.8 minutes, 95% CI: 0.7- 3.1, respectively).<sup>2,3</sup> On the contrary, Garbin et al. recorded no significant differences in procedure completion timings between the two groups.<sup>7</sup>

The procedure was completed successfully in 100% of cases in the vaginoscopy group. Similar rates of success were reported by Sharma et al.<sup>3</sup>

The complication rates were nil in the vaginoscopy group. However, severe pain was noted in seven patients and excessive vaginal bleeding in five patients in the traditional hysteroscopy group. For all of these seven patients who complained of severe pain, the procedure had to be terminated. All of them were prescribed parenteral analgesia in form of aqueous Diclofenac solution. There was no incidence of genital infection in either of the groups, which could be attributed to the pre-procedural disinfection of the vulvovagina.

In the present study, vaginoscopy was reported more superior to traditional hysteroscopy in terms of pain, duration of the procedure, complication rates, and procedure completion rates. The traditional method may resort only in those cases where the vaginoscopy method fails or when cervical dilatation is required. Hence, clinicians should be trained in this mode of hysteroscopy along with the traditional hysteroscopy. Further studies to determine the effect of flexible hysteroscopy on procedural pain, complication, and patient acceptability rates may be planned in line with the present study.

## Conclusion

The vaginoscopy method of hysteroscopy decreases the time taken during the procedure and causes lesser pain than the traditional hysteroscopy with comparable success rates. Therefore, the vaginoscopy method can be recommended as an excellent alternative to the standard method for office hysteroscopies.

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# A Comparative Evaluation of Endometrial Morphology by Doppler Transvaginal Sonography and Hysteroscopy in Postmenopausal Bleeding

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## Abstract

**Objective:** To assess the correlation and compare the efficacy of Doppler Transvaginal Sonography (TVS) with hysteroscopy and directed biopsy in diagnosing endometrial pathology. **Material and Methods:** 80 postmenopausal patients with complaints of bleeding per vaginum were recruited in this observational cross-sectional study. Each of the patients was subjected to a thorough medical check-up, pelvic examination, Doppler TVS, and hysteroscopy. Finally, all patients underwent an endometrial histopathological analysis. The data were entered in an Excel spreadsheet and analysed using the SPSS 21.0 software. **Results:** Hysteroscopy was more sensitive in diagnosing polyps, endometrial carcinoma, and endometrial atrophy. Color Doppler TVS was more specific in identifying endometrial malignancies when compared to hysteroscopy. **Conclusion:** TVS Color Doppler can supplement but not substitute hysteroscopy and directed endometrial biopsy in identifying endometrial pathologies.

**Keywords:** postmenopausal bleeding; endometrial pathology; hysteroscopy; transvaginal sonography; endometrial biopsy

## Introduction

Any bleeding from the genital tract after a year of amenorrhoea in a woman who has not received hormone replacement therapy is considered postmenopausal bleeding. The most common etiology (50%) of postmenopausal bleeding is atrophy of the endometrium. Endometrial polyps, fibroids, and hyperplasias are other important causes. In postmenopausal women, thickened endometrium is reliable, but a non-specific indicator of endometrial disease. The endometrial morphology is usually considered normal when the endometrial thickness is < 4 mm in these women.<sup>1</sup> Transvaginal sonography (TVS) may prove helpful in

distinguishing postmenopausal bleeding patients who may require further diagnostic tests from those needing merely reassurance. In postmenopausal bleeding, an endometrial biopsy is recommended when the endometrial thickness is > 4-5 mm.<sup>2</sup> Color Doppler enables visualization of vessels in the utero-ovarian circulation, measurement of resistance to blood flow, and differentiate benign and malignant endometrium. TVS may help assess the depth of myometrial invasion in cases of malignancy. An office-based endometrial biopsy is 90-98% accurate when correlated with the subsequent histopathological findings of Dilation and Curettage (D&C) or hysterectomy. In the last two decades, the focus has shifted from endometrial biopsy to hysteroscopy aided biopsy in evaluating postmenopausal bleeding cases. Hysteroscopy has the highest accuracy in identifying endometrial polyps but serves poorly for endometrial hyperplasia.<sup>3</sup> Histopathological examination (HPE) of the endometrium is considered as a gold standard modality in determining the diagnostic efficacy of hysteroscopy versus Doppler TVS for endometrial pathologies.

## Materials and Methods

Eighty eligible postmenopausal bleeding patients were recruited in this study after obtaining informed consent and an ethical committee clearance from the institute. Patients with a history of bleeding diathesis and malignant lesions of the cervix, vagina, or vulva were excluded from the study. Each patient was then subjected to a thorough medical and pelvic examination followed by a Doppler TVS and hysteroscopy.

TVS examination was done using a Multi-Hertz endovaginal probe with a field view of 150 degrees and color Doppler settings. The ultrasonographic variables studied were endometrial thickness, echogenicity of endometrium, uterine size, uterine

cavity, cervical canal, myometrium, uterine growths/ polyps, fluid in endometrial cavity, adnexa and resistance index (RI), and pulsatility index (PI) of endometrial and uterine vessels.

On office hysteroscopy, the endometrial surface, tubal ostias, and endocervical canal were inspected systematically. A panoramic view of the uterine cavity was obtained.

Relevant findings on sonography and hysteroscopy were recorded. Finally, endometrial sampling was done for each patient and sent for histopathological examination. The findings of sonography and hysteroscopy were classified as normal or abnormal according to the histopathology findings. The histopathology report was divided into the following groups of atrophic endometrium/inconclusive report, hormonal effect, endometrial polyp/ fibroid, hyperplastic endometrium, and endometrial carcinoma.

The data were entered into an Excel spreadsheet and statistical analysis was done using Statistical Package for Social Sciences (SPSS) licensed version 21.0.

## Results and Discussion

The present study was carried out to efficiently investigate postmenopausal bleeding using invasive and non-invasive methods. The main aim was to rule out endometrial cancer even though benign endometrial pathologies were reported as the most common cause of postmenopausal bleeding. The association of endometrial thickness on TVS with endometrial pathology diagnosed on hysteroscopy is shown in Table 1. Correlation of Doppler Indices with benign and malignant pathology is shown in Table 2. Benign, premalignant, and malignant aetiologies accounted for 87.5%, 23.75%, and 11.25% cases of postmenopausal bleeding, respectively (Table 3). There was no report of endometrial carcinoma in patients with an endometrial thickness of less than 4 mm. However, in patients with an endometrial thickness of  $\geq 11$  mm, the reported incidence of endometrial cancer was 11.25%.

**Table 1:** Endometrial Thickness and Endometrial Pathology on Hysteroscopy

Endometrial Thickness	Endometrial Disease	No Endometrial Disease	Total
Positive TVS (Endometrial thickness > 4 mm)	35	11	46
Negative TVS (Endometrial thickness $\leq$ 4 mm)	3	30	33
<b>Total</b>	<b>38</b>	<b>41</b>	<b>79</b>

**Table 2:** Correlation of TVS Doppler resistance and pulsatility index with histopathological examination

TVS Doppler		HPE		TVS Doppler		HPE	
		Benign	Malignant			Benign	Malignant
RI	>0.82	56	3	RI	>1.76	66	3
	$\leq$ 0.82	14	6		$\leq$ 1.76	04	6
<b>Total (n=79)</b>		<b>70</b>	<b>9</b>	<b>Total (n=79)</b>		<b>70</b>	<b>9</b>

**Table 3:** Endometrial pathology by HPE

HPE	Frequency	Percent
Atrophic endometritis	31	38.75%
Endometrial Ca	Endometrioid type	9
	Squamous type	
Endometrial hyperplasia	Simple hyperplasia without atypia	17
	Complex hyperplasia without atypia	
	Simple hyperplasia with atypia	
	Complex hyperplasia with atypia	
Polyp	10	12.5%
Proliferative	7	8.75%
Disordered proliferative	2	2.5%
Secretory	3	3.75%
Insufficient sample	1	1.25%
<b>Total</b>	<b>80</b>	<b>100%</b>

### **Hysteroscopy in Diagnosing Endometrial Abnormalities in Patients of Postmenopausal Bleeding**

Hysteroscopy in the present study had a high sensitivity (88.89%), specificity (98.57%), positive (88.89%), and negative predictive value (98.57%) in diagnosing endometrial cancer.

