The Mumbai Obstetric & Gynecological Society

# MOGS NEWSLETTER

# Buzz & Bytes

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## » MOGS NEWS HEADLINES

आपलं महानगर

### जागतिक लोकसंख्या दिनानिमित्त कार्यक्रम

मुंबई । मुंबई ऑब्स्टेट्रिक अँड गायनेकॉलॉजिकल सोसायटी, एमटीपी कमिटी, एफपीएआय आणि आपीएएस आणि अधिकृत ब्रांडकास्ट पार्टनर अँटिफेन्स यांनी संयुक्तरित्या नुकताच जागतिक लोकसंख्या दिवाचे आयोजन केले होते. हायब्रीड सोसायटीची मुख्यात प्रमुख पाहुणे डॉ. आर. पी. सूनवाला आणि डॉ. उषा कृष्णा यांच्या सान्निध्याने झाली. डॉ. नोझर शेरियार यांनी 'संख्याशास्त्रीय जग निवडून तयार केलेले गर्भनिरोधक उपाय', डॉ. कल्पना आपटे यांचे 'कोविड काळात कुटुंब नियोजनातील आव्हाने', डॉ. अतुल गणात्रा लिखित एसीटी दुरुस्ती २०२१, डॉ. मंदाकिनी मेघ यांचे 'लोकसंख्या स्थिरीकरण आणि सरकारी धोरणे' या विषयावर भाषण झाले. कार्यक्रमासाठी एकूण १८९३ नोंदणी झाल्याची माहिती एमओजीएसचे अध्यक्ष डॉ. निरंजन चव्हाण यांनी दिली.

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## MOGS TIMES

Registration Link/viewer Link:
https://bit.ly/MOGS_WorldPopulationDay

Dr. Niranjan Chavan
President - MOGS

Dr. Rajendra Sankpal
Secretary - MOGS

Chief Guests

Dr R. P. Soonawala

Dr Usha Krishna

Dr Rajendra Singh Pardeshi
President - AMOGS

Dr Sujata Dalvi
Secretary AMOGS
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V P AMOGS
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Chairperson, AMOGS
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and MTP Committee
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नवराष्ट्र

### मासिक पाळीबाबत जनजागृती

### रुग्णालयांमध्ये कार्यक्रमांचे आयोजन

### 'या' रुग्णालयांमध्ये कार्यक्रम

**Dr. Niranjan Chavan**
PRESIDENT

**Dr. Rajendra Sankpal**
SECRETARY

**Dr. Geetha Balsarkar**
TREASURER

*We request our esteemed readers to send their valued feedback, suggestions & views at* **mogs2012@gmail.com**

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C-14, 1st Floor, Trade World, D-wing Entrance, S. B. Marg, Kamala City, Lower Parel (W), Mumbai 400013

Tel. : 022-35114385 / +919022361841 • email: mogs2012@gmail.com

# From the Desk of President

**Dr. Niranjan Chavan**

MD, FCPS, DGO, DFP, DICOG, MICOG, FICOG,

Diploma in Endoscopy (USA), Training In Minimal Access Surgery. ( Hampstead, U.K)

Dear MOGS members,

Happy Ganeshotsav and greetings to all!

It gives me great pleasure to present to you all MOGS Newsletter BUZZ & BYTES, Volume 1, Issue 2, September 2022 as President of MOGS and Editor-in-Chief of this newsletter.

Editors – Dr. Ganpat Sawant, Dr. Bhumika Kotecha and Co-editors – Dr. Pradnya Changede and Dr. Ashwini Sakhalkar have put forth an interesting newsletter for you all.

This newsletter includes articles by eminent faculties who are masters in their fields like Artificial Intelligence in Reproductive Medicine by

Dr. Hrishikesh Pai, article on Managing Stimulation in Polycystic Ovary Syndrome by Dr. Nandita Palshetkar and article on Recent advances in Menopause Management by Dr. Suvarna Khadilkar. Dr. P K Shah has written an excellent article on Recent Advances in Imaging Science for Gynaecological Cancers. Hope you all like reading the article on Laparoscopic Advances in Gynaecological Cancers written by me.

This newsletter includes reports of MOGS programs like World Population Day CME and PPH International Conclave. World population Day was celebrated on 11th July 2022 where we had the honour of having Dr R.P. Soonawala and Dr. Usha Saraiya as Chief Guests. Professor Sir. Sabaratnam Arul Kumaran our international faculty and Past President of FIGO and RCOG enthralled the audience with his talk on PPH revisited – Challenges and Solutions in PPH at the International Conclave. Dr Rajendra Saraogi, our MOGS member spoke on influencing factors for the prevention of PPH. Both were awarded the MOGS Global Excellence Awards.

The Collages of Outreach CMEs held in June and July 2022 are a must-see.

MOGS celebrated World breastfeeding week by conducting several programs like MOGS FOGSI SAFOG UNICEF CME on breastfeeding and World Breastfeeding Week Poster & Slogan Competition. Many MOGS members and non-MOGS members contributed in large numbers and winners were awarded cash prizes.

This newsletter includes the report on Dr N A Purandare Teaching Program at Bhatia Hospital and includes a list of all forthcoming programs of MOGS. Hope you all like the Quiz, Sudoku ,Crosswords provided for your entertainment. Do enjoy the MOGS TRENDZ pics and remember to share your pics too with hashtags.

Your's in MOGS,

**Dr. Niranjan Chavan**

President, MOGS

# From the Desk of Secretary

**Dr. Rajendra Sankpal**

Dear Friends & Colleagues,

We are extremely pleased to present to you the MOGS Newsletter BUZZ & BYTES, Volume 1, Issue 2, September 2022.

This newsletter includes all the exciting events that were conducted by MOGS, almost every single weekend like the MOGS outreach programs, Dr. N. A. Purandare teaching programs, World population day CME and World PPH conclave. It also showcases all the MOGS celebrations of the breastfeeding week like the Poster and Slogan competition. I hope, like me, you too are excited to see all photographs of each and every event!

And if that's not enough, there are enthralling articles on some of our favourite topics ranging from Artificial Intelligence in Reproductive Medicine to Recent Advances in Imaging science for Gynaecological cancers and for those looking to rack their brains with some teasers, there are Quizzes, Sudoku and Crossword. Do enjoy the MOGS Trendz pictures to relive all the fun that we all had in the past few months. As editors, Dr. Ganpat Sawant, Dr. Bhumika Kotecha and Co-editors Dr. Pradnya Changede and Dr. Ashwini Sakhalkar, have compiled this wonderful newsletter of MOGS with great detail.

With kind regards,

**Dr. Rajendra Sankpal**
Secretary MOGS

VISION FOR HER NC
HEAL EDUCATE RESPECT

# From the Desk of Editors

## EDITORS

**Dr. Ganpat Sawant**

**Dr. Bhumika Kotecha**

## CO-EDITORS

**Dr. Pradnya Changede**

**Dr. Ashwini Sakhalkar**

Dear MOGS members,

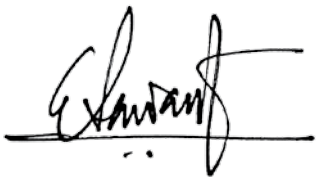
This September 2022, the MOGS newsletter - BUZZ and BYTES, Issue 2, is very informative and keeps all the members abreast of common topics in the field of Obstetrics and Gynaecology. The previous issue of the newsletter has given glimpses of HER WCLD 2022: World Congress on Labour and Delivery, HER WCA 2022: World Congress on Anaemia and MHD: Menstrual Hygiene Day celebration which was highly appreciated by all.

Now it's time for the second MOGS newsletter of the year 2022 which is also equally exciting. It focuses on the latest developments in the field of Gynaecology. All authors are experts in their respective fields and we thank them for their contributions. Along with academic feast, we also have brain tickling quiz time, Sudoku and crosswords for our enthusiastic members.

We thank our MOGS President Dr Niranjan Chavan and office bearers for allowing us to be part of this initiative. We also thank Co-editors and the entire team of Buzz and Bytes for compiling this newsletter so efficiently. We hope you enjoy reading the articles and find them useful. We would welcome any comments or suggestions and encourage you to reach out to us with feedback.

Wishing you and your family good health and a happy reading.

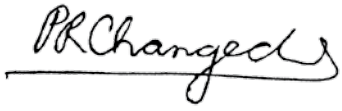
Thank you



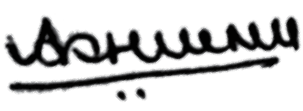
Dr. Ganpat Sawant

Dr. Bhumika Kotecha

Editors



Dr. Pradnya Changede



Dr. Ashwini Sakhalkar

Co-Editors

# Laparoscopic Surgery in Gynaecologic Oncology

**Dr. Niranjan Chavan**

President, MOGS ▪ Joint Treasurer, FOGSI ▪ Professor and Unit Chief, Department of Obstetrics and Gynecology, LTMMC and GH, Mumbai, Maharashtra, India.

Laparoscopy becomes a regular feature in the practice of gynecology during the 1960s. But the role of conventional and robotic-assisted laparoscopy in the management of gynecologic malignancies has increased considerably in the last decade. The ability to perform minimally invasive surgical staging procedures has revolutionized care and quality of life outcomes for women with suspected or known cancer of the female reproductive tract.

The role of minimally invasive surgery in gynecologic oncology has evolved significantly over the last several decades. While initially utilized as a diagnostic tool, it is now employed routinely in the surgical staging and management of gynecologic cancers and precancerous conditions. It is well known that a minimally invasive surgical approach provides several benefits to patients over an open approach. Advanced minimally invasive techniques have been used in the management of pre-cancerous gynecologic conditions, as well as cervical, endometrial, and ovarian cancers. Most studies demonstrate that the risk of cancer recurrence does not appear to increase with a minimally invasive approach. Surgical innovations such as robotic- and hand-assisted laparoscopy as well as single-port laparoscopy are expanding the role of minimally invasive surgery in the treatment of gynecologic malignancies.

## THE EARLY YEARS (1987-1992)

The first of laparoscopic pelvic assessments were performed through two separate inguinal Incisions. The view obtained of the pelvic side walls was much wider and node sampling was much easier than through mediascope. Criticism regarding operative risk, limited area of dissection, etc arose.

## BASIC ELEMENTS OF LAPAROSCOPIC SURGERY

Laparoscopic surgery is usually performed via CO2 insufflation to create pneumoperitoneum. 'Closed laparoscopy', employing a Veress needle followed by blind insertion of the first trocar, is favored by many laparoscopic surgeons. With the hope of decreasing tumour spillage, gasless laparoscopy was developed. Theoretically, gasless laparoscopy has numerous advantages over traditional laparoscopy. It avoids problems of CO2 leakage as well as difficulties associated with creating and maintaining adequate pressure. It can also avoid the potential risk of metabolic and hemodynamic instabilities, infection, etc.

## PORT-SITE METASTASIS

There has been increasing concern among surgical oncologists about the apparent increased rate of port–site metastases following laparoscopic procedures. The reported rate of abdominal wall recurrences from two large studies following traditional abdominal surgery is 1% to 1.5%". The overall incidence of port-site metastases is 2.3%. The risk was highest in patients with advanced ovarian cancer, recurrences of ovarian and peritoneal malignancies in the presence of ascites. Patients

with adenocarcinoma of the ovaries with ascites and peritoneal seeding were at the highest risk of port site metastasis. The time period between the laparoscopic surgery and the appearance of port site metastases varies between 1week and 3 years. The causes of port site metastases are multifactorial: local trauma, tumor manipulation, and biological properties of tumours. *Wang et al* identified a number of risk factors associated with port site metastasis ovarian cancer, adenocarcinoma, histology, peritonei carcinomatosis, and presence of ascites.

## CONCERNS REGARDING LAPAROSCOPIC MANAGEMENT OF PELVIC MASSES

In general, laparoscopic management for pelvic masses is considered safe and effective. There are several advantages to this approach: shorter duration of hospital stays, decreased postoperative pain and recovery time, less adhesion formation, decreased hospital cost, and lower complication rate. But failure to diagnose malignancy, underestimation of the extent of disease, tumour spillage from rupture of the masses, inability to perform complete staging, and long days before a staging procedure or definitive treatment can adversely affect the prognosis of the patient.

# LAPAROSCOPIC RETROPERITONEAL STAGING

## PELVIC AND AORTIC LYMPH NODE DISSECTIONS

Laparoscopy enables mutual assessment, sampling, and systemic dissection of the lymph nodes located in the extraperitoneal space, along the pelvic side walls, and in the paraaortic area.

**Pelvic Dissection:** The surgeon intending to perform pelvic dissection, stands on the patient's left side. The video monitor is placed at the foot of the operation table. The superior vesical artery is the first landmark in pelvic dissection. Retracting it medially enables one to open the paravesical space and free the pelvic side walls. In obese patients, it is recommended to locate Cooper's ligament first. Before dissection, one must identify the vascular landmarks, including the common, external, and internal iliac vessels. The next step is to dissect the node-bearing tissue located between the external iliac vessels and the psoas muscles.

The ureter is identified at the level at which it crosses the iliac vessels. The node-bearing tissue along the inferior aspect of the common iliac artery and posterior aspect of the internal iliac artery is exposed.

The most basic technique of dissection is recommended i.e., grasping the node with grasping forceps and employing blunt dissection to separate the node-bearing tissue from the underlying structure. Removal of the node can be accomplished by a) gathering and extracting them at the end of the procedure using an extraction bag and b) using a specialized nodal extractor such as the Coelio extractor to deliver the node without contaminating the abdominal wall.

Ouerleu et al studied 39 procedures performed on patients with cancer of cervix, stage 1A to I B, the mean duration of procedure were 80 minutes, and no conversion to laparotomy was required. Positive nodes were found in 5 patients which subsequently followed with radiotherapy, rest 34 cases underwent Abdominal hysterectomy or VAH

**Aortic dissection:** Two techniques are described to perform an aortic dissection with the laparoscope. In the first, the set-up is the same as the one used for pelvic dissection. Two details differ- the video monitor is put on the side of the patient opposite the side where the surgeon stands and the video camera is turned clockwise 90 degrees so that the axis of the aorta appears horizontal. The nodal tissue on the ventral aspect of the vena cava is removed, followed by that in the inter aortic-caval space. Finally, the node from the anterior aspect of the aorta and left

side of the aorta are mobilized and delivered. In the second technique, the surgeon stands between the patient's legs with the monitor at the head of the bed. Right gonadal vessels are identified at the level of the third portion of the duodenum. The left renal vein is identified and dissection is performed along the anterior aspect of the vena cava and then continued in the inter aortic-caval interspace, along the ventral aspect of the aorta, and finally along the left aspect of the aorta. The lumbar arteries and veins represent major danger during the final path of dissection.

Lymphadenectomy is one of the cornerstone procedures in gynecologic oncology. The development of laparoscopic lymphadenectomy has opened the door for the use of minimally invasive surgery in the management of gynecological malignancy.

**Extraperitoneal Laparoscopic pelvic lymphadenectomy:** This procedure is no longer routinely used in the present era. One of its important advantages is it avoids the other surface of the peritoneum and thus minimizes the risk of post-operative adhesion. On the other side, it has drawbacks lite prolongs the operation time and has the propensity for a post-operative collection like hematoma, or abscess. This approach is useful in cases where the pelvic cavity is not accessible such as in pregnancy of more than 16 weeks and when severe postoperative adhesions are present.

**Sentinel Node Biopsy:** The use of the sentinel node concept in the clinical management of epithelial malignancy started in 1970. A laparoscope is a tool perfectly suitable for SN biopsy techniques in the field of cervical cancer. The SN injection is started by injecting the normal tissue surrounding the tumor. The size of the needle is ideally 22 G. The injection must not be too deep or superficial. The injected medium – Blue dye (lymphazurin or patent blue violet) or radioisotope colloidal particles are used. The detection rates are generally higher and the number of detected nodes is greater with the radioisotope technique. The surgery is performed in a usual fashion for laparoscopic pelvic surgery, usually within 12 hours of injection of the colloidal radioisotope and immediately after the injection of blue dye. This technique plays a major role in the chances of success and explains the variation in the SN detection rate.