For diagnosing an atrophic endometrium, hysteroscopy had a sensitivity of 83.87%, specificity of 100%, a positive and negative predictive value of 100% and 90.57%, respectively.

For diagnosing a polyp, the documented sensitivity, specificity, positive and negative predictive values of hysteroscopy were 90%, 95.65%, 75%, and 98.51%, respectively. The predictive values for diagnosing a thickened endometrium using hysteroscopy was 66.7% (sensitivity), 82.86% (specificity), 33.33% (positive predictive value) and 98.08% (negative predictive value).

We observed that hysteroscopy was a more sensitive test in picking up focal endometrial anomalies like endometrial polyps than TVS (100% vs. 50%).

### **TVS Color Doppler in Diagnosing Endometrial Abnormalities in Patients of Postmenopausal Bleeding**

In the present study, all of the nine patients who were diagnosed with endometrial carcinomas had irregular endometrial surfaces. When the endometrial halo was thin, none of these cases had an abnormal endometrium. Six out of these nine patients had heterogeneously appearing endometrial linings.

For diagnosing endometrial cancer, TVS Doppler had a sensitivity, specificity, a positive and negative predictive value of 66.67%, 100%, 100%, and 95.98%, respectively. For diagnosing atrophic endometrium, the predictive values were 74.91% (sensitivity), 93.75% (specificity), 88.46% (positive predictive value) and 84.91% (negative predictive value). For diagnosing an endometrial polyp, TVS had a sensitivity of 50%, specificity of 97.1%, a positive and negative predictive values of 71.43% and 93.06%, respectively. The reported sensitivity, specificity, positive and negative predictive values of TVS for diagnosing thickened endometrium were 64.86%, 80.95%, 75%, and 72.34%, respectively.

On Color Doppler studies, the uterine artery RI and PI were significantly lower in patients with endometrial cancer. This finding was similar to that reported by Samulak et al.<sup>4</sup>

### **Hysteroscopy and TVS Doppler in Diagnosing Endometrial Morphology in Patients of Postmenopausal Bleeding**

We reported that hysteroscopy overall was a more sensitive test as compared to TVS in diagnosing endometrial pathologies. This finding was in line with the work done by Litta et al.<sup>5</sup> However when it came to diagnosing a thickened endometrium, TVS and hysteroscopy were equally sensitive. Doppler TVS had the added advantage of being highly specific (100%) in diagnosing endometrial malignancies as compared to hysteroscopy.

### **Conclusion**

Every patient with postmenopausal bleeding must undergo a thorough evaluation. This should commence as early as possible to provide her with the best treatment option available through early intervention. Although a thickened endometrium on TVS is a sensitive marker for endometrial cancer, it has low specificity (47.14%) in diagnosing such cases. Hence it is wise to supplement TVS with hysteroscopy and guided endometrial biopsy in all cases of an abnormal looking or a thickened endometrium in patients of postmenopausal bleeding.

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## Events Held in July 2021

S.No.	Date	Event	Time
1	1 <sup>st</sup>	"Antakshari Competition" by the Rural Health Subcommittee AOGD to celebrate Doctor's Day	4:00-6:00 pm
2	3 <sup>rd</sup>	Webinar on "High-Risk Pregnancy" organized by the IMA-SDB in association with AOGD to celebrate Safe Motherhood Week	5:00-7:00 pm
3	3 <sup>rd</sup>	Public Forum on 'Contraception Awareness" by AOGD in Association with Directorate of Family Welfare	4:00-6:00 pm
4	6 <sup>th</sup>	"Anaemia" organized by the IMA-SDB in association with AOGD in celebration of the Safe Motherhood Week	5:00-7:00 pm
5	7 <sup>th</sup>	"Impact of COVID and Endocrinopathies on Pregnancy" organized by the IMA-NDB in association with Reproductive Endocrinology & Safe Motherhood Subcommittees AOGD to celebrate Safe Motherhood Week	2:45-4:00 pm
6	7 <sup>th</sup>	"Infamous Obstetrical Triad- Recognition & Action" by the Safe Motherhood Subcommittee of AOGD	4.45-7:00 pm
7	8 <sup>th</sup>	"Current updates in Antenatal & Postnatal Management of Rh Isoimmunisation" by Foetal Medicine and Genetic Subcommittee	4:00-6:00 pm
8	9 <sup>th</sup>	"Adolescent Endometriosis– An Incessant Problem" (Searching for solutions) by Endometriosis Subcommittee AOGD & DGFS	3:00-5:00 pm
9	10 <sup>th</sup>	Public Forum "Adolescent Menstrual Problems" by Adolescent Health Subcommittee AOGD, DGFS, WOW	4:00-6:00 pm
10	10 <sup>th</sup>	"Management of Abnormal Cervical Screening- A Common Clinical Dilemma " by DGFS & Oncology Subcommittee	2:00-3.30 pm
11	10 <sup>th</sup>	"PCOS & Infertility" by FOGsd in association with NARCHI Delhi and Reproductive Endocrinology Subcommittee of AOGD	5:00-6:00 pm
12	12 <sup>th</sup>	Doctors Forum "COVID Vaccination in Pregnancy– Ask the Experts"	4:30-5:30 pm
13	13 <sup>th</sup>	"Vitamin D & Women's Health" by Multidisciplinary Subcommittee AOGD & DGFS	3.30-4:30pm
14	13 <sup>th</sup>	Series "All about PCOS" Part I by Adolescent Health subcommittee AOGD	5:00-7:00 pm
15	14 <sup>th</sup>	"Urological Injuries during Caesarean & Gynae Surgeries and Fistula Repair" by Urology Subcommittee AOGD	4:00-6:00 pm
16	16 <sup>th</sup>	"Comprehensive Abortion Care: Bridging the Gap" by the Safe Motherhood Subcommittee of AOGD	2:00-4:00 pm
17	18 <sup>th</sup>	"Recurrent Pregnancy Loss: Dilemmas & Solutions" by Reproductive Endocrinology & Foetal Medicine and Genetic Subcommittee	5:45-8:00 pm
18	20 <sup>th</sup>	Series "All about PCOS" part II by Adolescent Health Subcommittee AOGD	5:00-7:00 pm
19	21 <sup>st</sup>	"Demystifying Thyroid disorder in Women" FOGSI Endocrinology committee & Reproductive Endocrinology Subcommittee AOGD	3:00-5:00 pm
20	21 <sup>st</sup>	Quiz "Contraception" AOGD in Association with Directorate of Family Welfare	11:00 am onwards
21	22 <sup>nd</sup>	Series "Basic Gynae Endoscopy" by Endoscopy Subcommittee AOGD & IAGE	6:00-8:00 pm
22	23 <sup>rd</sup>	"Jaagruti Ek Peהל" by IMA-SDB under aegis of AOGD to celebrate World Population Day	5:00-7:00 pm
23	24 <sup>th</sup>	"Menopause" by AOGD under aegis of Indian Menopause Society, Delhi Chapter	4:30-6:30 pm
24	27 <sup>th</sup>	Series "All about PCOS" part III by Adolescent Health Subcommittee AOGD	5:00-7:00 pm
25	30 <sup>th</sup>	<b>Monthly Clinical Meeting by Sitaram Bhartia Hospital</b>	4:00-5:00 pm
26	31 <sup>st</sup>	Master Class "Gestational Trophoblastic Disease" by Oncology Subcommittee AOGD	6:00-8:00 pm