The goal of the SN concept is to avoid systemic dissection in patients who do not have nodal metastases. However, despite the fact, that the clinical significance of the micrometastases is not established. It seems oncologically safer to remove nodes that could be involved. On the other hand, laparoscopy makes systematic dissection a relatively safe and acceptable procedure.

That may be no more morbid than a laparoscopic SN biopsy. A reasonable strategy may include 1) laparoscopy with SN biopsy 2) Frozen section of SN 3) systematic dissection if the frozen section is negative.

**Extraperitoneal laparoscopic aortic lymphadenectomy**: An extraperitoneal approach to the aorta is begun by using a 3 cm incision made at McBurney's point (or at the point exactly opposite on the left side of the patient). The contralateral nodes can be removed using one-sided approach. If one starts with right-sided dissection, it is easy to remove the nodal tissue on the anterior aspect of the vena cava and inter aortic-caval space where right lateral-aortic nodes lie. However, the difficulty lies in reaching the left lateral aspect of the aorta. This is largely due to the non-compressible nature left aorta. Conversely, if dissection is started from the left side, exposing the right lateral aspect of aorta can be simplified by dissecting from beneath the aorta.

Hence it is recommended to start from the left side and move to the right side only if difficulties arise

## LAPAROSCOPIC ASSISTANCE TO RADICAL SURGERY AND LAPAROSCOPIC RADICAL SURGERY

Laparoscopically Assisted Vaginal Hysterectomy and Laparoscopic hysterectomy (LAVH). It includes five types:

Type 0: Laparoscopy is the only used to assess the pelvic cavity and the organs it includes.

Type 1: Laparoscopic management of inflammatory peritoneal adhesions and control of the round ligaments and infundibulopelvic ligaments.

Type 2: laparoscopic division and preparation of uterine arteries.

Type 3: laparoscopic management of paracervical ligaments.

Type 4: laparoscopic transaction of the vagina, transvaginal extraction of the vaginal specimen, and laparoscopic closure of the vagina. It corresponds to total laparoscopic hysterectomy.

**Laparoscopically Assisted Vaginal Radical Hysterectomy**: One of the technical difficulties of the radical vaginal approach is the clamping of parametrium close to the pelvis wall due to its obliquity, this is in contrast to the oblique angle along which the vaginal uses an ipsilateral iliac laparoscopic port, one can operate in the plane of the pelvis sidewall and using endoscopic staplers, bipolar cauterization, etc.

**Modified Laparoscopically Assisted Vaginal Radical Hysterectomy:** Laparoscopic Step: The route used for introducing the laparoscope can be either trans peritoneal or extraperitoneal. Pelvic lymphadenectomy is performed first and then 'para-cervical cellulolymphadenctomy.' Para-cervical cellulolymphadencctomy consists of removing all the lymph node-bearing tissues located in the vascular-nervous web marking up the lateral part of the paracervical ligament.

First, the deep obturator nodes are removed, which completely opens up the para-cervical space, reveals the origin of the obturator vessel, and exposes the ventral surface of the paracervical ligament. The dorsal aspect of the paracervix is exposed and fatty tissue among the paracervical vascular network must be removed.

**Laparoscopic Vaginal Radical Trachelectomy:** Radical trachelectomy is a conservative variant of radical hysterectomy for younger patients affected by early invasive cancer on the superficial aspect of the cervix. The arch of the uterine artery must be identified and preserved. The operation proceeds in the same way as LAVRH. Once the frozen section is negative, the reconstruction is undertaken.

**Laparoscopic Surgery and Endometrial Cancer:** Using a combined laparoscopic and vaginal approach, all the procedures required for endometrial cancer surgery can be accomplished. Complete assessment of the peritoneal surface and retroperitoneal dissection is possible. The patients who undergo laparoscopic surgery seem to have higher satisfaction with laparoscopy when compared to the patients treated with total abdominal hysterectomy in the terms of shorter recovery time, ability to return to a full-time job more quickly. Laparoscopic surgery for the management of endometrial cancer undoubtedly has its limitations. Upwards of 50-80% of women with endometrial cancer are obese. The performance of an endometrial surgical staging procedure can be technically challenging in a morbidly obese woman. Moreover, a patient's comorbidities put her at significant risk for peri-operative morbidity. Therefore, a surgical procedure that minimizes duration under anesthesia and operative morbidity are preferable in this patient cohort. Most of these women can be safely managed with minimally invasive surgery with overall excellent surgical outcome, shorter hospitalization, and less post-operative pain than those managed through laparotomy. Large fibroid that cannot be removed without morcellation should not be operated on

using laparoscopic surgery.

**Hand-assisted Laparoscopy:** The introduction of hand-assisted laparoscopic surgery (HALS) in the 1990s was an attempt to facilitate the transition from open techniques to minimally invasive procedures. HALS allows the surgeon to insert his or her hand into the abdominal cavity through a relatively small incision while preserving the ability to work under pneumoperitoneum. This approach allows for hand assistance during laparoscopic surgery and tactile sensation of the lesion that is not possible with the use of endoscopic instrumentation alone. HALS has been used in the treatment of early-stage colorectal, kidney, and ovarian cancers and various benign surgical and gynecologic indications.

**Robotic Surgery:** Robotic technology represents significant progress along the continuum of minimally invasive operative techniques, accounting for shorter performance times, improved accuracy, greater dexterity, and quicker suturing when matched against conventional laparoscopy. Da Vinci 360-degree console and the latest 3D vision camera are cutting-edge technology being used in the armamentarium of tools for gynae. Oncology surgery.

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# Report of MOGS with AMOGS Family Welfare and MTP Committee Program on Occasion of World Population Day, 11th July 2022

MOGS with AMOGS Family Welfare and MTP Committee along with FPAI & IPAS organized a Hybrid CME on the Occasion of World Population Day.

Date: 11/07/22 Time - 1:30 - 4:30 pm

Venue: FOGSI Office Conference Hall & Onference

Office Bearer in Charge of this program was Dr Sujata Dalvi, Secretary AMOGS and Conveners were Dr Ameya Purandare, VP AMOGS & Dr Komal Chavan, Chairperson of Family Welfare and MTP Committee AMOGS.

The program started at 1:30 pm with Inauguration and Welcome message by Dr Niranjan Chavan, President MOGS & Dr Rajendra Pardeshi, President AMOGS

This was followed by Felicitation of Chief Guests - Dr R P Soonawala & Dr Usha Krishna with traditional style shawl, coconut, flower bouquets & Plaque of MOGS Excellence Award. Following this Chief Guests shared their pearls of wisdom regarding their journey and experiences in the field of family welfare.

The scientific session included 4 talks on Tailored contraceptive solutions - From choice to a world of possibilities by Dr Nozer Sheriar. Chairpersons were Dr Rajendra Pardesi and Dr Rajendra Sankpal

Challenges in Family Planning during Covid Pandemic by Dr Kalpana Apte (FPAI), Chaired by Dr Sujata Dalvi & Dr Suvarna Khadilkar. What's MTP Law 2021? New Amendments by Dr Atul Ganatra. Chairpersons were Dr Kiran Kurtukuti and Dr Ameya Purandare. Population stabilisation & Govt Policies by Dr Mandakini Megh Chaired by Dr Ajay Mane & Dr Komal Chavan.

The Master of Ceremony Dr Bhumika Kotecha & Dr Pradnya Supe conducted the program very well.

Total Registration for the program was 1893 with Live login of 1549 viewers.

The program was very informative and we received lots of appreciation messages from all attendees.

Many thanks to Dr Niranjan Chavan, President MOGS, Dr Rajendra Sankpal, Secretary MOGS, Dr Rajendra Pardesi, President AMOGS & Dr Sujata Dalvi, Secretary AMOGS for the opportunity.


Registration Link/viewer Link:
https://bit.ly/MOGS_WorldPopulationDay

**Dr. Niranjan Chavan**
President - MOGS

**Dr. Rajendra Sankpal**
Secretary - MOGS

**Chief Guests**

**Dr R. P. Soonawala**

**Dr Usha Krishna**

**Dr Rajendra Singh Pardeshi**
President - AMOGS

**Dr Sujata Dalvi**
Secretary AMOGS
MOGS Office Bearer Incharge

CONVENERS

**Dr Ameya Purandare**
V P AMOGS
Member Managing Council MOGS

**Dr Komal Chavan**
Chairperson, AMOGS
Family Welfare
and MTP Committee
Member Managing Council MOGS

# Managing Stimulation in Polycystic Ovary Syndrome

**Dr. Nandita Palshetkar**

Infertility Specialist, Lilavati Hospital's Bloom IVF Centre, Bandra, Mumbai, Maharashtra, India

## BACKGROUND

Polycystic ovary syndrome (PCOS) is a common endocrinological disorder in women of reproductive age causing infertility. About 70–80% of women with PCOS exhibit anovulatory infertility as the primary cause of infertility. For these women to achieve a pregnancy, it is important for ovulation to occur. There are two main treatment strategies involving similar medications for ovulation in PCOS as mentioned below:

a. Ovulation Induction (OI): This treatment strategy is commonly used in patients who do not ovulate on their own. External stimulants are used for ovulation, resulting in mono folliculogenesis.

b. Controlled Ovarian Stimulation: It is used in women who have regular ovulatory cycles but still experience infertility. This strategy results in multifolliculogenesis.

## PHENOTYPIC CLASSIFICATION OF PCOS

The Rotterdam criteria define the classification of PCOS as mentioned in Table 1. It is divided into four phenotypes.

A study by Reshef *et al*., published in March 2020 highlights the clinical significance of Anti-Mullerian Hormone (AMH) levels as a diagnostic parameter in PCOS women. A lot of lean PCOS women with hyperandrogenism have high levels of AMH. Clinical AMH value of more than 8 ng/mL was found to be associated with a low birth rate. Hence, it is important to address the hyperandrogenism and the AMH values for these women to have a healthy pregnancy.

## OI AGENTS

### Letrozole

Clomiphene citrate (CC) has been the drug of choice for OI in PCOS for a long time. However, currently, letrozole is the first drug of choice in women with PCOS for better clinical outcomes. Table 2 suggests the different protocols available for the administration of letrozole in PCOS.

Franik *et al.,* in 2019, based on 42 randomized controlled trials in approximately 7935 women stated that letrozole resulted in a higher live birth rate in women with PCOS as compared to CC. However, the ovarian hyperstimulation rates were similar and there was no difference in the miscarriage and multiple pregnancy rates as compared to CC.

## METFORMIN

Metformin can be considered as a reliable drug in PCOS management as an insulin-sensitizing agent. Morley et al., in 2017 demonstrated that metformin improved the menstrual pattern, ovulation rate, and clinical pregnancy rates in PCOS women. Furthermore, the International PCOS guidelines released in 2018 by ESHRE, ASRM, etc., suggested that metformin can be added to the treatment plan for PCOS rather than persisting with CC or gonadotropins alone.

**Table 1: Classification of various PCOS phenotypes**

| PCOS phenotypes | Definition | Includes |
|---|---|---|
| 1 | Classic PCOS | Women with polycystic ovarianmorphology on ultrasound |
| 2 | Classic PCOS | Women with normal ovaries onultrasound |
| 3 | OvulatoryPCOS | Symptoms of hyperandrogenism, polycystic ovarian morphology, andovulatory cycles in women |
| 4 | Normoandro-genic PCOS | Women have chronic anovulation, polycystic ovarian morphology, and no clinical or biochemical signs of androgen excess or hyperandrogenism |

**Table 2: Letrozole dosing protocols**

| Dose and Duration | Uses |
|---|---|
| 2.5 mg/day fromcycle day 3 to 7 | Used in patients with high AMH >5 ng/mL |
| 5 mg/day from cycle day 3 to 7 | Used in most of the PCOS patientsCan be started on day 2 or 3 |
| 20 mg once oncycle day 3 | Single dosing strategy using 20 mg at once This is not a popular strategy and is rarely used |
| 2.5 mg from cycleday 1 to 10 | Extended protocol for use beyond the regular5-day treatment |

## INOSITOL

The International PCOS Guidelines in 2018 stated that inositol can be used in PCOS, and evidence suggests that D-chiro inositol may improve ovulation rates, however, it does not have any effect on the body-mass index (BMI) or improves the metabolic syndrome in women with PCOS.

However, Deepti *et al*., in May 2020 reported that 9 articles were reviewed on inositol usage in PCOS, and their use has showed improvement in the oocyte and embryo quality. More randomized controlled trials are required to prove its strong efficacy.

## MELATONIN

Melatonin is usually administered when the egg quality is bad in women with PCOS. Sina *et al*., showed that in PCOS patients, the serum levels of melatonin are high. However, the follicular level of melatonin remains decreased.

Melatonin is important to promote the oocyte maturation and ovulation by protecting the oocytes against oxidative stress. It also promotes weight loss, healthy BMI and reduces intra-abdominal fat. Supplementation of melatonin in PCOS women should be strongly considered.

## GONADOTROPINS

These are the second-line drugs given in PCOS patients and the administration of gonadotropins requires ultrasound monitoring. They always present a risk of multiple pregnancies and hence, low-dose gonadotropin protocols can induce a better monofollicular response as compared to CC or letrozole. In PCOS patients with CC resistance, it is recommended to use gonadotropins along with metformin for a better clinical response. Furthermore, triggers should be used only when <2 follicles are present.

The Cochrane review of 2015 consisting of 14 trials in 1726 women compared ten trials between recombinant follicle- stimulating hormone (FSH) versus urinary FSH and 4 trials between FSH-P versus HMG. It suggested that there was no difference in live birth or ovarian hyperstimulation rates between them. Hence, any choice of

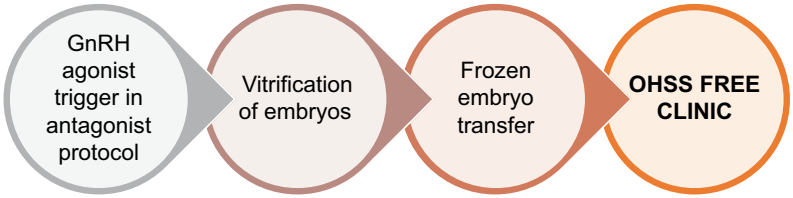


**Figure 1: Segmentation approach to obtain an ovarian hyperstimulation syndrome-free clinic.**

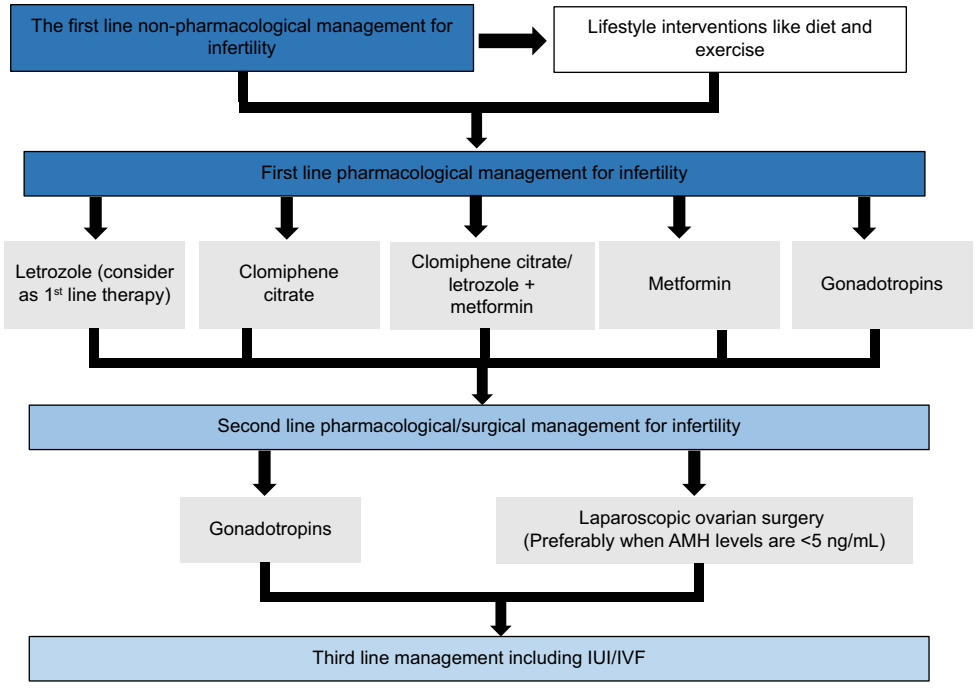


**Figure 2: Treatment algorithm for infertility in polycystic ovary syndrome.**

gonadotropin can be successfully used in PCOS women.

## GONADOTROPIN STEP-UP DOSING PROTOCOL

1. Conventional step-up protocol A dose 75–150 IU of gonadotropins is started from day 1 to 5. The dose is increased by 75 IU FSH every 5 days until the desired follicular response is seen.
2. Chronic low dose step-up protocol A low starting dose of 37.5– 75 IU is given 7 days. After 7 days, an ultrasound monitoring is performed, based on which the dose can be increased by 50–100% of the starting dose until the next 7 days. Human chorionic gonadotropin (hCG) 5000 IU can be used as a trigger for achieving a dominant follicle of >16 mm size.
3. Step-down protocol Started with dose of 112.5–187.5 IU/day and the dose is decreased every 4–5 days by 37.5 IU until a dominant follicle of >16mm is seen. hCG 5000 IU is used as a trigger.
4. Sequential regimen CC or letrozole is administered by cycle day 2–5. Gonadotropins at the dose of 75 IU are added from day 6. Ultrasound monitoring is done for observing the developing follicles and once the dominant follicle reached 17–18 mm, hCG trigger is administered.

## GONADOTROPIN-RELEASING HORMONE (GNRH) ANTAGONISTS

GnRH antagonists are preferred to be added to the treatment regimen as they prevent premature luteinization in women with PCOS, leading to 25–30% higher pregnancy rates with IUI.

### Trigger

A low dose hCG and GnRH analog are used as triggers. Sometimes, a dual trigger is also given,

which includes a bolus of GnRH agonist for the release of luteinizing hormone (LH) and FSH from the pituitary along with the long-acting LH activity of a small bolus dose of hCG, covering the early luteal phase LH deficiency.[1]

**Plan of Action**

The International PCOS guidelines recommend OI with timed intercourse as the first choice for achieving a pregnancy. The usual course of action for fertility treatment in PCOS patients includes:

- CC or letrozole therapy with timed intercourse – 3 cycles
- CC or letrozole + FSH + intrauterine insemination (IUI) – 2 cycles
- CC or letrozole + FSH + antagonist+ IUI – 2 cycles
- FSH + antagonist + IUI – 2 cycles
- *In vitro* fertilization (IVF)

Indications that suggest proceeding to IVF include poor or lack of response to OI, prevention of ovarian hyperstimulation, or coincidental to other factors such as male or tubal factors or unexplained infertility.

**IVF**

IVF is the third line of management resulting in similar pregnancy rates for both PCOS and non-PCOS women. In this procedure, the GnRH antagonist protocol is preferred. Analog, low dose hCG, or dual trigger can be used in IVF procedure. Metformin is always preferred as an adjunct therapy during IVF.

**Segmentation Approach**

The most common problem encountered with the IVF procedure is the serious consequences of ovarian hyperstimulation syndrome (OHSS). In recent times, a segmentation approach[2] to manage this in women with PCOS has been developed [Figure 1], leading to an OHSS-free clinic.

**Algorithm for the Management of Infertility in PCOS**

The International guidelines recommended an algorithm for the treatment of infertility in PCOS outlined in Figure 2.[3]

## CONCLUSION

Women with PCOS often present with infertility. Initiating medications for OI is comparatively a simple treatment for female infertility. First-line management of infertility should always include lifestyle modifications such as diet and exercise.[4] CC has been the drug of choice for OI in PCOS for a long time. However, currently, letrozole is the first drug of choice in women with PCOS. Gonadotropins and laparoscopic ovarian surgery should be considered as second-line therapy for infertility. If a patient does not become pregnant in a timely manner, resources including IUI or IVF are other effective options.

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# Report of MOGS International PPH Conclave held on 23rd July 2022

Date: 23 rd July 2022

Time: 7 - 10 pm

Venue: Hotel Orchid, Vile Parle, Mumbai.

This focused program on PPH began with a talk on Influencing factors for the prevention of postpartum haemorrhage by Dr. Rajendra Saraogi. This session was chaired by Dr. S N Agarwal, Dr. Aspi Raimalwala and Dr. Shashikant Kamat.

This was followed by Inauguration Ceremony with traditional lamp lighting by dignitaries Prof Sir Sabarathnam Arulkumaran, from UK ( Past President FIGO), Dr. Shyam Desai (Trustee MOGS), Dr. P K Shah (Past President MOGS) along with Dr. Niranjan Chavan (President MOGS), Dr. Rajendra Sankpal (Secretary MOGS) & Dr. Komal Chavan, Convener & Chairperson FOGSI Medical Disorders in Pregnancy Committee.

After the Presidential address and welcome by Dr. Niranjan Chavan, Prof Sabaratnam Arulkumaran and Dr. Rajendra Saraogi were felicitated and presented MOGS Global Excellence Award. Inauguration concluded with a vote of thanks by Dr. Rajendra Sankpal, Secretary MOGS.

The second talk was on PPH revisited- Challenges and solutions: Highlights on Carbetocin by Prof Arulkumaran. This session was chaired by Dr. Shyam Desai, Dr. P K Shah and Dr. Niranjan Chavan. It was an excellent elaborative lecture with lots of scientific studies, references and recent advances.

The last session was an Interactive Panel discussion on various clinical scenarios of PPH. Moderators for this panel were Dr. Komal Chavan and Dr. Mansi Medhekar

The panel Expert was –
Prof Sir Sabarathnam Arulkumaran
and Panelists were
Dr. Madhuri Patel
Dr. Rajendra Saraogi
Dr. Arun Nayak
Dr. Bipin Pandit
Dr. Parikshit Tank
Dr. Ashok Anand

Master of Ceremony- Dr. Pradnya Changede, and Dr. Pranay Desai conducted the program very well.

The program was granted 1 MMC and 3 ICOG points and was well appreciated by all for lots of practical and evidence-based take home messages.

Many thanks to MOGS President, and Secretary for this opportunity.

# PPH Conclave




# Recent Advances in Imaging Science for Gynecological Cancers

**Dr. P. K. Shah**

Department of Obstetrics and Gynecology, King Edward Memorial Hospital and Seth Gordhandas Sunderdas Medical College, Mumbai, Maharashtra, India

## INTRODUCTION

Gynecological malignancies are of increasing importance to the gynecologists as well as radiologists, not only due to the changing demography of population but also due to the diverse symptoms.

This article aims to provide a comprehensive overview of the current practice of ultrasonography in gynecological malignancies. With advances in magnetic resonance imaging (MRI) and functional imaging, imaging in gynecological oncology has been revolutionized. These imaging methodologies have been integrated into disease diagnosis, staging, and treatment.

## MALIGNANCY 1: CARCINOMA CERVIX (CACX)

TVS is useful in studying the size and extent of the tumor, parametrial involvement of bladder and/or rectum, response to the therapy, and long-term follow-up. Although, to study the involvement of ureters, kidneys, liver metastasis, and lymph nodes transabdominal sonography should be used.

**Diagnostic Features of Cancer Cervix by TVS**

- Presence of pyometra
- Direct extension of hypoechoic mass laterally into the parametrium as shown in Figures 1-3.
- In case of recurrence, it is seen as an irregular hypoechoic mass at the vault of the vagina
- Direct involvement of the vagina from Cancer cervix can be studied with a water balloon or condom in the vagina
- Involvement of bladder/rectal wall.
- TVS cannot differentiate parametrial involvement by inflammation or malignancy.

**Limitations of TVS in Cancer Cervix**

- Cephalic extension of the tumor from the cervix cannot been seen
- Extra pelvic masses, metastasis, and lymph nodal involvement cannot be visualized
- Radiation fibrosis and recurrence often difficult to differentiate
- TVS is complementary to clinical examination and TAS
- It is not found to be overall cost-effective.

**Disadvantages of TVS in Cervical Cancer**

- It may cause difficulty in visualizing the cervix properly
- It may initiate bleeding
- It makes the examination messy
- Manipulations of the probe at times are painful and difficult with a big mass on the cervix
- In elderly patients with stenosed vagina, it may not be possible to perform TVS.

**Scope of Transvaginal Color Doppler (TVCD)**

- It is used for the detection of neovascularization
- Measuring blood flow and waveform analysis to

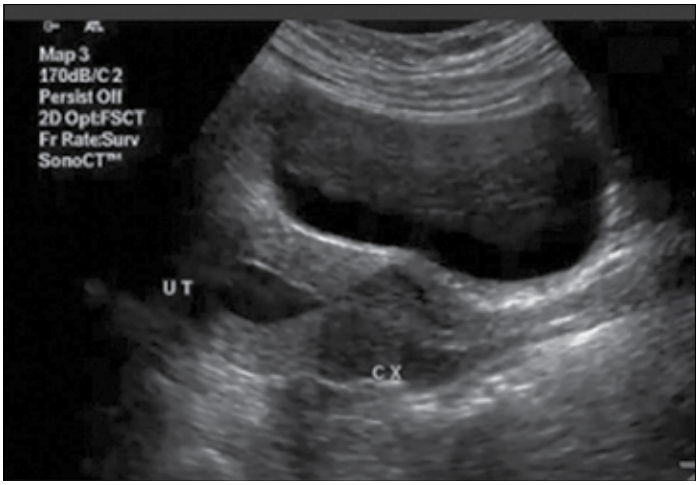


**Figure 1: It's a typical case of Ca cervix with hypoechoic mass in the region of the cervix**

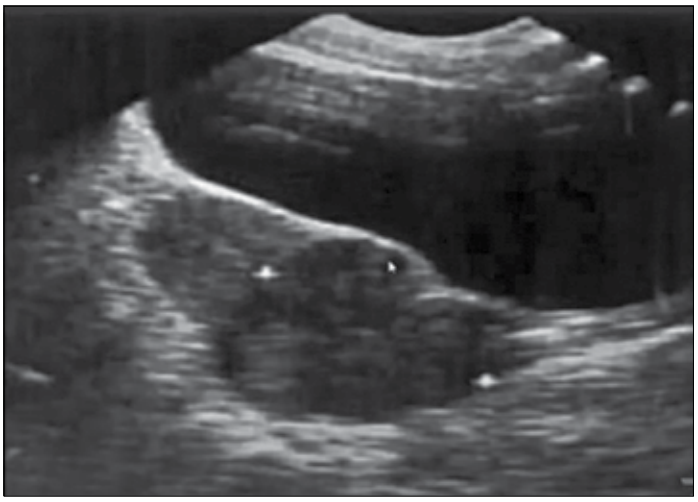

**Figure 2: TAS: Longitudinal section of pelvis ca cervix. Huge mass going upto the body of the uterus and also in the vagina**

differentiate the benign from malignant tumors

- Resistance index (RI) < 0.4 or Pulsatility index (PI) < 1, then it suggests malignancy

Bernaschek (1986) and Carter (1992) have used TVS for proper staging of cancer cervix. Trans-rectal sonography, CT scan, and MRI are better methods for the diagnosis of cancer cervix compared to TVS.

A study on transrectal ultrasonography (TRUS) versus MRI in the staging of early cervical cancer published in the International Journal of Gynecological Cancer showed that the accuracy for detecting a tumor in 95 patients was 93.7% for TRUS compared to 83.2% for MRI.

**3D USG in Cancer Cervix**

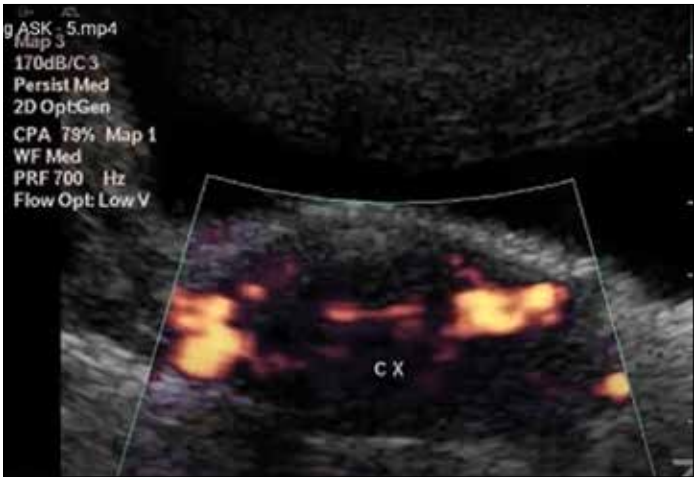


**Figure 3: The figure shows TV color doppler of the CA cervix vascularity**

- In the cervical cancer group, there was a significant positive correlation between 3D- PDU indices and cervical volume
- Estimation of cervical volume is done using a vocal software.

**Power Doppler in Cancer Cervix and Cervical Intraepithelial Neoplasia**

- The three indices (vascularization index [VI], flow index [FI], and vascularization FI [VFI]) were all statistically significantly higher in the cervical cancer group and precancerous lesions group than in the controls ($P < 0.001$) and in the cervical cancer group than in the precancerous lesions group ($P < 0.001$)[1]
- However, the indices did not significantly differ in relation to the grade, histology, presence of positive lymph nodes, or lymphovascular 1995 space involvement ($P > 0.05$).

  The Figures 4 and 5 show Power Doppler ultrasound in cancer cervix and the vascularity.
- Cervical cancer staging prior to 2018 was entirely based on clinical and surgical findings. However, in 2018, FIGO revised cervical cancer staging to incorporated imaging findings into the staging system
- As per the revised system, imaging and pathology findings can be used to supplement tumor size and extent at all stages

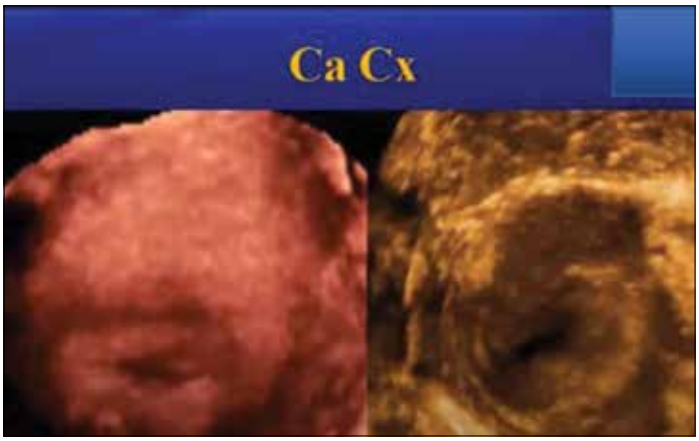


**Figure 4: 3-D USG in cervical carcinoma**

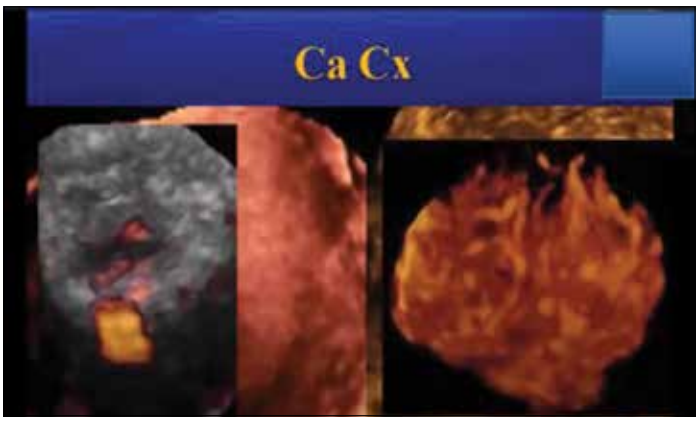


**Figure 5: 3D- USG with color doppler in cervical carcinoma**

- In addition, there was a newly introduced "Stage IIIC" for lymph node involvement, which is further subdivided into o
  - o IIIC1 (pelvic lymph node) and
  - o IIIC2 (para-aortic lymph node)
  - o A small letter "r" for imaging and a "p" for pathology is used as a suffix to the stage to denote the method of lymph node detection[3]
- Due to its exquisite soft-tissue resolution, MRI is the imaging modality of choice in evaluating local disease extent
- MRI can best identify parametrial invasion, which upstages disease to at least FIGO IIB and classifies the disease as locally advanced, with a sensitivity and specificity of 73% and 93%, respectively.[3]

**Fertility Preservation**

- In disease of FIGO 1B1 or below, fertility-sparing treatment such as conization and trachelectomy can be alternatives to radical surgery

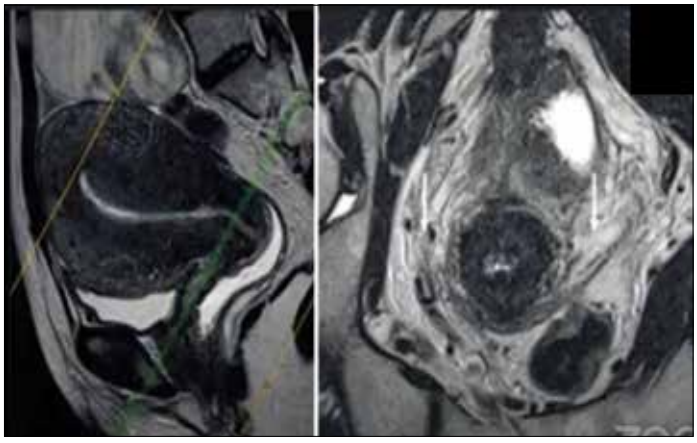

**Figure 6: Image of ca cervix showing extension into the parametrium.**

- A multidisciplinary approach and MRI, play a key role in the selection of cases
- Preoperative MRI with parametrial assessment will give an accurate delineation of the extent of the tumor, especially in the craniocaudal planes with endocervical cancer and the relationship to the internal os[3]
- Measurement on MRI correlates well with pathological measurement. A distance of 5 mm to 10 mm between the tumor and the internal os puts the patient at high risk for local recurrence after surgery
- Other factors to consider include a maximum tumor size of <2 cm with sufficient cervical length after resection (at least 1 cm), absence of deep cervical stromal invasion, and absence of lymph node involvement.