## Forthcoming Events August 2021

S.No.	Date	Event	Time
1	2.8.2021	"Breast Feeding Awareness' by AOGD Outreach Committee	3:00-5:00 pm
2	3.8.2021	"IVF pregnancies: how are they different" by Infertility committee AOGD and NARCHI	5:00-7:30pm
3	3.8.2021	"Breast Feeding Awareness" by AOGD Outreach Committee	3:00-5:00 pm
4	4.8.2021	"Reining in the CS pandemic" by NARCHI under aegis of Safe Mother Hood Committee	2:30-4:30pm
5	4.8.2021	"Breast Feeding Awareness" by AOGD Outreach Committee	3:00-5:00 pm
6	5.8.2021	QI Workshop by QI committee	2:00-5:00 pm
7	5.8.2021	"Breast Feeding Awareness" by AOGD Outreach Committee	3:00-5:00 pm
8	6.8.2021	QI Workshop by QI committee	2:00-5:00 pm
9	7.8.2021	Breast Feeding Awareness by AOGD Outreach Committee	3:00-5:00 pm
10	7.8.2021	Public Forum for Breast Feeding by AOGD Public Coordinator	3:00-5:00 pm
11	12.8.2021	"Male Infertility" by Haryana ISAR under aegis of AOGD	3:00-5:00pm
12	13.8.2021	"Lactation management workshop" by Rural Health committee	1:30-4:00pm
13	13.8.2021	"Improving Fetal Outcomes in maternal medical condition" by Fetal Med Genetics Committee	5:00-7:00 pm
14	14.8.2021	"Challenges during COVID pandemic in population" by Adolescent committee	2:00-4:00pm
15	18.8.2021	"Infertility" by Delhi Gynae forum north under aegis of AOGD	5:00-7:00 pm
16	19.8.2021	Masterclass on "Endoscopic Approach to Surgical Management of Endometrial carcinoma" by Endoscopy Committee & Oncology Committee	6:00-8:00pm
17	20.8.2021	"Pregnancy with thyroid disease" by Multidisciplinary committee in association with DGFSW	4:00-6:00 pm
18	21.8.2021	"Ovarian Cancer" by Oncology committee	5:00-7:00 pm
19	23.8.2021	"Antenatal Vaccination & Labour Care" by AOGD	5:00-7:00 pm
20	26.8.2021	"Infertility Capsule & IUI workshop" by LHMC under the aegis of AOGD	9:00am-5:00pm
21	27.8.2021	NARCHI Pre Congress workshop on Critical Care obstetric" under aegis of AOGD	2:00-5:30pm




**BASICS OF HYSTEROSCOPY**  
25<sup>th</sup> & 26<sup>th</sup> September, 2021

ON POPULAR DEMAND

**Course Fees**  
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 International Delegates - INR 5500  
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# Events held under the aegis of AOGD in July 2021



Antakshari Competition



Webinar on "High Risk Pregnancy"



Public Forum on Contraception Awareness



Webinar on "Anemia"



"Infamous Obstetrical Triad- Recognition & Action"



"Impact of COVID and Endocrinopathies on Pregnancy"



"Management of Rh Isoimmunisation"



"Adolescent Endometriosis"



“Cervical Cancer Screening”



“PCOS and Infertility”



Doctor Forum on COVID Vaccination



“Vitamin D and Women Health”



Series on “PCOS” on 13<sup>th</sup>, 20<sup>th</sup> & 27<sup>th</sup>



Urologic Injuries and Fistula Repair



“Comprehensive Abortion care : Plugging the Gaps”

**PUBLIC FORUM ON BLADDER LEAKAGE REASONS AND CONTROL**

As you know, with the growing age, surgery or due to some other reasons, leakage from the Bladder is becomes a big problem.

**PUBLIC FORUM ON MENSTRUAL AWARENESS AND PROBLEMS IN ADOLESCENTS**

**CERVICAL CANCER AWARENESS AND PREVENTION**

Dr. Pratima Mittal  
Professor Obstetrics and Gynaecology, VMMC & Safdarjung Hospital

Dr. Achla Batra  
Professor Obstetrics and Gynaecology, VMMC & Safdarjung Hospital

**WORKSHOP ON BACKACHE**  
Medical reasons and Therapy through Yoga

Public Forums

**Recurrent Pregnancy Loss: Dilemmas and Solutions**

Organized by:  
**Emcure Hydrozem**

Reproductive Endocrinology Committee & Fetal Medicine Committee of AOGD

"Recurrent Pregnancy Loss"

Quiz on "Contraception"

Quiz on "Contraception"

"Thyroid Disorders in Women's Life"

"Thyroid Disorders in Women's Life"

**Delhi Gynaecologist Forum (North-West) in Association with Multidisciplinary Committee of AOGD invites you for Live Webinar on**

**22<sup>nd</sup> July 2021, Thursday** | **04.00 pm to 06.00 pm**

Dr. Abha Sood, President DGF NW  
Dr. Achla Batra, President AOGD  
Dr. Kiran Chhabbar, Organizing Secretary DGF NW

"Legal Implications for Obstetricians"

"Basic Series on Gynae Endoscopy"

"Basic Series on Gynae Endoscopy"

"Jaagrati Ek Peהל"

"Jaagrati Ek Peהל"



CME on "Menopause"

**Haryana ISAR & Mohali Obs Gynae Society**  
 under the aegis of  
**Reproductive Endocrinology Committee of AOGD**  
 invite you for a webinar on the occasion of  
**WORLD IVF DAY**  
**Sunday, 25<sup>th</sup> July 2021 | 10:00 am to 12:30 pm**  
**"Infertility and IVF"**



Webinar on "Infertility"

**Association of Obstetricians & Gynecologists of Delhi**  
 invites you to  
**Delhi PG Forum**  
**Case discussions on**  
**ABNORMAL UTERINE BLEEDING IN ADOLESCENTS**  
 by  
**Post Graduates of Kasturba Hospital**  
**Monday, 26<sup>th</sup> July 2021 | 7:00 PM to 8:30 PM**

Moderators		Chairperson
<b>Dr. Sruthi Bhaskaran</b> Associate Prof. ObGy UCMS & GTB hospital Delhi	<b>Dr. Shivani Agarwal</b> Sr. Specialist Kasturba hospital Delhi	<b>Dr. Manjula</b> HOD ObGy Kasturba hospital Delhi