  The MRI image in Figure 6a shows the sagittal section and the image in Figure 6b on the right shows the coronal section.

  The clear boundaries and arrows are pointing at the parametrium on both sides and no tumor is going from the cervix to parametrium . Parametrium is normal.

**Image-Guided Brachytherapy**

- MRI is important not only for diagnosis but also

for the management of the condition

- The GEC-ESTRO (The Groupe Européen de Curiethérapie and the European Society for Radiotherapy & Oncology) guidelines recommend MRI- guided brachytherapy as a component of radiotherapy in locally advanced cervical cancer treated with chemotherapy (FIGO IB-IVA)[3]

  It shows the CA cervix area and radiation can be given through it.

**Transrectal USG for CA Cervix**

- TRUS-guided interstitial of the cervix is not brachytherapy widely practiced in India, though recommended for patients ineligible for ICBT.

## MALIGNANCY 2: CARCINOMA ENDOMETRIUM

- The incidence of carcinoma is on the rise
- It is the cause of 7% of cancers in women
- The age group most affected is between 50 and 64 years
- 75% of carcinoma endometrium occur in post-menopausal age.[2]

**TVS: Endometrial Thickness**

| Phase | AP diameter range in mm |
|---|---|
| Menstrual phase | 1–4 |
| Proliferative phase | 4–8 |
| Secretary phase | 7–14 |
| Postmenopausal | 4–8* |

*Up to 10mm if taking estrogen Normal endometrial volume: Proliferative phase 1.6±0.4 ml Secretary phase 3.6±0.8 ml

- TVS can help in distinguishing patients with endometrial atrophy from patients with a significant amount of endometrial tissue (hyperplasia), submucous fibroid, or polyps
- Instillation of fluid (sonohysterography) can help distinguish global thickening of endometrium from polyps or focal thickening.

  Any endometrium >5 mm in post-menopausal women warrants endometrial biopsy

**How Endometrial Hyperplasia is Associated with Endometrial Cancer?**

- Simple hyperplasia - 1% progress to endometrial cancer
- Complex hyperplasia - 3% progress to endometrial cancer
- Complex hyperplasia with atypia - 28% progress to endometrial cancer.

About 30–40% of endometrial cancers develop with a background of atypical hyperplasia. These tumors, however, tend to be lower grade.[2]

**USG Features**

- Diffusely thick endometrium with well-defined margins
- Small cysts in the endometrium.

**Differential Diagnosis**

- Cystic atrophy of the endometrium
- Endometrial polyps
- Endometrial carcinoma.

**TVS Criteria for Diagnosis of Carcinoma Endometrium**

- Thickened endometrium (more than the normal range for different age groups and phases of menstruation)
- Hyperechoic endometrium or variable echogenicity (due to necrosis and hemorrhage in it)
- Enlarged distended uterus with irregular margins
- Loss of continuity of sub endometrial halo due to the involvement of myometrium, dense echo complexes penetrating myometrium (disruption of endo myometrial interphase)
- The uterine cavity appears enlarged, irregular, and indistinct in outline.
- Presence of pyometra/hematometra due to extension to cervix

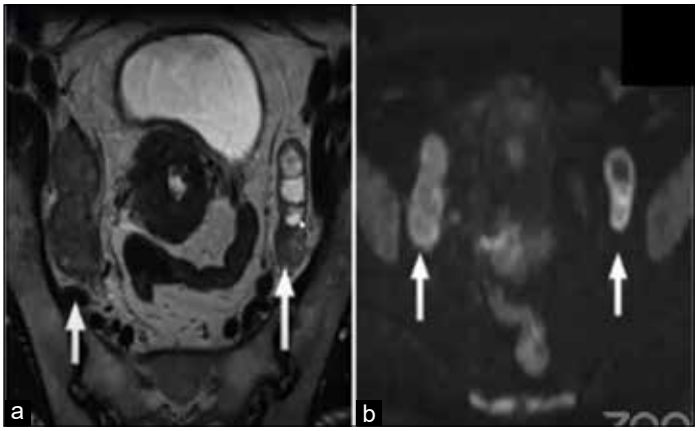


**Figure 7: (a) Image of involvement of lymph nodes on both the sides. (b) Type of lymph nodes involved identified using T1 edited image**

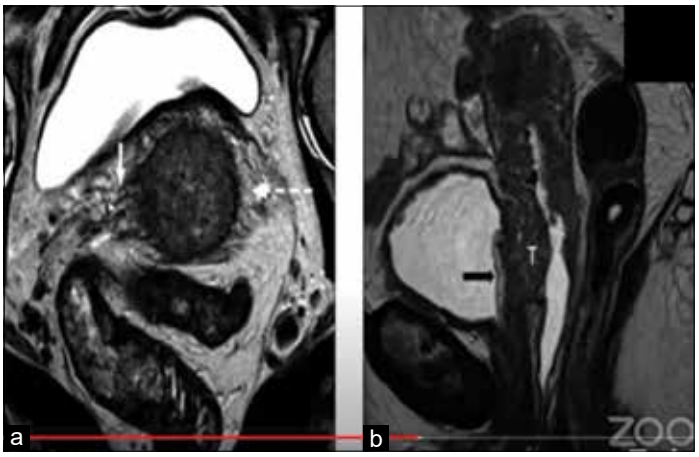


**Figure 8: (a) The infiltration of cervical tissue into the parametrium on the right-hand side and on the left hand side, the wall of the cervix is clear. (b) The sagittal section on MRI shows the mass at the entry leaf of the cervix. Furthermore, it shows the edema of the wall of the bladder**

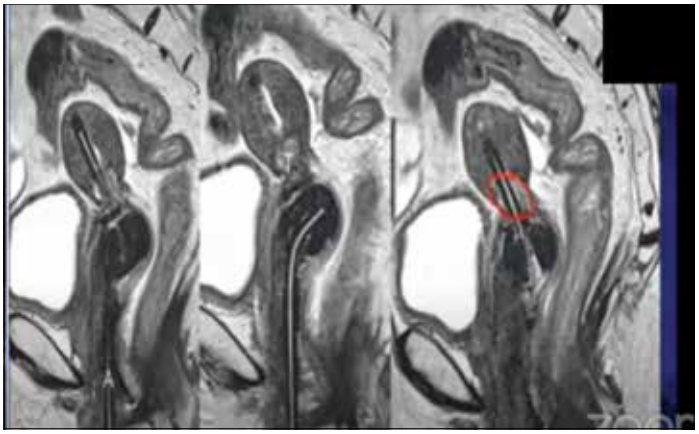

**Figure 9: Guided brachytherapy image where applicator is in place, seen in red**

- Exact depth of myometrial invasion (prognostication), staging

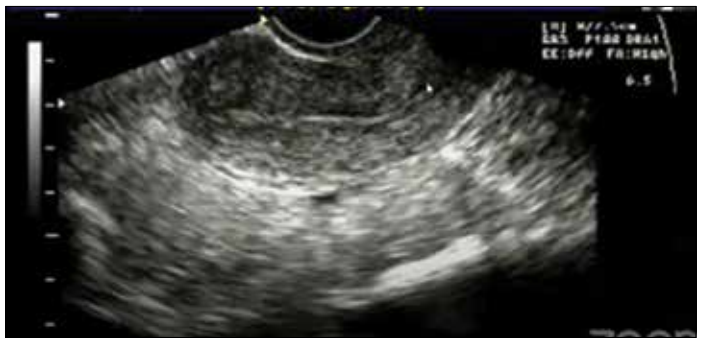

**Figure 10: Menopausal endometrium (Atrophic)**

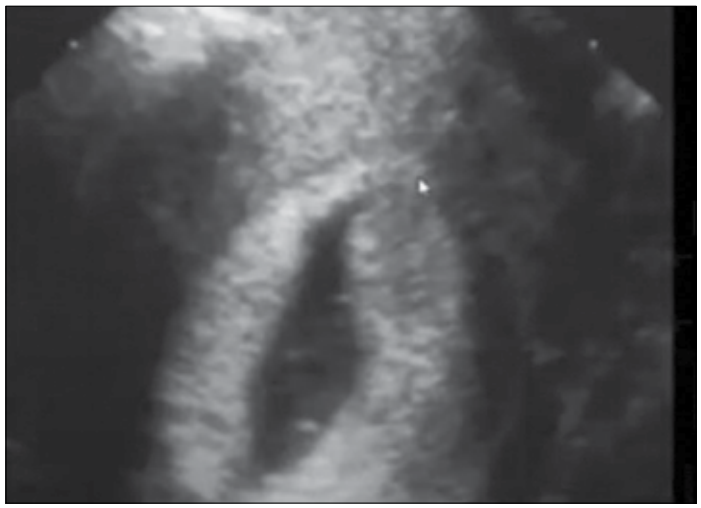

**Figure 11: Endometrial hyperplasia**

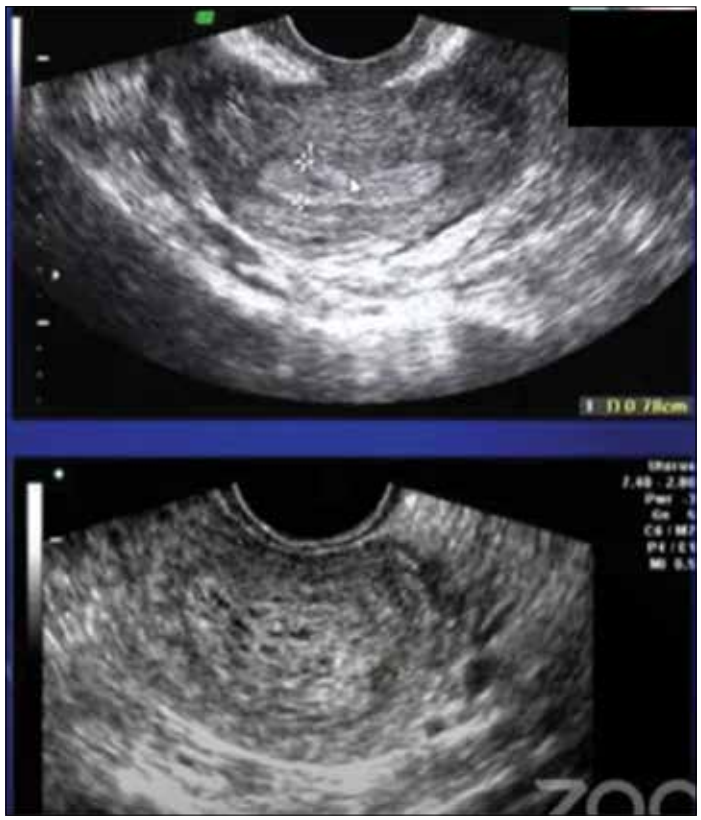

**Figure 12: USG Features and differential diagnosis of endometrial hyperplasia**

- Concomitant ovarian pathology may be detected as demonstrated in Figures 10-15.[6]