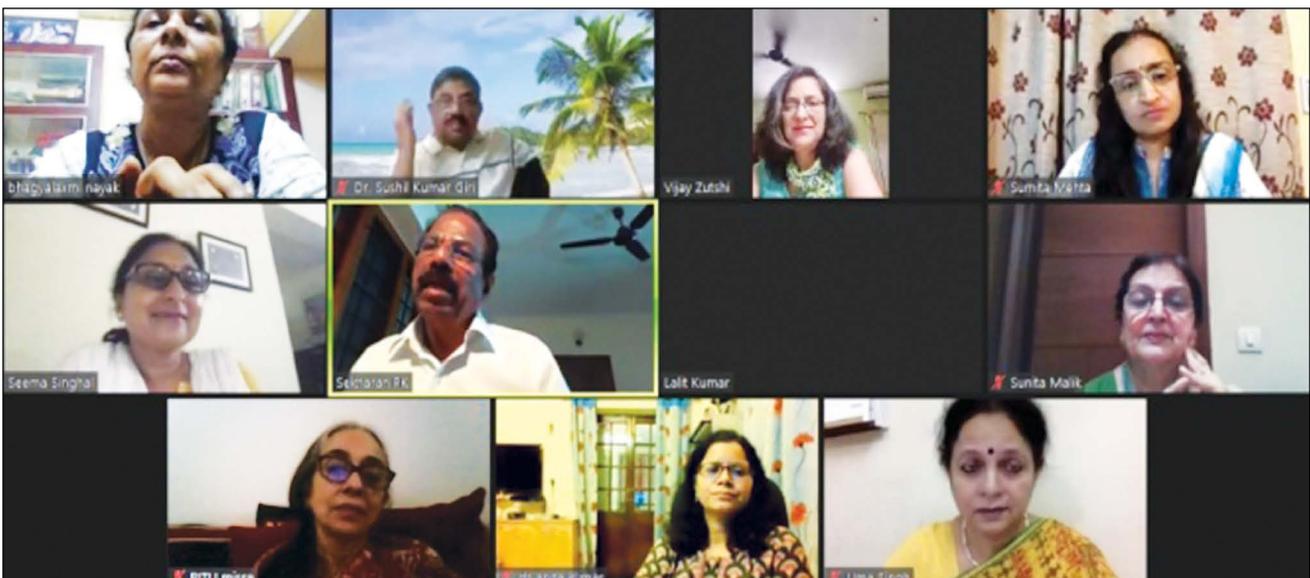
PG Forum on Abnormal Uterine Bleeding

**Webinar on Contraception**  
**Organized by Abbott**  
 Under aegis of  
**Multidisciplinary Subcommittee AOGD**

"Role of Oral Contraceptives in Women's Reproductive Health"



"AOGD Monthly Clinical Meeting" at Sitaram Bhartia Hospital



Master Class on "Gestational Trophoblastic Disease"

# Journal Scan

Saumya Prasad<sup>1</sup>, Sheeba Marwah<sup>2</sup>

<sup>1</sup>Consultant, Obstetrics, Gynaecology & IVF Center, Primus Super Speciality Hospital

<sup>2</sup>Associate Professor, Obstetrics & Gynaecology, VMMC & Safdarjung Hospital

## Role of Single-site and Mini-Laparoscopy in Gynecologic Surgery

Elsa Delgado-Sánchez, John A Peay-Pinacho, Alicia Hernández Gutiérrez, Julio Álvarez Bernardi, Ignacio Zapardiel

*Minerva Obstet Gynecol. 2021 Apr;73(2):166-178.*

**Introduction:** Laparoscopy is a surgical procedure that has been used widely in medicine over the last thirty years. In gynecology, laparoscopy is the “gold standard” for the majority of gynecological procedures, as its superiority over laparotomy has been widely demonstrated. In recent years, the current trend of gynecologists is to make laparoscopy surgery even less invasive by reducing the number of incisions in the skin, as it happens with laparoendoscopic single-site surgery, or by reducing the size of them as in mini-laparoscopy. The aim of this work was to perform an extensive review and update of the evolution of single-port surgery and mini-laparoscopic surgery in gynecology as well as to evaluate its current role in this field.

**Evidence Acquisition:** A systematic review was performed during April and May 2020. PRISMA guidelines were followed for the literature search.

**Evidence Synthesis:** The main objective of performing less invasive procedures is to reduce both intraoperative complications (decreased risk of bleeding or damage to internal organs), and postoperative ones (hernias through the trocar) and improve cosmetic results. Results of studies about LESS and mini-LPS showed encouraging results, being both of them safe with a similar perioperative and postoperative outcome. They have the approval of the international surgical community as well as patients’ satisfaction with cosmetic results.

**Conclusions:** Minimally invasive surgery is the present and future in gynecological surgery. More prospective randomized trials are needed in order to obtain valid results and affirm that both LESS and Mini-LPS are superior to conventional laparoscopy.

## Outcomes of Minimally Invasive versus Open Radical Hysterectomy for Early Stage Cervical Cancer Incorporating 2018 FIGO Staging

Monica D Levine, Jubilee Brown, Erin K Crane, David L Tait, R Wendel Naumann

*J Minim Invasive Gynecol. 2021 Apr;28(4):824-828.*

**Study Objective:** To compare outcomes after minimally invasive surgery (MIS) vs open radical hysterectomy for early stage cervical cancer incorporating 2018 Federation of Gynecology and Obstetrics (FIGO) staging.

**Design:** A retrospective analysis.

**Setting:** A single teaching hospital.

**Patients:** Patients after radical hysterectomy for stage IA1 with lymphovascular invasion, IA2, or IB1 squamous, adenosquamous, or adenocarcinoma of the cervix between 2007 and 2018, mirroring the Laparoscopic Approach to Cervical Cancer trial criteria.

**Interventions:** The use of MIS surgery for performing radical hysterectomy.

**Measurements and Main Results:** The outcomes were compared between patients undergoing MIS vs open approaches. A total of 126 patients met the inclusion criteria. The approach was open in 44 patients (35%) and MIS in 82 patients (65%); 49% were laparoscopic and 51% were robotic. Distribution based on the 2009 FIGO staging showed 1 stage IA1 with lymphovascular invasion, 15 stage IA2, and 110 stage IB1 patients. Although not statistically significant, the 3-year disease-free survival (DFS) was higher in the open compared to the MIS group (95% vs 87%;  $p = .17$ ), and the overall survival was higher in the open compared to the MIS group (97% vs 92%;  $p = .25$ ). Fourteen patients whose disease recurred were Stage IB1 by FIGO 2009 staging; 11/14 were reclassified to a higher stage by 2018 FIGO staging (5/5 open, 6/9 MIS). Adjuvant therapy was recommended for all these patients based on the Sedlis criteria (10/14) or other risk factors (4/14). Despite this, only 1/9 of MIS patients

whose disease recurred received adjuvant therapy compared with 3/5 patients whose disease recurred in the open group (p = .05).

**Conclusion:** In a cohort of patients similar to that of the Laparoscopic Approach to Cervical Cancer trial, 2018 FIGO staging may be useful to refine indications for MIS radical hysterectomy in early stage cervical cancer. However, disparate outcomes between MIS and open approaches may be explained by differences in compliance with National Comprehensive Cancer Network guidelines for adjuvant therapy.

## The Development of a New Uterine Manipulation Method during Minimally Invasive Radical Hysterectomy

**Seiji Mabuchi, Emiko Niiro, Mika Nagayasu**

*J Minim Invasive Gynecol. 2021 May;28(5):1000-1005.*

**Study Objective:** The use of a vaginal uterine manipulator may compromise the oncological outcomes of patients with cervical cancer undergoing minimally invasive radical hysterectomy (MIS-RH). We aimed to describe the safety and efficacy of a novel uterine manipulation device during MIS-RH.

**Design:** Retrospective study.

**Setting:** A university hospital and a tertiary care hospital.

**Patients:** Patients with early-stage cervical cancer who were treated with MIS-RH.

**Interventions:** We developed the U-traction, a new device that consists of a 65-mm half-curved cutting needle with a 2.5-mm polyester tape (45-cm long), and investigated its utility to manipulate the uterus during MIS-RH.

**Measurements and Main Results:** This study describes the utility and safety of the U-traction for uterine manipulation during laparoscopic or robotic RH in 8 patients with cervical cancer. Uterine manipulation was successfully and safely performed using the U-traction during laparoscopic or robotic RH in patients with cervical cancer without any complications. The application time was less than 5 minutes. In all cases, the use of a vaginal manipulator, an additional incision for an extra port, or the need for assistant surgeons for uterine manipulation was avoided.

**Conclusion:** The novel U-traction device allows for easy and reproducible uterine manipulation during MIS-RH. With this device, the use of a vaginal uterine manipulator can be avoided, and MIS-RH can be safely performed without the need for an assistant surgeon for uterine manipulation.

**Block your dates for 43<sup>rd</sup> Annual Conference 2021 to be held on 19<sup>th</sup> - 21<sup>st</sup> November, 2021**

## Calendar of Virtual Monthly Clinical Meetings 2021-22

28 <sup>th</sup> May, 2021	B L Kapoor Hospital
25 <sup>th</sup> June, 2021	All India Institute of Medical Sciences
30 <sup>th</sup> July, 2021	Sitaram Bhartia Hospital
3 <sup>rd</sup> September, 2021	Army Hospital (Research & Referral)
24 <sup>th</sup> September, 2021	Deen Dayal Upadhyay Hospital
29 <sup>th</sup> October, 2021	PGIMS & ESI Hospital
21 <sup>st</sup> - 23 <sup>rd</sup> November, 2021	43 <sup>rd</sup> Annual Conference
26 <sup>th</sup> November, 2021	MAMC & Lok Nayak Jai Prakash Narayan Hospital
31 <sup>st</sup> December, 2021	Sir Ganga Ram Hospital
28 <sup>th</sup> January, 2022	ABVIMS & Dr Ram Manohar Lohia Hospital
25 <sup>th</sup> February, 2022	UCMS & Guru Tek Bahadur Hospital
25 <sup>th</sup> March, 2022	VMMC & Safdarjung Hospital
29 <sup>th</sup> April, 2022	LHMC & Smt. Sucheta Kriplani Hospital
27 <sup>th</sup> May, 2022	Apollo Hospital

# Monthly Proceedings of AOGD Virtual Clinical Meeting at Sitaram Bhartia Institute of Science and Research on 30<sup>th</sup> July, 2021

## Gender Dysphoria

S V Kotwal, Rinku Sen Gupta Dhar, Swati Sinha

**Definition:** Gender Dysphoria (GD) refers to discomfort or distress that is caused by a discrepancy between a person's gender identity and that person's sex assigned at birth (and the associated gender role and/or primary and secondary sex characteristics) It is not a mental disorder. Recent ongoing research suggests variants in several genes in oestrogen signalling pathways of where multidisciplinary and interdisciplinary care ensures that a wide choice of treatment pathways are offered, tailored to the needs of the patient. For some people, treatment may just involve acceptance and affirmation or confirmation of their identity. For others, it may involve bigger changes, such as changes to their voice, hormone treatment or surgery

Hormone therapy must be individualised based on a patient's goals and the risk benefit ratio of medications. This is done after psychosocial assessment. Feminizing/masculinising hormone therapy may lead to irreversible physical changes. Hormone replacement with oestrogen or testosterone is usually continued lifelong after an oophorectomy or orchiectomy, unless medical contraindications arise. Physicians who perform surgical treatments for gender dysphoria should be urologists, gynaecologists, plastic surgeons, or general surgeons.

*For the Male-to-Female (MtF) Patient, Surgical Procedures May Include* Breast/chest surgery: augmentation mammoplasty (implants/lipofilling); Genital surgery: penectomy, orchiectomy, vaginoplasty, clitoroplasty, vulvoplasty;

*For the Female-to-Male (FtM) Patient, Surgical Procedures May Include* subcutaneous mastectomy, creation of a male chest; Genital surgery: hysterectomy/salpingo-oophorectomy, reconstruction of the fixed part of the urethra with a phalloplasty, vaginectomy, scrotoplasty, and implantation of erection and/or testicular prostheses

**Controversy:** Gender Dysphoria in children and the role of puberty blocker drugs for the same is still under debate in some countries although International Transgender care guidelines clearly indicate standard of care regarding their usage. Innate sex hormones can be suppressed using GnRHAs, which produce a reversible chemical gonadectomy until a surgical gonadectomy is performed

**Role of Gynaecologist:** Gynaecologists form a part of the multidisciplinary team who engage with transgender either as part of the transition stage performing surgery or managing pre- or post- transition gynaecological problems. Setting up gender neutral clinics and guiding transgender individuals to the appropriate colleagues is paramount

- Preventive Gynaecology It is recommended that transmen consider a hysterectomy after 4–5 years of testosterone therapy to reduce the risk of endometrial cancer It is recommended that any transman who has retained their cervix should still undergo cervical screening
- Fertility preservation Guidelines recommends clearly informing patients about their future reproductive options before initiating medical or surgical treatment. Options of gamete storage should be discussed before gender affirming hormones or surgical treatment
- Contraception and prevention of unwanted pregnancy

**Conclusion:** Indian law provides for a government official to issue a 'certificate of identity' as a transgender person, without the requirement of any medical or physical examination. It further provides that a person undergoing surgery for change of gender to either male or female may make an application for issuance of a revised certificate indicating change in gender. However we have a long way to go as transgenders are still marginalized in society. There is an utmost need to formalize integrated multidisciplinary care centres to provide care with dignity to these individuals.

## Everlasting Challenges of Endometriosis with Infertility

Priti Arora Dhamija

Endometriosis is an enigmatic disease and often leads to compromised reproductive outcome due to multiple factors. Many patients of endometriosis have already undergone surgical management before they present for ART. Apart from diminished ovarian reserve, high requirement for gonadotropins, reduced fertilization and implantation rates, endometriomas often pose mechanical obstruction to egg retrieval, risk of abscess formation and are the cause of highly situated, inaccessible and adherent ovaries in the pelvis.

We reviewed the data of IVF patients at SBISR and found 12 patients with inaccessible ovaries, most common reason being endometriosis. At the time of pickup, some of these ovaries become heavy and accessible whereas in others, the conventional method of transvaginal oocyte retrieval needed to be modified. Some patients could be managed with traction on cervix, abdominal pressure and for a special subset of patients (n=5) after ensuring that the ovaries are in close proximity to uterus (by TVS, CT, MRI, laparoscopy) the 17 gauge single lumen OPU needle was passed safely using the novel Doppler guided transmyometrial technique to retrieve eggs from the adherent ovary which would otherwise go waste.

All these patients were young (age range 30-32 years), 4 had undergone previous surgeries, 2 of them second time, 2 had low AMH. Long protocol was used in 2 patients, 3 underwent embryo transfer and 2 have ongoing pregnancies.

All patients were observed closely for signs of intraperitoneal bleed and no complications were noted. We conclude that despite a very small subset of patients, we can use this novel technique in patients with inaccessible ovaries without compromising outcome.

## Meconium Blues - Our Experience

Swati Sinha, Priya Sindwani

Meconium stained liquor occurs by three distinct mechanisms– as a physiological maturation event, a response to acute hypoxic event or an underlying

chronic intrauterine hypoxia. Meconium alone is not an indication of foetal distress and usually reflects as mature gastrointestinal tract that is working. Its prevalence is 15-20% of term babies and 30-40% of post term babies.

Historically, it is considered a soft marker for foetal distress and its perceived risk of Meconium aspiration syndrome (MAS) often influences obstetric decisions resulting in high caesarean section rates. However, the causal relationship between MSL and MAS is unclear.

We undertook a retrospective study of our MSL patients over last 5 years 2016-2020. Demographic details, course of labour, mode of delivery and perinatal outcomes were noted in women with meconium stained labour in singleton, cephalic term pregnancies. Our incidence of MSL was 11% (400/3728). 75.5% of the MSL women were primigravida. In 53% (212) of women, MSL was diagnosed in latent labour. 240/400 (60%) of women had normal vaginal delivery, 56/400(14%) had instrumental delivery and 104/400 (26%) had Caesarean section. The caesarean section rate was comparable to our non MSL group i.e. 20%. This is attributable to adherence to evidence based guidelines, continuous intrapartum monitoring, one to one care of women in active labour, urgent caesarean section in case of non reassuring CTG and presence of neonatologist for every delivery/CS that is being practiced in our institute. As regards to perinatal outcomes, 15/400 babies had MAS (3.75%). Of these 6 babies had Apgar score of <7 at 1 minute of birth. Neonatal mortality was 1 out of 400 (0.25%). 31/400 babies (7.75%) had nursery stay for >72 hours and causes included MAS, TTNB and early onset sepsis.

Meconium aspiration syndrome is a challenging condition; however its incidence was low in our study (although the numbers were low). Holistic approach to management is needed for early recognition of foetuses at increased risk for MAS and their delivery should be facilitated.