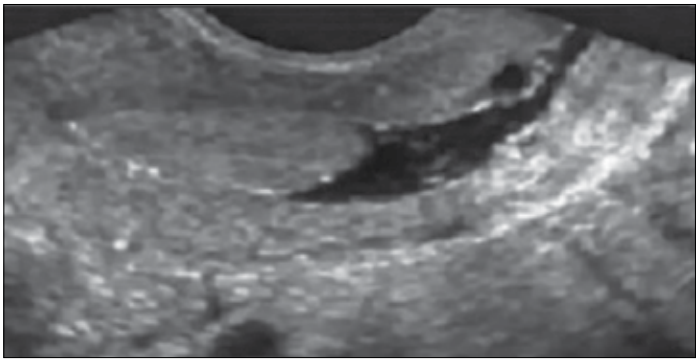

Figure 13: Endometrial carcinomatous polyp

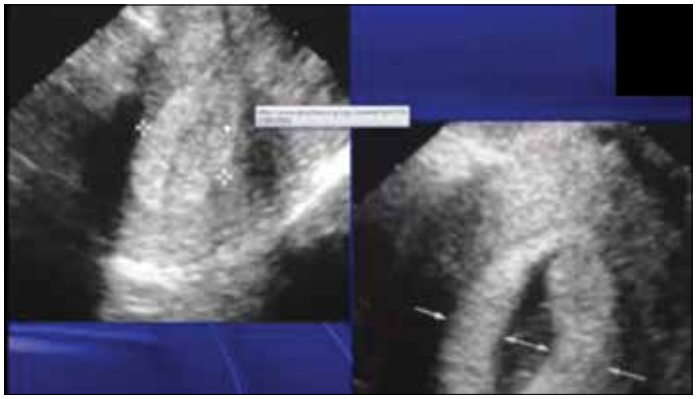

Figure 14: Endometrial hyperplasia before and after saline infusion sonography

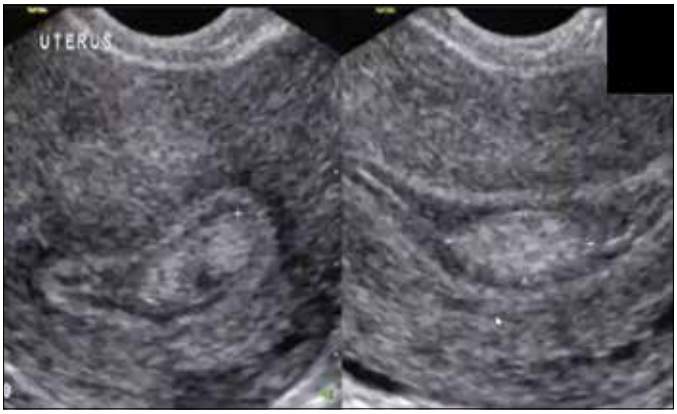


Figure 15: Endometrial polyp

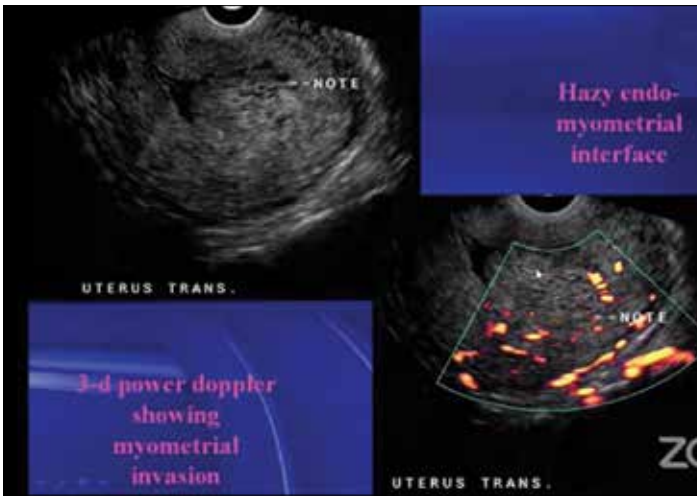


Figure 16: 3D power doppler showing myometrial invasion

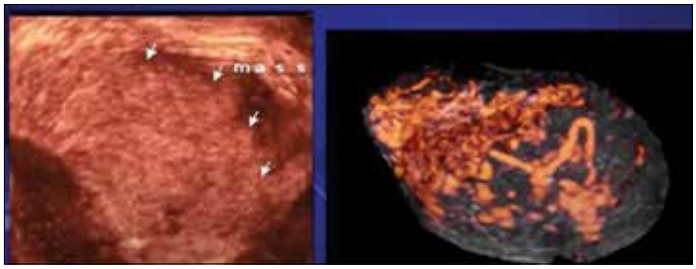

Figure 17: 3D USG in endometrial carcinoma

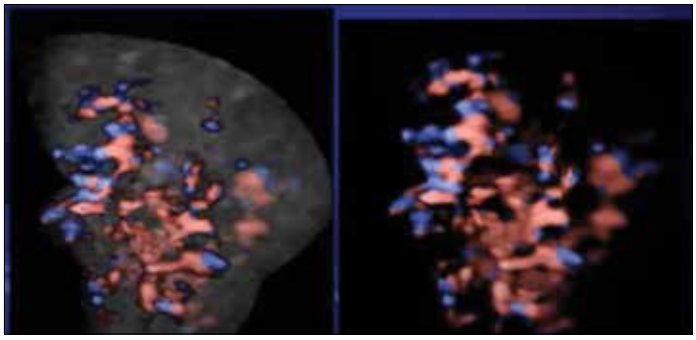

Figure 18: Endometrial carcinoma on 3D color Doppler

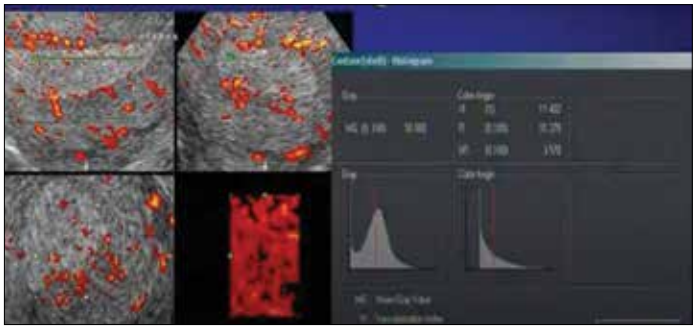

Figure 19: 3D Power Doppler Rendering and quantification showing 3 indices, i.e., flow index, vascularization index, and vascularization flow index

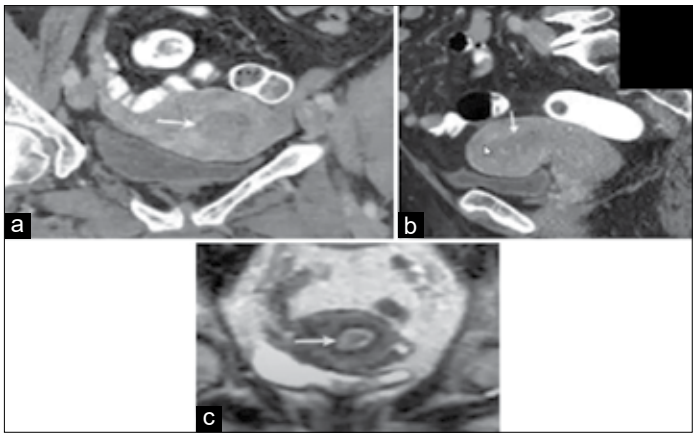


Figure 20: CT scan. (a) In transverse section shows endometrium. (b) Sagittal section with endometrium showing no breach of endo-myometrial junction. (c) MRI showing endometrial junction with localized

**Endometrial Carcinoma**

- In a prospective study of 201 patients, the sensitivities of endometrial volume and endometrial thickness for the diagnosis of endometrial cancer were the same, at about 70%.
- The specificity of volume measurement was better than the endometrial thickness (98% vs. 88%).

**TVCD in Carcinoma Endometrium**

- It is used for detecting the presence or absence of vascular signals from suspicious endometrial thickening

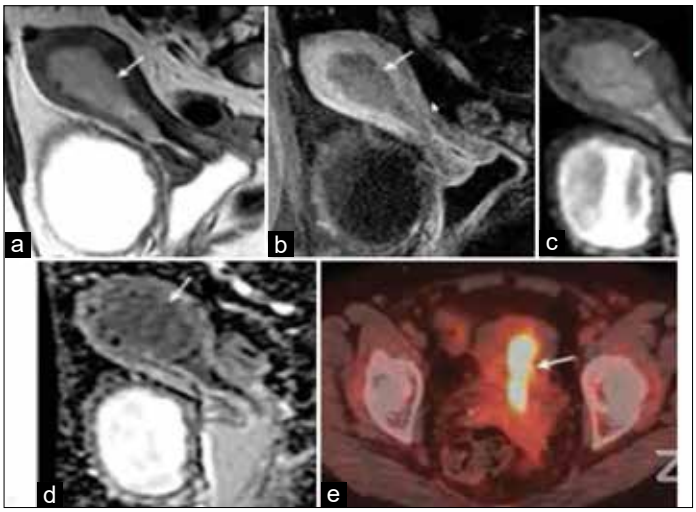


**Figure 21: (a) T2 image of Ca endometrium sagittal section. (b) T1 weighted MRI following contrast. (c) Fluorodeoxyglucose. (d) Positron emission tomography. (e) FDG-PET/CT scan**

- It helps to detect intratumoral vascularity and areas of neovascularization
- Studying the PI and RI of vessels, i.e., uterine artery and tumor vessel wave from analysis, one can differentiate benign from malignant tumors
- PI of 1.5 or more was the cut-off point for uterine artery waveform analysis in detecting malignancy
- If PI of less than 1.5 of uterine artery it suggests malignancy in the carcinoma endometrium.

**3D USG in Endometrial Ca**

It shows the obliteration of endo-myo junction and invasion into myometrium with color doppler.

**Ca Endometrium 3D Color Doppler**

Vascular indices: FI, VI and Vascular FI (VFI) is studied by 3D Color Doppler as in Figures 16-19.

3D Power Doppler Rendering and quantification which shows 3 indices, i.e., FI, VI, and vascularization FI(VFI)as shown in the figure below. Surgical staging is the gold standard in determining lymph nodal status in endometrial cancer. An MRI with diffusion-weighted imaging showed higher sensitivity but lower specificity than fluorodeoxyglucose (FDG)-positron emission tomography (PET)/CT (83% vs. 39% and 51% vs. 96%, respectively) shown in Figures 21 and 22.[3]

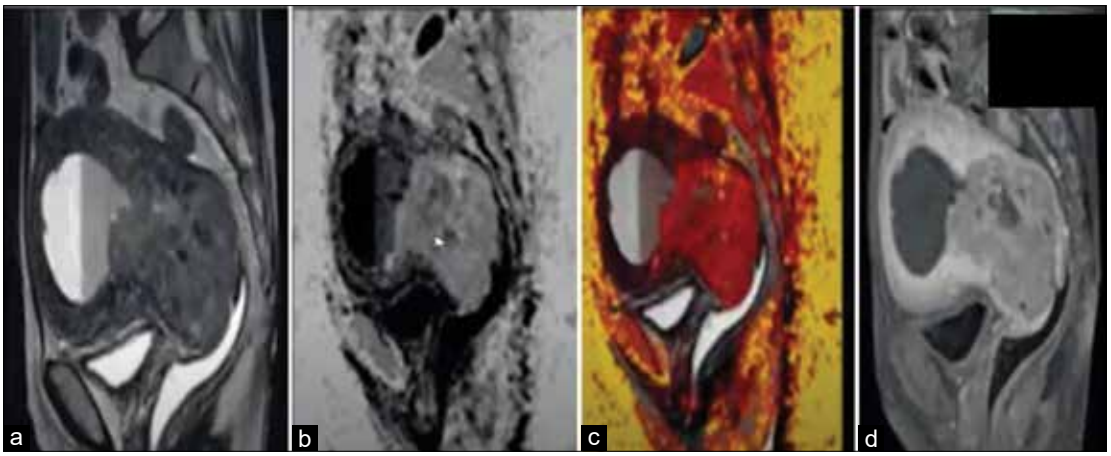


**Figure 22: Pictures of a patient with endometrial carcinoma. (a) T2 weighted Ca endometrium showing collection of fluids inside the uterine cavity. (b) Second image shows inverted apparent diffusion coefficient. (c) Third image is fusion of the first two technologies showing malignancy and collection of fluids in the upper part of the uterus. (d) T1 post-contrast**

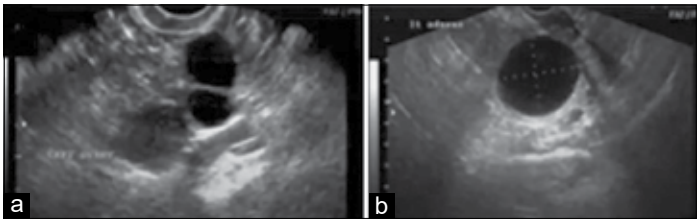


**Figure 23: (a) Complex ovarian cyst of malignant potential. (b) A simple ovarian cyst**

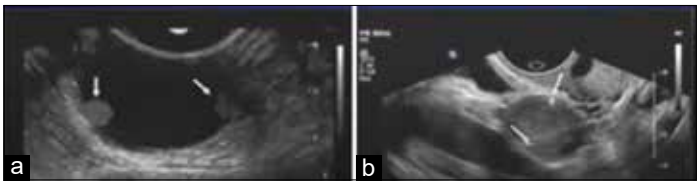


**Figure 24: (a) Ovarian malignancy containing two papillary excrescences. (b) Echogenic foci on the periphery of the ovary**

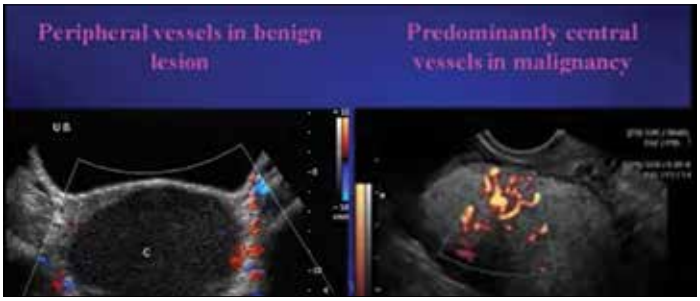


**Figure 25: Peripheral vessels in benign lesion and central vessels in malignancy**

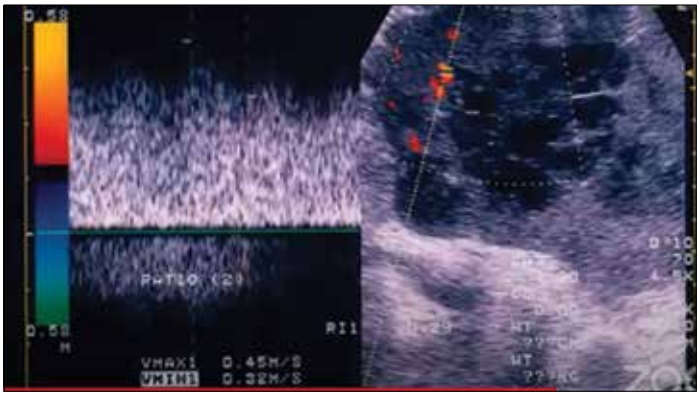

**Figure 26: Malignant ovarian tumor showing very low RI**

## MALIGNANCY 3: OVARIAN MALIGNANCY

CA-125 as a screening procedure can detect only 38% of ovarian carcinoma cases. The overall 5-year survival rate is 35%, 70–80% for stage IA B, and 5% for Stage IV. This leads to the use of TVS

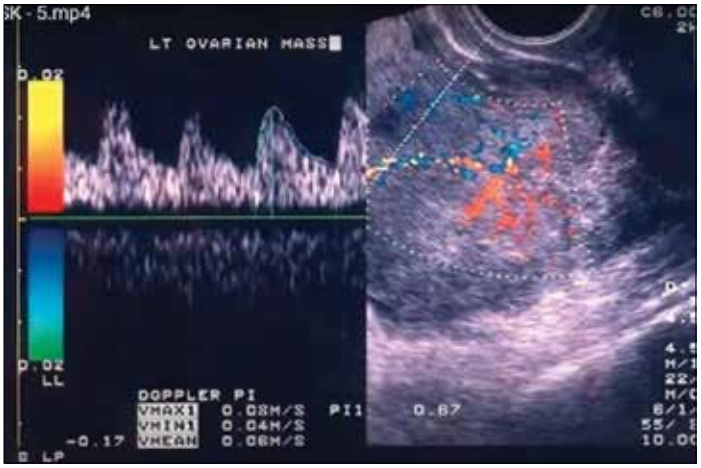


**Figure 27: Solid ovarian tumor showing very low RI**

and TVCD as screening methods for early detection of ovarian malignancies to improve prognosis in women at risk. TVS is complimentary to transabdominal sonography in such conditions.

**Ultrasound Features Suggestive of Ovarian Malignancy**

- Bilaterality as in Figures 23-27.
- III-defined margins
- Solid (echo-dense) projections from within cyst wall
- Mixed echogenic or predominantly solid mass
- Thick septa
- Multiloculated
- Ascites
- Secondaries in the liver.

Also look for cul-de-sac, ureters, kidneys, liver, para-aortic lymph nodes, omentin, bladder, rectum, peritoneal surface, and subdiaphragmatic areas.

**Scoring For Carcinoma Ovary**

- Ovarian size (volume)
- Morphological scoring
- Color Doppler scoring.

Ovarian Volume -The mean ovarian volume in postmenopausal women quoted by various authors ranges from 1.3 to 2.9 $cm^3$ (Granbery 1987, Higgins-1989, Schoenfeld 1990, Wolf-1991).

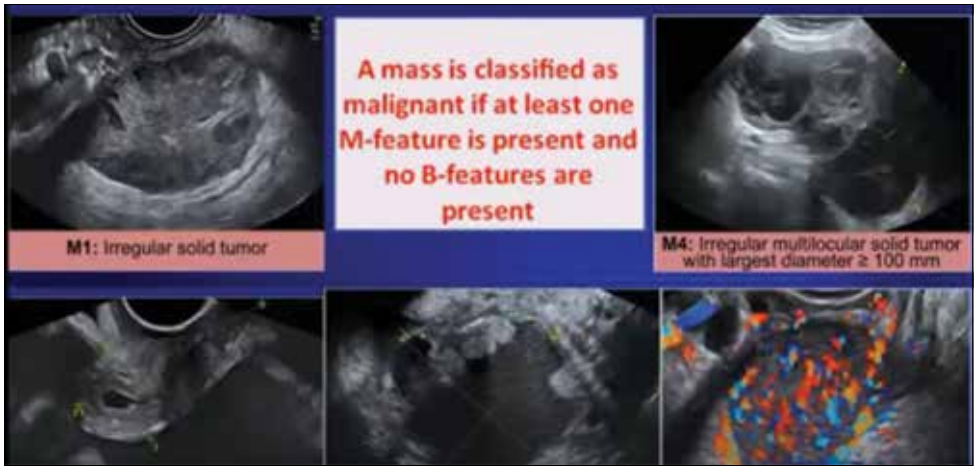


**Figure 28: Features of a malignant mass (M-Features)**

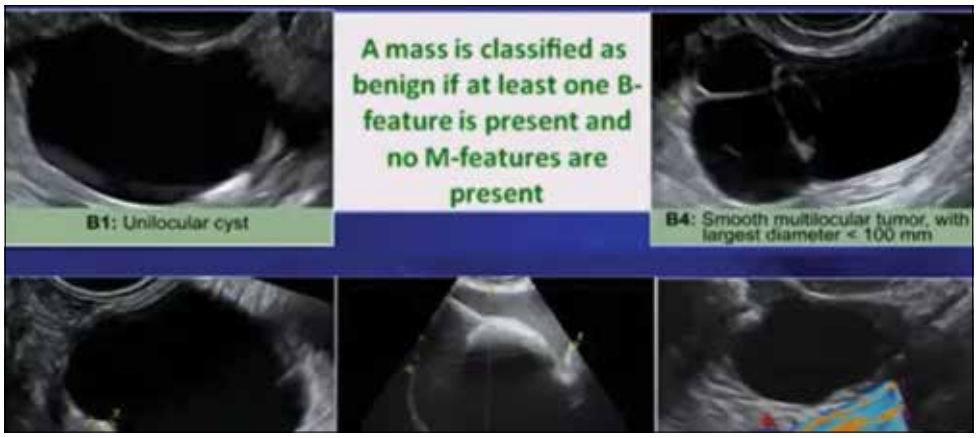


**Figure 29: Features of a benign mass (B-Features)**

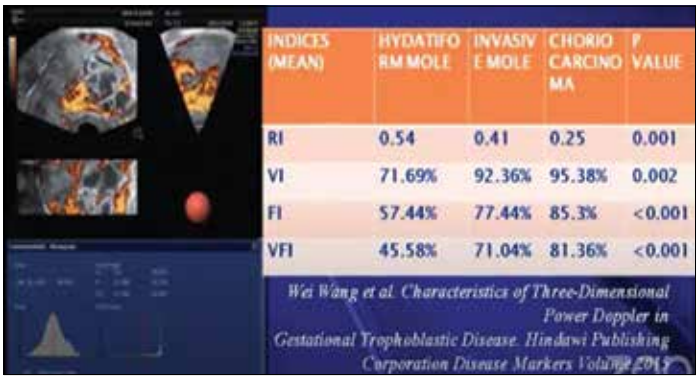


**Figure 30: Lowest RI whereas VI, FI, and VFI is highest**

For premenopausal women, it ranges around 6 $cm^3$.