# Quiz Held at Monthly Clinical Meeting

**Rekha Bharti, Niharika Guleria**

<sup>1</sup>Senior Resident, <sup>2</sup>Professor, VMMC & Safdarjung Hospital

- 1. Provider can be reasonably certain that the woman is not pregnant if she has no symptoms or signs of pregnancy and meets the following except**
  - a. She is within first 7 days of normal menses
  - b. Non-lactating within 6 weeks postpartum
  - c. Nearly fully breastfeeding, amenorrhoeic, and less than 6 months postpartum
  - d. Has been correctly and consistently using a reliable method of contraception
- 2. If following contraceptive is initiated between 5<sup>th</sup> to 7<sup>th</sup> day of cycle, advice additional protection for next 7 days**
  - a. LNG IUD
  - b. LNG implants
  - c. Progestogen-only Injectables
  - d. Progestogen-only pill
- 3. Which of the following is correct for Vaginal Contraceptive Rings?**
  - a. If left in place for >3 but ≤5 weeks, new ring is inserted after 1 week ring free interval
  - b. Tampons should not be used with contraceptive ring
- 4. Which of the following statement is not correct for Uliprestal Acetate?**
  - a. Not recommended for women taking oral glucocorticoids for severe asthma
  - b. Approved as EC by FDA but not by DGCI
  - c. Has better efficacy than LNG
  - d. POP can be started for regular contraception along with UPA
- 5. For MTP of a woman at 16 weeks gestation two approved RMPs need to sign Form I (Opinion Form)**
  - a. True
  - b. False

## Answers

- |         |         |         |
|---------|---------|---------|
| Q. 1- b | Q. 2- d | Q. 3- a |
| Q. 4- d | Q. 5- a |         |

## Winners of the Monthly Clinical Meeting Quiz, July Issue 2021



**Dr Rita Malik**  
Consultant, Malik Maternity  
Home & Surgical Centre,  
Najafgarh, New Delhi



**Dr Priyanka Singh**  
Senior Resident, D Y Patil  
Medical College, Navi Mumbai



**Dr Aditi Chawla**  
Postgraduate Resident  
VMMC & SJH

# Annexure: COVID 19 Mitigating the 3<sup>rd</sup> Wave in India: Adapting to New Norms

Yukti Bhardwaj<sup>1</sup>, Sumitra Bachani<sup>2</sup>

<sup>1</sup>Senior Resident, <sup>2</sup>Associate Professor, VMMC & Safdarjung Hospital

An unprecedented surge of COVID 19 cases and deaths was witnessed in India in the months of March-April 2021. India reported an average of 3.9 lakh cases per day. Combination of new strains, less effective lockdown, less effective monitoring, COVID denial amongst the people and Vaccine hesitancy are being touted as possible reasons for this. The National curve has entered the declining phase and expects to touch the same case counts as in February this year. Any surge after that will be classified as the third wave. The Susceptible- Infected -Recovered (SIR) model predicts that the third wave will peak in September 2021. This article deals with possible preventive arrangements which can mitigate further peaks.

The three terms mutations, variants and strains are often intermixed and confused. Mutation is a change in the virus's genetic sequence. Around 4000 mutations have been recorded in the corona virus spike protein alone. Variant is a virus whose genetic sequence differs from its parent and variants of concern (VOC) are virulent and infectious. Lastly, strain is a variant with many mutations that significantly alters its behaviour.

The Delta Plus variant is the mutated form of the

Delta variant and has so far been found in 85 countries, according to health experts, and has been the driving force behind a surge in infection in South Africa.

This new variant of coronavirus, also known as AY.1, spreads almost 60% faster than its predecessor, the Delta variant. Two graded mutations have occurred in the Delta variant, which was the dominant strain of coronavirus in the country till now. These graded mutations are L452R and P871R. It can be the plausible cause for the third wave. At the time of writing the article Kerala reported 13,772 and Maharashtra reported 9083 new cases which could be ringing the bell for a third wave.

## What are the Symptoms of the Delta Plus Variant ?

The Delta Plus variant causes symptoms of the Delta as well as the Beta variant which includes cough, diarrhoea, fever, headache, skin rash, discolouration of fingers and toes, chest pain, and shortness of breath. Its virulence is still under surveillance however it seems to have milder course in vaccinated individuals.

**Table 1:** Covid Variants

Variant	Details of the Variant
<b>Alpha variant (B.1.1.7)</b>	It was first detected in the United Kingdom in December 2020. This variant is 70% more transmissible and thus spreads easily.
<b>Beta variant (B.1.351)</b>	It was first detected in South Africa in December 2020. It spreads easily but does not seem to cause a severe illness.
<b>Gamma variant (P.1)</b>	P.1 was first identified in travellers from Brazil, who were tested at an airport in Japan, in January 2021. It is more contagious than the earlier strains of the virus. It can infect people who have already contracted COVID-19.
<b>Delta (B.1.617.2)</b>	This variant was identified in India in December 2020. It was responsible for the surge in cases in April 2021. This highly contagious variant has now been identified in 43 other countries including the U.S.A., U.K., Australia, and Singapore. It is responsible for the COVID-19 cases in the young.
<b>Delta plus variant (AY.1)</b>	It is a mutation of <b>Delta (B.1.617.2)</b> which could be responsible for the third wave of the pandemic. It is a sub-lineage of the Delta variant first detected in India and has acquired the spike protein mutation called K417N which is also found in the Beta variant first identified in South Africa.
<b>Epsilon (B.1.427)</b>	Found in America.
<b>Lambda (C.37)</b>	Found in Peru, South America. Now emerged in more than 25 countries.

## What are the Concerns?

The Indian SARS-CoV-2 Genomic Consortia (INSACOG) has informed that the Delta Plus Variant, currently a Variant of Concern (VOC), has the characteristics such as increased transmissibility, stronger binding to receptors of lung cells and potential reduction in monoclonal antibody response. WHO has stated that this variant does not seem to be common, currently accounting for only a small fraction of the Delta sequences however all VOC remain a higher public health risk as they have demonstrated increases in transmission.

## Are Vaccines Effective Against the Delta Plus variant?

The delta plus variant of coronavirus may affect the efficacy of the COVID-19 vaccines available in the country but they will still be effective against the variant. However, a detailed study would be required to establish any effect of the mutant on the immune system. The emergence of the Delta plus variant, has once again put India, and by extension the world, in a state of high alert. The new variant is certainly ringing an alarm over the need to avoid large gatherings and maintain Covid appropriate behaviour. Once again, it's time to ensure that we don't let our guard down.

The government is planning to contain or minimise the impact of a possible third wave with an Emergency Covid Response Preparedness (ERCP-2) package of more than Rs 20,000 crore. The package will focus on strengthening healthcare infrastructure including augmenting dedicated treatment facilities, ramping up hospital beds, bolstering procurement of essential medical equipment and drugs, setting up additional laboratories and testing centres in addition to amplifying the vaccination.

## Role of Obstetricians and Gynaecologists in Mitigating Further Wave of the Coronavirus Pandemic: Adapt to the new norm

Antenatal care (ANC)

1. Antenatal visits should be planned at 12, 20, 28 and 36 weeks of gestation. Antenatal immunizations and sonography can be clubbed along with the visits.
2. It is very important to educate the pregnant women on when to seek urgent medical and obstetric help.

**3. Telemedicine and Mobile health** "Mobile health" has proved to be useful in this outbreak. Mobile health is "the use of mobile devices and its associated technology for health interventions". Telemedicine plays a very important role in mitigating the spread of the virus. It encompasses methods such as web-based programmes, video teleconferences and telephone consultations.

Telemedicine has its own limitations as it lacks the "face to face communication" between the doctor and the patient. Also patient cannot be examined as meticulously as is done in hospital settings. The optimal utilization of e-health and e-consultations and virtual ANC consultations may reduce pregnancy-related complications, and therefore improve maternal and neonatal health during the COVID-19 outbreak. Telehealth is of importance for "uninfected pregnant women" in areas of active infection transmission.