**Morphological Criteria**

- As TVS is superior to TAS in tissue characterization, morphology of an organ is displayed in better fashion. Bourne (1990) suggested a scoring system to detect ovarian malignancy which is as follows:
- Score 0–3
  - o Solid mass-3, multicystic-2, monocystic-1
  - o Loculi, Unilocular-1, multilocular-2
  - o Outline of cyst wall: Irregular-2, regular-0.
  - o Echogenicity: anechoic-0, randomly echoic-2, uniformly echoic-1.
- If the score is more than 5, the chances of the ovarian tumor being malignant are high
- Morphology score sensitivity is 92% and specificity is 94.2%.

**Ovarian Neoplasm: Characteristics**

- Ovarian volume >10 cc in post-menopausal and >20 cc in premenopausal women
- A papillary or complex tissue projection into a cystic ovarian tumor
- Any multiloculated, complex, or solid ovarian mass
- Persistently cystic mass >5 cm with abnormal echo and blood flow pattern.

In TVCD, PI and RI of blood flow in the ovarian vessels were calculated.

- Benign lesions had high PI >1 and high RI >0.4
- In cases of malignant lesions, there was considerable overlap. This is the limitation of color Doppler.

**3D Power Doppler Imaging**

- New emerging technology provides additional information[8]
- Multiplanar and volume rendering display methods with the ability to rotate volume data into standard orientation
- Multiple sections of tumor, rotation, translation, and reconstruction allow precise evaluation as in Figures 31 and 32.

**3D Power Doppler Ultrasound**

- The vascular sampling is done in highly susceptible areas, for example., thick septae, solid areas, gross papillary projections
- Vascular indices are studied: VI, FI, VFI
- Specificity significantly improved with the addition of 3D power Doppler as in Figure 34
- The first line of investigation for pelvic masses is transvaginal sonography (USG) for adnexal mass characterization
- Terminology and measurements on endovaginal USG have been standardized by the International Ovarian Tumor Analysis (IOTA) group[4]
- The risk of ovarian malignancy algorithm score that incorporates ultrasound findings, CA125 and HE4 levels, is useful for prediction of the likelihood of malignancy of an adnexal mass.[3]

**IOTA Simple Rules in Differentiating between Benign and Malignant Ovarian Tumors**

(Charuwala Tantipalakorn *et al.* Asian Pacific Journal of cancer Prevention. 2014, vol. 15)

- The IOTA simple rules have high diagnostic performance in differentiating between benign and malignant adnexal masses
- Morphological evaluation was performed by 2D ultrasound after 2D USG evaluation was performed, the color doppler gate was activated to access tumor vascularization.
- Sensitivity = 82.2%
- Specificity = 95.3%
- Positive predictive value = 89.8%
- Negative predictive value = 91.4%.

The sonographic characteristics of ovarian lesions based on simple ultrasound rules is shown in table below:

Adnex Model (The Assessment of Different Neoplasia in the AdneXa)

The IOTA consortium published the ADNEX model, the first risk model that differentiates between benign and four types of malignant tumors namely Borderline, Stage I cancer, Stage II-IV cancer, and Secondary Metastatic cancer.[7]

**Gestational Trophoblastic Diseases (GTD)**

- TVS helps in detecting myometrial invasion and proper staging of GTD. (Ansbacher 1991)
- Choriocarcinoma is seen as an irregular echogenic tumor mass containing areas of cystic necrosis and hemorrhage

**Sensitivity, specificity, PPV, NPV of TVS in detection of ovarian malignancy**

| | Sensitivity | Specificity | Positive predictive value (PPV %) | Negative predictive value (NPV %) |
|---|---|---|---|---|
| Finkler(1988) | 61 | 95 | 88 | 81 |
| Granberg(1991) | 82 | 83 | 74 | 95 |
| Sassone(1991) | 100 | 83 | 37 | 100 |

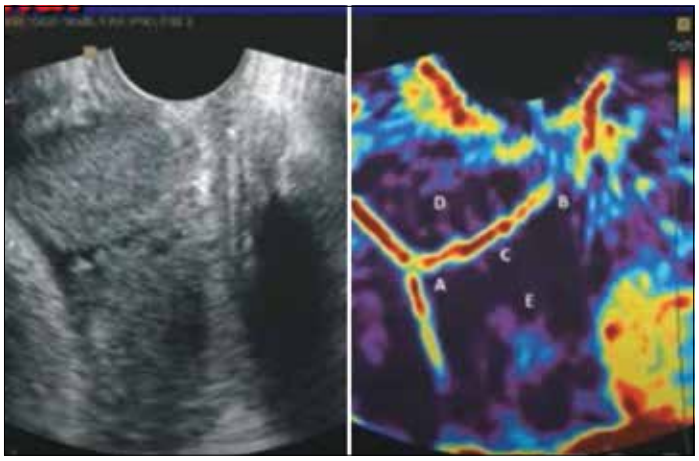


**Figure 31: 2D ultrasound and elastogram of the uterine cervix with soft cervical canal**

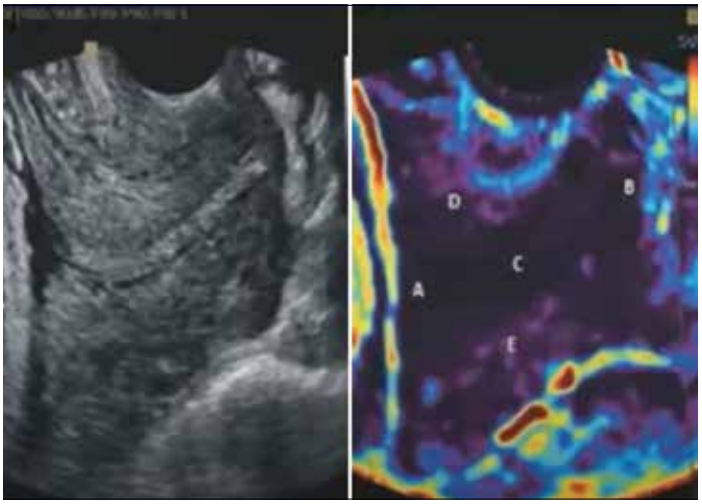


**Figure 32: 2D ultrasound and elastogram of the uterine cervix with hard cervical canal**

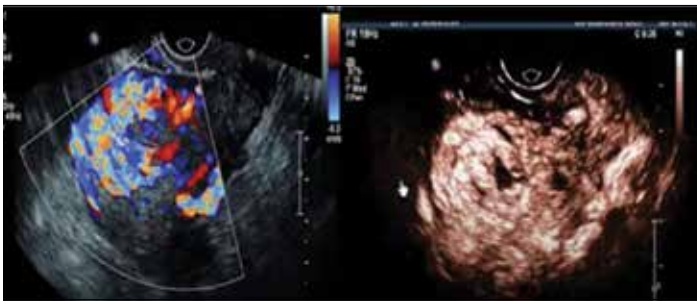

**Figure 33: Gestational trophoblastic neoplasia**

- TVS can also be used to monitor intramural tumor response to systemic chemotherapy (Schnelder 1990)
- TVCD assists in the detection of microscopic persistent GTD or invasive choriocarcinoma (Dobkin 1991, Flam 1991, Desai 1991)
- In GTD lot of vascularity is seen and PI always <0.4 as shown in Figure 33.

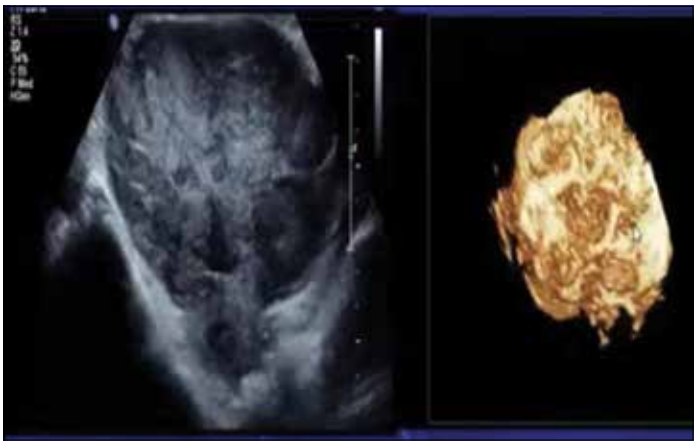

**Figure 34: Contrast ovarian tumor**

**Power Doppler in GTD – Study**

- Three-dimensional power doppler indicated that there were significant differences in the RI, VI, FI, and VFI between the healthy individuals and GTD patients ($P < 0.01$)
- There was a significant difference between hydatidiform mole and the combined malignant group ($P < 0.01$)
- On successful chemotherapy, abnormal power doppler findings were resolved.[5]

**Elastography**

- Elastography is an objective method of assessing the relative consistency of tissues. It allows visualization of stiffncolor-coding coding and enables comparison of different parts of tissues
- Conventionally, blue represents stiff tand issue, green is indicative of average stiffness/soft tissue, and red represents soft tissue.

**Elastography of the Uterine Cervix with Soft Cervical Canal**

Elastogram showing differences in the stiffness of uterine parts visualized as different colors:

A-Internal os, B-External OS, C-cervical canal, D-anterior wall of the cervix, E-Posterior wall of the cervix.

**Elastography of the Uterine Cervix with Hard Cervical Canal**

Elastogram showing that the entire cervix is the

same color representing the same stiffness.

A-Internal os, B- External OS, C- cervical canal, D-anterior wall of the cervix, E- Posterior wall of the cervix

In elastography, the central cavity disappears which was seen in ultrasonography which is suspicious malignancy, and as it shows hard cervical canal which is abnormal.

**Contrast Enhanced Ultrasound**

There are contrast agents like

- Levovist
- Luminity
- Optison
- Sonovue- Mostly used. Sulfur hexafloride gas after 2.4 ml of contrast agent had been injected into the cubital vein, the lesion was observed continuously for over 3 min.

## CONCLUSION

Imaging plays a crucial role in gynecological oncology from diagnosis to treatment stratification.

The revised 2018 FIGO incorporates radiological findings in cervical cancer staging.

Treatment outcomes are improved by the use of MRI planning in image-guided brachytherapy for cervical cancer. In depicting myometrial invasion and cervical stromal invasion in endometrial cancer, MRI is highly accurate. Functional imaging is effective for detecting peritoneal carcinomatosis**.** MRI is the most widely used modality for preoperative local staging, with CT or PET/CT used to evaluate distant metastases. Recent technologic advances have introduced new modalities such as FDG PET/CT and FDG PET/MR. These new imaging techniques will aid in the process to provide a comprehensive assessment of distant metastases thus contributing to better management of patients with gynecological cancers.

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# Glimpse of MOGS Outreach Programs

## GCC Club




## Sunville Banquets


## Sunville Banquets

## Lavender Baugh


## Khar Danda


## Krishna Palace


# Artificial Intelligence in Reproductive Medicine

**Dr. Hrishikesh Pai**

Department of Obstetrics and Gynecology, Lilavati Hospital, Mumbai, and Fortis Hospital, Delhi, Mohali, Gurugram, Haryana, India,
Gynecologist and Head IVF Unit, D.Y. Patil Medical College, Navi Mumbai.

## INTRODUCTION

Artificial intelligence (AI) is intelligence demonstrated by machines that mimic cognitive functions associated with the human mind, such as learning or problem-solving. Machine with AI does not possess the natural intelligence displayed by humans and animals, which involves consciousness and emotions.

The standard Artificial machine-based Intelligence, which we know of today, is made up of cognitive function and problem-solving, On the other hand, Artificial biological intelligence, which we humans do not want the machines to possess, is related to consciousness and emotion. The computers may keep on evolving, and at some point in time, they may start behaving like human beings, with emotions and consciousness. This is the danger that many people are worried about. If we can achieve a high level of machine intelligence without enhancing biological intelligence, then we will be able to achieve a lot!!

There are many applications of AI. One is automated reasoning, wherein, the computers can reason completely or near completely in an automatic fashion. The second application is knowledge representation, in which a diagnosis of a medical condition using machines or having a dialogue in a natural language is possible. Examples are automatic planning including autonomous robots, unmanned vehicles, or driverless cars. The computers can also be capable of understanding the contents of documents, including the contextual nuances of language within them. Another application is Machine perception, in which there is a capability of a computer system to interpret data in a manner, that is similar to the way humans use their senses like vision, touch, smell, and hearing.

## MACHINE LEARNING (ML)

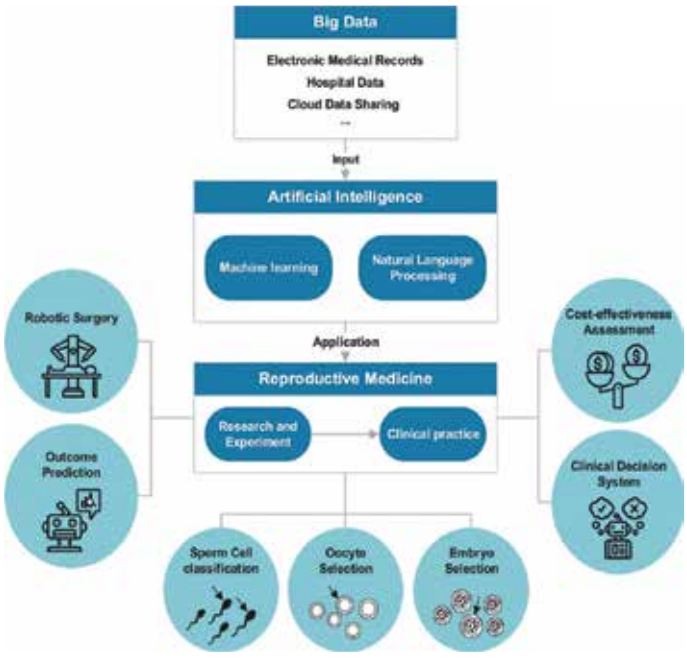
ML is a form of AI, in which a machine can learn and adapt to situations and undergo self-driven data training. Typically, a training data set is used to train a computer program by feeding images describing a series of features such as color, shape, and texture. For example, the machine can see a skin lesion using a camera and then by using image analysis, can differentiate and diagnose cancer or a non-cancer lesion.

There are two main approaches to ML, viz supervised and unsupervised learning. In supervised learning, the data sets are known during training; but in unsupervised learning, hierarchal clustering is used to discover structure within classes, etc. In ML, the computers operate at high speed and thus need a great degree of memory backup as well as energy consumption. This is possible with the use of cloud computing. ML is a study of computer algorithms that can improve automatically through experience. The machine improves itself on its own as time goes by.

## ARTIFICIAL NEURAL NETWORKS

The ML consists of artificial neural networks, which mimic the way, the brain works. A neural network

typically consists of several layers of artificial neurons, fully connected to each other. Each neuron receives signals from multiple neurons from the previous layer, integrates these signals, and then fires these integrated signals, in all directions. The network is in a digital space. For example, one of the types of artificial network is the deep or convoluted neural network (CNN), which is an extended neural network, achieved by increasing the number of layers and the number of neurons per layer.[1] Increasing these layers will give rise to deeper neural networks, which can be trained to classify complex objects, images, or videos. When ML is used to analyze images or videos a deep neural network is required. They are very powerful for image classification in biomedical imaging domains. One can understand ML by analyzing, how a computer identifies and enhances an image of an elephant. The computer will have an ML section where the machine will start analyzing multiple image variables in the elephant's photograph, such as the color of the skin, the greyscale areas, contours, etc.: it can analyze many thousands of such variables, which the naked human eye cannot see or assess. The variables are inputted by the machine and all these variables will be considered when the machine concludes that the photograph is of an elephant. The computer, using its deep neural networks, will keep on training itself and refining itself so that it can quickly analyze the photograph of an elephant, faster and in a better way, every time it does so. This is known as unsupervised learning.



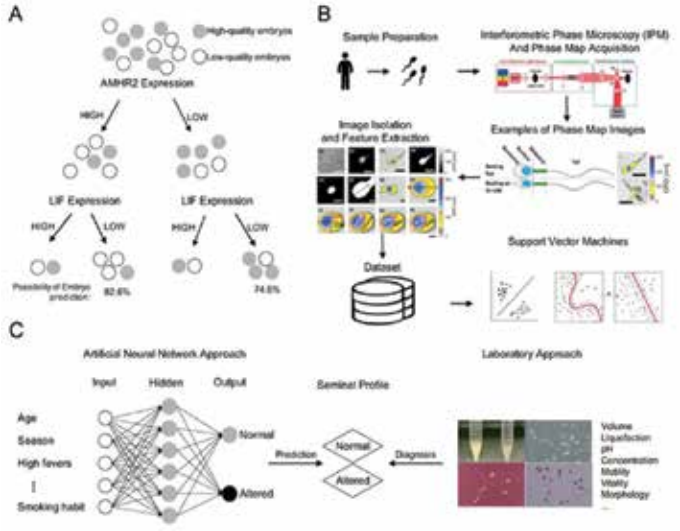

## ECONOMIC BENEFITS OF AI

AI can improve health care, make diagnosis more precise, enable better prevention of disease, increase the efficiency of farming and contribute to climate change, mitigation, and adaptation. It will improve the efficiency of production systems through predictive maintenance, be able to operate drones, and self-driving cars, create art, write poetry, prove mathematical theorems, play games, operate search engines such as Google search, and perform the role of online assistants like Siri. Etc.

With AI, image or photograph recognition is possible. Face recognizing technology for criminals, spam filtering, predicting flight delays, prediction of judicial decisions, targeting online advertisement, energy storage, answering service, and robotic service devices, are the other benefits of AI. The machine chats or chatting with robotic friends, posting stories on digital media, etc. is possible too.

### AI in Medicine

The role of AI in medicine is immense. It can detect genetic variants from large genomic datasets, identify somatic genetic variants and predict responses to therapy based on genomic features, leveraging



medical imaging, etc. There is a big database called "ImageNet" which has about 14,000,000 images.[2] Many people can access this image data, created through the ML systems. AI can help in diagnosing skin lesions, differentiate between malignant and non-malignant lesions, predict diabetes, and predict abnormalities by looking at retina scans and analyzing pathological slides. At present, we need expert pathologists and radiologists the diagnosis of diseases using microphotographs, X-rays, CAT scans, and magnetic resonance imaging. However, in the future, AI with ML will be able to supplement if not replace such image-based diagnostic human expertise.

**AI in Reproductive Medicine**

In the field of reproductive medicine, AI and ML are being increasingly used in administration, medical records keeping, research, laboratory, and Clinical practice practise. The *in vitro* fertilization (IVF) specialist in the USA is utilizing AI, to distribute the work in the clinics, so that every day there is the same number of patients for ovum pick up. AI has improved the work efficiency in the clinical laboratories. AI can be used for stock-taking, inventory, quality control, etc.

AI can be used to predict male factor infertility, to understand the impact of lifestyle and environmental factors on semen quality and fertility rates. The smartphone-based applications can be used for semen analysis as well as for analyzing sperm viability and DNA integrity.[3] AI can be used to identify sperm with good morphology and sperm DNA integrity for IVF.

Presently, research is ongoing, in enabling the embryologist to identify the best sperm during the procedure of Intra Cytoplasmic Sperm Injection (ICSI). A new system is being evolved, which connects the ICSI screen, in real time, to the internet and then to the AI server. The machine guides the embryologist, to identify, immobilize and inject the best possible sperm into the oocyte. [1] This helps in obtaining good fertilization rates, high- quality embryos, thus increasing the chances of a successful pregnancy outcome.

AI with ML, using image analysis, can be used to assess and grade the mature eggs prior to fertilization or cryopreservation. The system exports the images of the oocytes, to the server, which in turn, predicts whether the eggs will yield a good blastocyst and pregnancy, when thawed and fertilized, in the future. The data can be used to counsel patients undergoing elective egg freezing for fertility preservation. It can help the patient in deciding whether there is an adequate number of good quality eggs, to assure her of a future pregnancy. In case the good quality eggs are less in number, the patient can decide to undergo an additional cycle of oocyte retrieval and cryopreservation, thus improving her chances of a successful pregnancy, in the future.

AI with ML can be used to analyze and predict the implantation potential and genetic euploid status of the blastocyst, prior to the embryo transfer. One can grade and rank the available blastocyst, thus selecting the best embryo for transfer. In the future, AI with ML will be frequently used to predict the genetic competence of the embryo. We will be able to correlate the genetic analysis of the embryo with actual visual analysis and the machine will slowly learn, identify, and guide the embryologist, in selecting the best embryo for transfer.[4] This will obviate the need to perform complex tests such as Next-gen sequencing on DNA obtained from the embryo.

## EMBRYO TRANSFER

ML will help us in performing a perfect embryo transfer, resulting in a successful pregnancy outcome. It will help us to analyze the endometrial lining, thickness, appearance of the lining, and the endometrial blood flow. The machine can correlate these images and will guide us to decide whether the endometrial lining is ideal for transfer or not.[4]

If the lining is not ideal, one can transfer in the next cycle.

## DISADVANTAGES OF AI

Currently, multiple platforms are used for AI. There is a lack of standardization. It is possible that a machine can selectively analyze only the good data, by mistake, thus giving rise to wrong predictions. The machine must have a balance of good images and bad images to guide us correctly. Some laboratories are developing new programs, that can eliminate bad data, thus improving results. The machine must have data based on ethnic diversity, for example, Indian people are different from Caucasian people; hence in ML too, the Indian data is required along with Caucasian data. If the analysis and application is done from in different countries, one may interpret data, wrongly. The pooling of information has to be done from multiple data sets, to help us make better predictions. The data sharing, implementation, and integration of information are important.

Algorithmic bias can create deep fake news, spam, and fraud.[4] People are fearing that ML may create a lot of job losses with a prediction of 9–47% job loss. The fields or jobs involving human- to-human contact will remain in the future, but the fields currently using a lot of automation will be taken over by ML. As the machines are trained, using CNNs to evolve their programs, there is a fear that AI will spell the end of the human race. Stephen Hawking said that "once Man develops artificial intelligence, AI will take off on its own and redesign itself at an ever-increasing rate. Humans, limited by slow biological evolution, will be unable to compete and will be superseded by Machines." However, the opinions of experts within the field of AI are mixed, both concerned and unconcerned by this eventual superhuman capacity. The danger of uncontrolled advance needs to be realized. However, AI will unlock a huge number of possibilities, like curing disease.

Many feel that AI will, create more jobs, not less. A group of

prominent tech Titans, including Peter Thiel, Jeff Bezos, and Elon Musk have committed hundreds of thousands of dollars, to open a non-profit company aimed at championing responsible AI, creating jobs by using applications of AI, especially in cancer, infections, and reproductive medicine.

## CONCLUSION

AI will usher in a new era in Reproductive Medicine. The standardization, automation, and precision of IVF driven by AI are likely to be more objective, more rapid, and more accurate. While applications of AI have gained the most attention and shown the greatest promise, its use will widen to other aspects of reproductive medicine including precisely assessing patient characteristics such as age, endocrine status, etc. The clinical diagnostic steps will undoubtedly increase the efficiency of diagnoses in all areas of reproductive disorders.

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# Report of MOGS Dr. N. A. Purandare Teaching Program – held on Sunday July 24, 2022 by Bhatia Hospital, Tardeo, Mumbai

The program started with Registration

MOC Dr. Rashmi Patil and Dr. Sarang welcomed everyone

First Case presentation on "PIH in Pregnancy" was done by Dr. Bhavna and Dr. Sneha from Saifee Hospital. The examiners were Dr. Sujata Dalvi, Dr. Ameya Purandare and Dr. Pooja Shah.

The first talk session was chaired by Dr. Avan Dadina and Dr. Darshana Gandhi. Dr. Atul Ganatra – briefly spoke on 'MTP Amendments" (video recorded) followed by Dr. Devika Chopra who spoke on 'UTI in Pregnancy'. Dr. Miloni Gadoya talked on "Eclampsia"

Welcome Inaugural video address with personalized message was given by MOGS President Dr Niranjan Chavan. Chief Guest Dr Vandana Walvekar – Trustee of MOGS gave her words of wisdom.

Second Case presentation on 'Vault Prolapse' was done Dr. Santosh from Wadia Hospital. The examiners were Dr Ajit Virkud , Dr Reshma Rao and Dr. Pradnya Parulkar.

The second talk session was chaired by Dr. Yashwanti Mody and Dr. Neelang Shah. Dr Pranay Shah gave an insight into 'Laparoscopy in Vault Prolapse' followed by Dr Kinjal Shah who spoke on 'Scar ectopic Pregnancy'.

The program was very interactive and concluded with Vote of Thanks by Dr Neelima Bhanushali.

Total attendance was 71.

We would like to thank Bhatia Hospital administration and MOGS President- Dr Niranjan Chavan for giving an opportunity to conduct this program for PG students. Thanks to Spectra Division of Sun Pharma for being an educational partner.

# Report of Inaugural Program of World Breastfeeding Week 2022 conducted by LTMMC & GH, Sion, Mumbai – 22 on 2nd August 2022

The inaugural program of World Breastfeeding Week was conducted by Mumbai Breastfeeding Promotion Committee on 2nd August, 2022. The event was in the Main Auditorium, Lokmanya Tilak Municipal Medical College & General Hospital, Sion.

The program was attended by around 250 attendees from various medical colleges of Mumbai, Navi Mumbai, Thane and all BMC peripheral hospitals. Dr. Sanjeev Kumar, IAS [Hon AMC (WS)] was the Chief Guest for the program. Other guests included Mr. Sanjay Kurhade (Deputy MC), Dr. Neelam Andrade (Director, ME & MH), Deans of all BMC medical colleges, and Dr. Mangala Gomare (Exec. Health Officer, BMC, Public Health), Dr. Vidya Thakur (Chief MS, Peripheral hospitals). The program was attended by senior doctors like Dr. Armida Fernandez, Dr. Potdar, and Dr. Jayashree Mondkar.

Dr. Niranjan Chavan, President of MOGS was invited to the program to represent MOGS.

Chief guest Dr. Sanjeev Kumar spoke thereafter and appreciated the work done by MBPC for the promotion of breastfeeding. This was followed by the prize and certificate distribution for Street play, e-Poster, Slogan, PG Quiz competitions and felicitation of the organizers and judges. Chief guest Dr. Sanjeev Kumar visited Asia's first milk bank at LTMMC & GH, with the founder Dr. Armida Fernandez.


Dignitaries pledging their support for Breastfeeding at the photo booth.

Dean Dr. Mohan Joshi addressed the guest

# Report of MOGS World Breastfeeding Week Slogan and Poster competition 3rd August 2022

MOGS had organised a Poster and slogan competition as a part of the World breastfeeding week celebration 2022. Posters and slogans were invited from all on the theme for World Breastfeeding Week 2022 **STEP UP FOR BREASTFEEDING – EDUCATE AND SUPPORT**. Posters of A3 size ( handmade or digital) and slogans of up to 12 words in English, Hindi and Marathi were invited. The last date of submission was 2nd August 2022. **A total of 90 entries were received for the competition.**

Judges for the competition were Dr. Reena Wani, Dr. Pradnya Changede, and Dr. Madhuri Mehendale. Prizes were awarded in the Senior and Junior category for MOGS members. Names of winning participants were announced during WORLD BREASTFEEDING WEEK CME organised by MOGS- SAFOG-FOGSI and UNICEF held on 3rd August 2022. Winners of the competition were given cash prizes

1. First prize: Rs. 2000/-
2. Second prize: Rs. 1500/-
3. Third prize is: Rs. 1000/-

**Winners of Poster: Senior category**

1st Prize Dr. Punit Bhojani.

2nd Prize Dr. Rana Chaudhary.

3rd Prize Dr. Lalita Mayadeo and Dr. Sandeep Jeste.

**Winners of Poster: Junior category**

1st Prize Dr. Sayli Wankhedekar .

2nd Prize Dr. Reena Avkire.

3rd Prize Dr. Juvariya Jammel.

**Winners of Slogan: Senior category**

1st Prize Dr. Pramod Survase.

2nd Prize Dr. Jagruti Ghosh.

3rd Prize Dr. Riddhi Desai.

**Winners of Slogan: Junior category**

1st Prize Dr. Manan Boob.

2nd Prize Dr. Mrinal Chatterjee.

3rd Prize Dr. Divita Kamble and Dr. Freni Shah.