4. During this pandemic associated stress, additional support to the mental health of pregnant women should be an essential component of ANC. It is the social duty of every obstetrician to realize the psychological impact of the pandemic on the mother's health. New onset and exacerbation of subsyndromal psychiatric symptoms has been seen in the pandemic.
5. The antenatal women should be taught "Home BP monitoring". The US Food and Drug Administration (FDA) has expanded its approval for use of noninvasive fetal and maternal monitoring devices at home in patients who require foetal and/or maternal monitoring. This can further reduce patient and health care provider contact and potential exposure to COVID-19 during the pandemic. Emphasis should be laid on regular self-monitoring and early identification of danger signs.
6. The obstetricians should also spread awareness that the central government has now approved the use of COVID vaccines in pregnant and breastfeeding women.
7. "Fixed day approach" for antenatal checkups in a week maybe adopted. The ANC patients should be "triaged" before they come from a physical appointment. It is very important to limit the accompanying visitors. For women who have had symptoms, appointments should be deferred until 7 days after the start of symptoms, unless symptoms (aside from persistent cough)

become severe. Ultrasound for foetal growth is recommended after 14 days following the resolution of acute illness.

8. Patients should inform their obstetrician if they experience symptoms such as dyspnea, unremitting fever  $>39^{\circ}\text{C}$  despite use of antipyretics, persistent chest pain, confusion, or obstetric complications (e.g. preterm contractions, vaginal bleeding, rupture of membranes). Respiratory rate  $\geq 20$  to 24 breaths/minute and/or heart rate  $>100$  beats per minute are also warning signs of patients at risk of clinical deterioration. Those in the third trimester should perform foetal kick counts and report decreased foetal movement.
9. If COVID19 infection is confirmed during pregnancy, isolation for 10 days since the onset of symptoms with 72 hours of being afebrile is recommended.
10. Isolation can be done either at home or in a health care facility depending on the clinical status

The modifications for antenatal USG monitoring if the patient is suspected/ confirmed case of COVID 19 are given in the table below.

**Table 2:** USG monitoring in suspected/ confirmed COVID 19 patient

Scan	Outpatient	Inpatient
<b>11+0 to 13+6 weeks (also for dating)</b>	Combined test to be rescheduled in 2 weeks (if patient still in the gestational age window) Offer NIPT/serum screening and detailed scan 3-4 weeks after recovery	Offer NIPT screening perform bedside if available
<b>18+0 to 19+4 weeks</b>	Reschedule in 3-4 weeks after recovery	Perform bedside
<b>Fetal growth scan (third trimester)</b>	Reduce frequency with first scan 2-4 weeks after recovery	Follow up growth every 4 weeks or earlier based on findings

## Family Planning Services

1. The need to raise awareness about the family planning services and contraception is more than ever in these COVID times. In this pandemic, women's health has been disproportionately affected due to reduced access to contraceptive

and family planning services. It has led to a rise in unsafe abortions and unwanted pregnancies.

2. Emphasis has particularly been laid on long acting contraceptive methods (LARCs) such as postpartum IUD, which are effective and reduce the need for repeated follow-up visits.
3. Awareness also needs to be generated regarding "self-care family planning methods" which include emergency contraceptive pills, injectables, condoms, vaginal rings, and fertility awareness methods.
4. Couples can choose from the "basket of choices" available. Here again lies the importance of telemedicine and mobile health to guide the couples in choosing the appropriate family planning method.
5. Women should be counselled in their antenatal and postnatal period for postpartum contraception like postpartum IUCD insertion or postpartum sterilisation which would in turn reduce the hospital visits.

## Gynaecological Surgeries

1. Elective surgeries should be strictly avoided during the acute peak of the pandemic by using medical or other conservative management or deferring procedures till the peak subsides.
2. Screening Protocols: All patients require screening before entering the hospital. The patients are screened in isolated and separated room preferably outside the hospital building. All health personnel should wear mask, plastic apron and gloves (change gloves in between patients). Patients & their relatives should continue to wear mask all the time in hospital. History of Cough / Fever / Breathlessness / Travel / Contact/ Loss of sensation of taste or smell should be recorded at the initial screening room. In event of a positive history, the patient is sent to "COVID dedicated centres".
3. For gynaecological malignancies, surgeries can be deferred till the end of the peak of the pandemic. During this period, malignancies such as carcinoma Endometrium and carcinoma Ovary should be managed with high dose hormonal therapy and neoadjuvant chemotherapy respectively.
4. Laparoscopy can be performed if emergency surgery is to be done under General anaesthesia (Regional anaesthesia is preferred to avoid aerosol

- spread). Full safety measures in the operating room including Multiple air changes should be available.
5. Laparoscopic procedures and general anaesthesia should be avoided on confirmed COVID positive cases. They are either postponed or are performed via a laparotomy in emergency situation under regional analgesia.
  6. Energy devices are used minimally and with smallest duration possible to avoid fume generation. Low electrosurgery settings are recommended to avoid smoke generation or use smoke evacuators.
  7. Aerosol-generating procedures (AGP) should be performed in a room with negative pressure ventilation.
  8. In operating theatre ensure a minimum of 12 air changes/ hour and filtering of exhaust air.
  9. If air-conditioning is not available, negative pressure can be created by putting 3-4 exhaust fans.

## Art and Covid

1. The ART cycles that were in progress were abandoned in the pandemic. Now when the IVF centres gradually re-starting their services, they can counsel the couples regarding the risks related to the COVID-19 disease and also the increased risks in case of infection during pregnancy.
2. All women who are planning to undergo a fertility treatment should have a "ART risk assessment triage" two weeks before starting the treatment.
3. After triage, these women and their partners should undergo a COVID RT-PCR test.
4. Women or their partners who test positive for the COVID-19 infection should not start treatment until they have fully recovered.
5. Telemedicine should be utilised thereby reducing face to face appointments.
6. Social distancing should be maintained at the ART centre by spacing the furniture in waiting area and workstations.
7. Routine sanitization of all areas should be performed according to local protocols
8. Follow-up of women should be done two weeks after oocyte retrieval and/or embryo transfer to identify potential COVID19 positive patients. If the women and/or their partners become symptomatic after oocyte retrieval but prior to embryo transfer, they should be advised to undergo RTPCR test. If RTPCR is negative, they can continue the treatment

but if RTPCR is positive then they should be advised to postpone the treatment and freeze all their embryos for future use.

9. Semen analysis: It should be ensured that the husband/donor is COVID negative.
10. For COVID positive women and/or partners, cryopreservation of gametes and embryo may be performed using routine practices, although centres are advised to use storage practices as used for infectious diseases such as HIV( like using separate liquid phase storage). Separate cryo-containers and closed system vitrification process are to be used for COVID -19 positive patients.

The practice of Obstetrics & Gynaecology can thus adapt to the COVID era. However the COVID facility of hybrid COVID hospitals should be kept in readiness with all appropriate infrastructure and training of health care professional should continue to ensure complete preparedness for any new surge of cases.

## Suggested Readings

1. Official updates Coronavirus- World Health Organisation. <https://www.who.int/covid-19/information> <https://www.mygov.in/information/covid-19>
2. Coronavirus infection and pregnancy- RCOG. <https://www.rcog.org.uk>
3. Management of Pregnant women in Covid-19 Pandemic. <http://nrhmhp.gov.in>
4. Novel Coronavirus 2019(COVID-19)- ACOG. <https://www.acog.org>
5. Pregnancy with COVID-FOGSI. <https://www.fogsi.org>
6. Pregnancy- COVID-19 Treatment Guidelines. <https://www.covid19treatmentguidelines.nih.gov>
7. Guidelines for management of Pregnant women in COVID-19 Pandemic. <https://www.icmr.gov.in>
8. Good Clinical Practice Recommendations for Gynaecological Endoscopy During the COVID-19 Pandemic. <https://www.iageonline.com>
9. ESGE Recommendations on Gynaecological Laparoscopic Surgery during COVID-19 outbreak. <https://www.esgo.org>
10. COVID-19 and Family planning. <https://www.familyplanning2020.org>
11. Contraception in the era of COVID-19. <https://www.ncbi.nlm.nih.gov>
12. COVID19 Contraception and Family Planning. <https://www.figo.org>
13. Guidelines for Recommencing ART services during COVID-19 Pandemic. <https://icmr.gov.in>
14. ASRM Patient Management and clinical recommendation during the COVID-19 Pandemic. <https://www.asrm.org>
15. COVID-19 and ART. <https://www.eshre.eu>
16. <https://cmeindia.in/chasing-the-corona-third-wave/>

# CALL FOR COMPETITION PAPERS OF 43<sup>rd</sup> Annual AOGD Conference

## ELIGIBILITY CRITERIA FOR COMPETITION PAPERS

- **Candidates should be less than 30 years of age.**
- Only members of AOGD are entitled for paper submission (Proof of membership should be enclosed)
- Registration for Conference is Mandatory
- Send competition Papers (abstract & full text) by email at [aogdcompetitions@gmail.com](mailto:aogdcompetitions@gmail.com) with the Pre-registration details for the conference.
- **Last Date for Competition Paper Submission 15 September, 2021**

## ABSTRACT SUBMISSION GUIDELINES FOR COMPETITION PAPERS

- Title must be in capital letters. It should be short and concise.
- The name of authors should follow immediately under the title in one line. Type initials & family name of authors in BLOCK letters and underline the presenter's name. DO NOT include degrees or professional designations.
- The name of institution, should be in lower case, following immediately after the authors, on a different line.
- Leave one line between the title/ authors/ institution block and the body of the abstract.
- Use single-line vertical spacing and leave one line between paragraphs.
- Please use the following required headings to construct your abstract:
  - Objective: State the purpose of the study or investigation.
  - Methods: State details on study subjects, techniques, and/or observational/analytical methods.
  - Results: Include your main findings, noting statistical data.
  - Conclusions: Summarize principal conclusions, emphasizing new and important aspects.

## GUIDELINES FOR FULL TEXT PAPERS

- Title page should have only topic ,name of candidate ,phone number and email id
- **Full text should only have topic written , name of candidate , place of study should not be mentioned anywhere in the paper.If written would be considered as disqualification**
- Full text should be of 3000 – 4000 words
- All tables and graphs in the full text should be appropriately labelled & numbered.
- References: As per the Vancouver style.
- Use of standard abbreviations is desirable. Please write special or unusual abbreviation in brackets after the full word, the first time it appears. Use numerals to indicate numbers, except to begin sentences.
- All the papers should be original manuscripts and not already published anywhere else.

**NOTE:** 1. Abstract & full text papers should be attached as two 'separate files' in a single mail to be mailed at [aogdcompetitions@gmail.com](mailto:aogdcompetitions@gmail.com)  
2. Selected papers would be presented in conference in competition slot and all other papers would be considered for free paper oral presentation.

**For any Query Please Contact**  
**Dr. Sheeba Marwah: +91 98715 54989 / Mrs. Sarita: +91 92116 56757**

# The Association of Obstetricians & Gynaecologists of Delhi

## 43rd Annual AOGD Conference

**19 20 21 NOVEMBER, 2021**

**Organized By: VMMC & Safdarjung Hospital**

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### Registration Form

#### DELEGATE DETAILS

AOGD Membership No. \_\_\_\_\_

Title: Prof.  Dr.  Mr.  Ms.  Mrs.

Gender: Male  Female

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Last Name

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State:

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#### Registration Fees - Conference + Workshops

Category	Early Bird (Till 30 <sup>th</sup> September, 2021)	1 <sup>st</sup> October to 31 <sup>st</sup> October, 2021	1 <sup>st</sup> November, 2021 Onwards
AOGD Member	INR 3000 <input type="checkbox"/>	INR 3500 <input type="checkbox"/>	INR 4000 <input type="checkbox"/>
Non AOGD Member	INR 3500 <input type="checkbox"/>	INR 4000 <input type="checkbox"/>	INR 4500 <input type="checkbox"/>
PG Students	INR 2000 <input type="checkbox"/>	INR 2000 <input type="checkbox"/>	INR 2000 <input type="checkbox"/>

- Note:**
- Registration for the Conference is mandatory for attending Workshops. Inclusive of 18% GST
  - AOGDIANS above the age of 70 years are exempted from registration fees. Kindly submit copy of your Aadhar Card.
  - Post Graduates to attach a Certificate from HOD and also should be an Annual Member of the AOGD in order to attend and Present a Paper.

**Workshops can only be attended by conference registered candidates**

#### Pre & Post Conference Workshops

Workshops	Proposed Dates
FETAL INTERVENTIONS (APOLLO HOSPITAL) <input type="checkbox"/>	11 - 11 - 2021
STILL BIRTH PREVENTION & MANAGEMENT (LHMC) <input type="checkbox"/>	12 - 11 - 2021
PICSEP (FOGSI) <input type="checkbox"/>	13 - 11 - 2021
MEDICO-LEGAL (MAMC & LNJP HOSPITAL) <input type="checkbox"/>	14 - 11 - 2021
POST PARTUM HAEMORRHAGE (DDU) <input type="checkbox"/>	15 - 11 - 2021
HYPERANDROGENISM: EVIDENCE BASED METHODOLOGY( MAX SAKET) <input type="checkbox"/>	16 - 11 - 2021
LAPAROSCOPY & HYSTEROSCOPY: BASICS & BEYOND (FORTIS LAFEMME & SGRH) <input type="checkbox"/>	17 - 11 - 2021
3 P'S OF CERVICAL CANCER (PROTOCOLS, PROCEDURES, PREVENTION) (SJH) <input type="checkbox"/>	18 - 11 - 2021
REVISITING BASIC INFERTILITY PRACTICES (SHJ) <input type="checkbox"/>	22 - 11 - 2021
FIGHTING THE FRIGHT: NON HAEMORRHAGIC MATERNAL COLLAPSE (GTB) <input type="checkbox"/>	23 - 11 - 2021
UROGYNAECOLOGY - OASIS EPISIOTOMY (SGRH) <input type="checkbox"/>	24 - 11 - 2021
RESPECTFUL ABORTION CARE (AIIMS) <input type="checkbox"/>	25 - 11 - 2021

**IF NOT ALREADY: CLICK HERE TO BECOME AN AOGD MEMBER**

## For Offline Payment

1. All DD/Cheque payable at New Delhi & should be made in favour of "Association of Obstetricians and Gynaecologists of Delhi".

Write your Name and Contact No. at the back of DD/Cheque.

Cheque should be deposit in **AOGD Secretariat, Room no. 1, ward - 6 , Department of Obst. & Gynae, VMMC & Safdarjung Hospital, New Delhi - 110029**

Tel: **01126730487**, Email: **aogdsjh2021@gmail.com**

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**Account No.:** 3674596638

**Bank:** Central Bank of India

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2. Post Graduates to attach a certificate from HOD and also should be an annual member of the AOGD in order to attend and present a paper.
3. To register for workshops conference registration is mandatory

### Cancellation & Refund Policy

1. All cancellation should be made in writing and sent to AOGD secretariat.
2. All cancellation received before 15th september2021 will be entitled for 75% refund of the amount paid.
3. All cancellation received between 15th September 2021 to 30th October2020 will be entitled for only 25% refund of the amount paid.
4. No refund for cancellation made after 30th October 2021.
5. The refund process will begin only 30 days after the completion of the conference.

### AOGD Secretariat

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