**All participants were awarded a certificate of participation.**

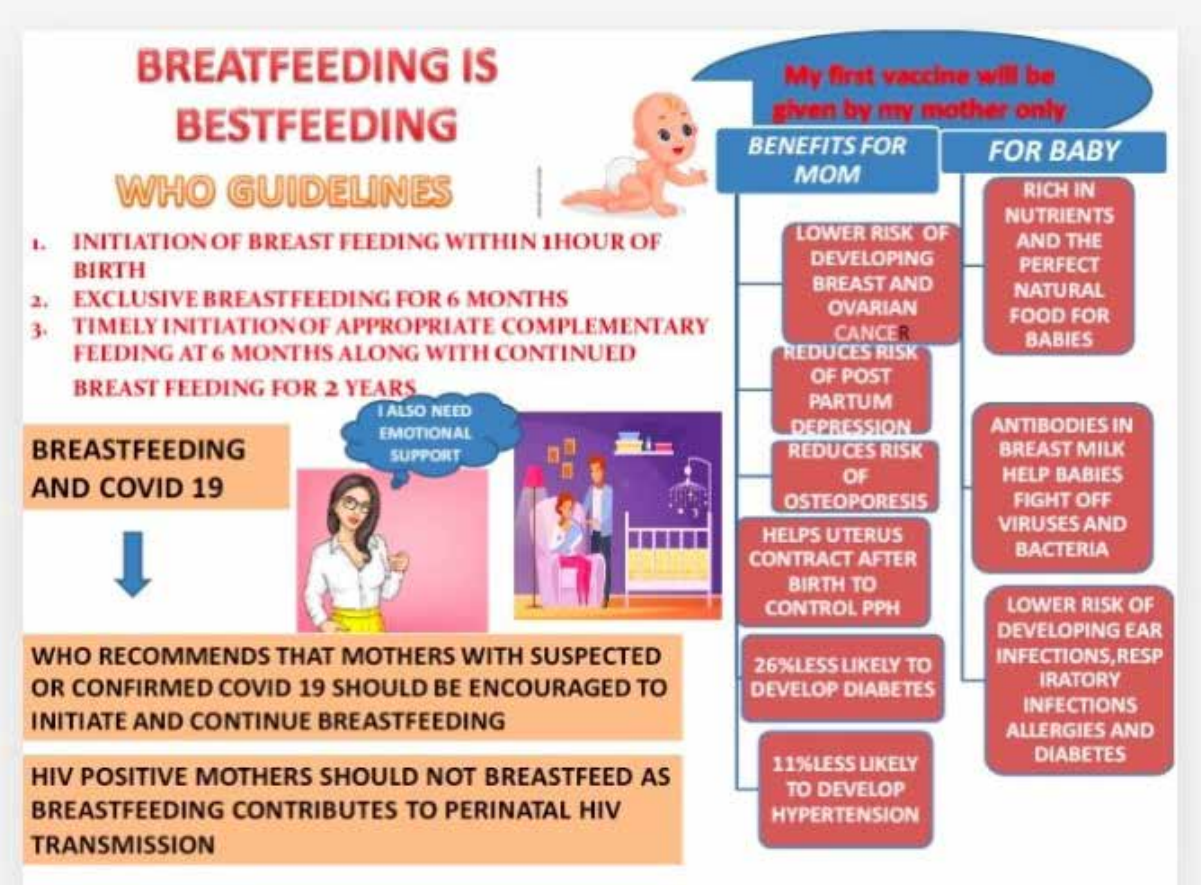

**1st Prize Senior Category**
**Dr Punit Bhojani**


**2nd Prize Senior Category**
**Dr Rana Chaudhary**

**3rd Prize Senior Category**
**Dr Sandeep Jeste**

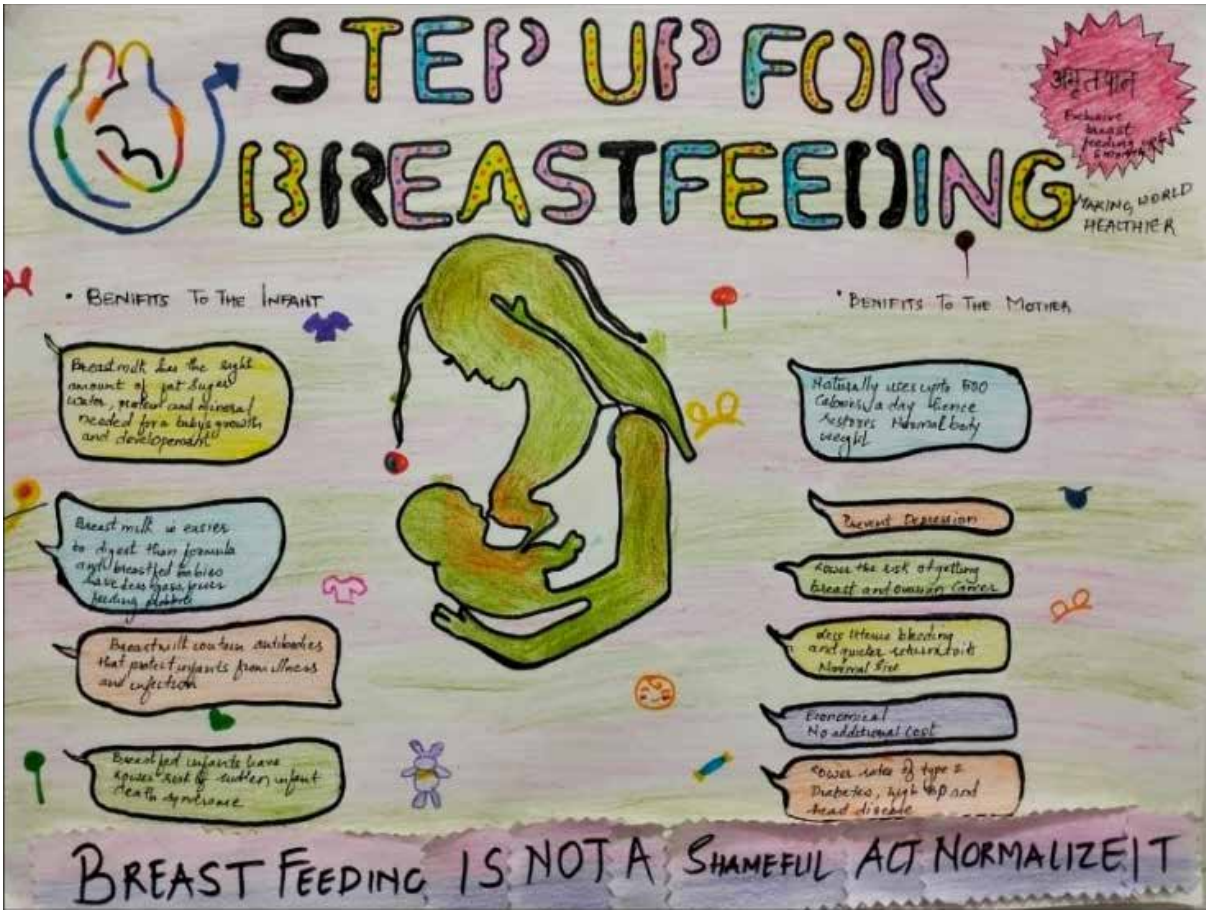

**3rd Prize Senior Category**
**Dr Lalita Mayadeo**


**1st Prize Junior Category**
**Dr Sayli Wankhedekar**




**2nd Prize Junior Category**

**Dr Reena Avkire**




**3rd Prize Junior Category**

**Dr Juvariya Jammel**

# Recent Advances in Menopause Management

**Dr. Suvarna S. Khadilkar**

Vice President, MOGS ▪ Deputy. Secretary General FOGSI
Prof. & HOD, Department of Obstetrics and Gynecology, Bombay Hospital, Mumbai, Maharashtra, India.

## INTRODUCTION

According to the 2011 consensus statement, the total population of India is 1.21 billion. About 48.46% of women contribute to the total population of India. The world population is projected to reach nearly 9.6 billion in 2050. About 22% and 33% of women will be aged over 50 by 2025 and 2050, respectively.

Thus, we know the magnitude of needs and practices of menopause management. There are three major killers beyond midlife and menopause. These include:

1. A major cause of death is cardiovascular disease (CVD).
2. The burden of low bone mass is 62% at 60 years and 80% at 65 years. About 25% of mortality is associated with hip fracture.
3. There is also a steady rise in age-adjusted rates of cancer.

A survey was conducted at FOGSI on menopause. There were a total of 1338 responses to the survey. Several questions were asked. About 61% of responders agreed that the symptoms of menopause need to be treated. When asked about the number of patients with menopause in which they offer menopause hormone therapy (MHT), 67% of responders said that they offer MHT in < 5% of patients. The variable response was noted when asked about the drug of choice for MHT.

A higher number of practitioners were using vaginal estrogen cream for local symptoms. Conjugated equine estrogen, tibolone and estradiol were being used by practitioners for systemic symptoms.

## MENOPAUSE

Menopause is the permanent cessation of menstruation resulting from loss of ovarian follicular activity. Perimenopause is the first feature of approaching menopause until up to 1 year after the final menstrual period. Estrogen levels decline over the menopausal transition. Menopause occurs in phases. In the premenopausal phase, women have regular cycles and fertility is maintained. In the perimenopausal phase, cycles become irregular and women may show symptoms and have suboptimal fertility. In menopause and beyond women have no periods for 12 months, they may show symptoms and the reproductive potential goes to zero.

## MENOPAUSE SYMPTOMS

Initially, seven symptoms were associated with menopause, but today about 35 symptoms have been identified at mid-life crisis. Some of them include vasomotor symptoms (VMS), urogenital symptoms, musculoskeletal symptoms, menstrual irregularities, unintended pregnancy, palpitation, muscle, and joint pain. Many of the times the patient first visits the cardiologists where all the possible causes are ruled out and then the patient is referred to a gynecologist to rule out perimenopausal symptoms. Increased risks of cardiac disease, hypertension, risk of diabetes, osteoporosis, forgetfulness, and Alzheimer's are some of the long-term problems of menopause.

- VMS: These symptoms include hot flashes, mood swings, depression, sleep disturbances, and fatigue.
- Urogenital symptoms: These symptoms include dryness of the vagina, dysuria, urinary leak, urinary frequency, and sexuality problems.
- Musculoskeletal symptoms: These symptoms include sarcopenia/weakness of muscles, joint aches and pains, osteoarthritis, and osteoporosis.

The VMS can start from 40 to 50 years and its incidence increases with age. Some menopausal women experience VMS and sleep disorders beyond 60 years of age. They have urogenital atrophy little after menopausal and perimenopausal age. Osteoporosis and atherosclerosis start during the same time and advances as age increases after menopause [Figure 1].

## MANAGEMENT OF MENOPAUSE

The first point of contact usually must be gynaecologists. However, patients first go to orthopaedics for backaches, and cardiologists for palpitations and other cardiac symptoms. Sometimes, there are referrals from psychiatrists where patients have undergone treatment for severe depression.

Appropriate counselling, diet and exercise form the mainstay of menopause management. Non-pharmaceutical options include cognitive behavioural therapy. Hormone therapy covers therapies including estrogens, progestogens, combined therapies, and tibolone. Common indications of hormone therapy are symptom relief, urogenital atrophy, and bone health.

## MANAGEMENT OPTIONS AND DILEMMA

There are certain dilemmas associated with different management options. In 2002, the WHI trial revolutionized the way we used to manage menopausal women. The trial reported that post-menopausal women taking combination hormone therapy for menopause symptoms had an increased risk for breast cancer, stroke, and myocardial infarction and decreased risk of colorectal cancer and hip fractures. However, the risks outweighed these benefits. Worldwide, the trial was stopped after 5.2 years.

## IMPORTANT POINTS TO CONSIDER

While thinking to start MHT, when to start, which molecule, what therapy, how long to give it, and when to stop are all important points that one should consider. There should be a good balance of the benefits and risks of whatever treatment is prescribed.

A full assessment is required irrespective of presenting the reasons of the midlife woman. First, take a complete medical history of the

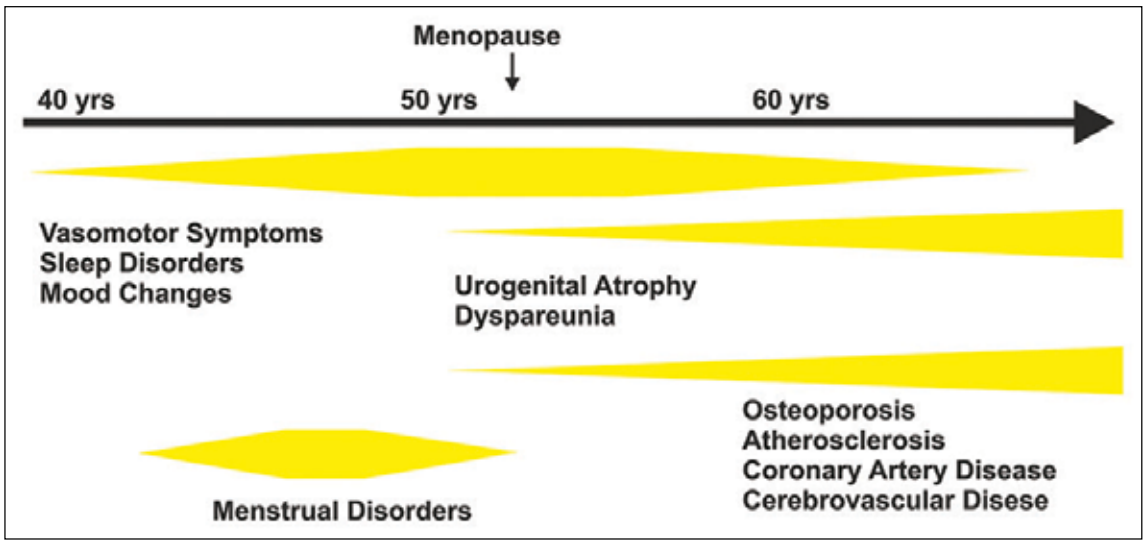



**Figure 1: Signs and symptoms during and after menopausal transition**

patient and assess various menopausal symptoms and gynaecological conditions. It is important to identify the risk factors and comorbid conditions in individual patients. The management treatment will change accordingly. Risk profile, family history, current medications, and social and personal history should be assessed before starting treatment.

Clinical examination includes height, weight, blood pressure, pelvic examination, breast examination, thyroid examination, and physical fitness.[1] Patients are also advised to get an eye and dental check-up. Laboratory tests ideally to be done are complete blood picture, urine test routine, fasting blood glucose level, lipid profile, thyroid stimulating hormone, Papanicolaou smear, transvaginal ultrasound (individualized), and mammogram (individualized after 40 years).[1]

## TREATMENT OPTIONS

Treatment options are either hormone replacement therapy or non-hormonal therapy. The age-old time-tested estrogen therapy (ET) is still the best to tackle symptoms, but the concepts have now changed. It was the universal way of giving estrogen to all, but today, it is given to only patients who are symptomatic or those who are in need. Along with ET, estrogen and progesterone combination therapy, and androgen therapy can also be used. Tibolone, a selective tissue enzyme receptor regulator is also a very good option for the treatment of menopause symptoms, bone, and breast health.

Raloxifene, a selective estrogen receptor modulator (SERM) is another option. The main drawback of SERMs is that it precipitates VMS. Bazedoxifene along with estrogen has emerged as a new treatment option. Bazedoxifene alone can be given for the improvement of osteoporosis but along with estrogen can help improve all symptoms. The latest addition, ospemifene is the only licensed drug for dryness of vagina and vulvovaginal atrophy and dyspareunia. Non hormonal therapy such as clonidine, venlafaxine, propranolol, gabapentin, vitamin E, and certain phytoestrogens and others can also be given.

## COUNSELING

Counselling is addressing women's questions and concerns and providing patient education on what exactly menopause is all about. It also includes enhancing patients' confidence in decision-making. If therapy is chosen, the patient and clinician should agree on goals, risks, and benefits, whether they are short-term, long-term, or both.[2]

## EXERCISE

Physical exercise helps to maintain a healthy weight, improves bone density, coordination and balance, muscle strength and joint mobility, lipid profiles, genitourinary problems, relieves depression, and induces sleep. A combination of exercises, diet, and yoga helps postmenopausal women to increase their metabolic rate and maintain a healthy weight. Social interactions either in an exercise program or otherwise, help postmenopausal women to improve their mood, and relieve depression, and anxieties.[2]

## COMPLEMENTARY AND ALTERNATIVE THERAPIES

Non-hormonal prescription agents may relieve VMS, but they also have their own side effects. These can be considered when hormone replacement therapy is contraindicated or not desired. Complementary and alternative treatments should be advised with caution, as the data are still insufficient, especially in moderate to severe VMS.[3]

## PHYTOESTROGENS

There is little data available on phytoestrogens. The 2007 Cochrane database shows no evidence of effectiveness in the alleviation of menopausal symptoms with the use of phytoestrogen treatments. In observational trials, phytoestrogens have proven to be useful.

## ESTROGEN

There are three types of estrogens: Estrone, estriol, and estradiol. Estriol is the weakest of all, and estradiol is the most potent. 17 β-estradiol is identical to the estrogen produced by the ovary. It metabolizes to estrone, estriol, and estrone sulfate. It has a minimal load on the liver. It is available for administration through different routes and is the most physiological form of estrogen available for use. Estradiol valerate is a slight modification of the natural molecule. It has more loads on the liver than when using 17 β-estradiol. Thus, it is better to give 17 β-estradiol.

Conjugated equine estrogens are time-tested and have been used for several years. They have a much lower propensity to induce hepatic adverse effects than the synthetic estrogens. Synthetic estrogens have high potency with regards to adverse hepatic effects and potential secondary risks, but low doses are used in hormone therapy. Thus, use the lowest possible dose of estrogen for the shortest period to minimize the side effects and risks associated with it. The dose of 0.625 mg of conjugated estrogens generally is considered equivalent to 5–10 mg of ethinyl estradiol. Hence, always use low or ultra-low dose, whichever alleviates the symptoms.[4]

Estrogens have positive effects on bone mass. They prevent the action of osteoclast. They also have positive effects on lipids. They slightly decrease total cholesterol levels. Estrogen plus progesterone reduces bile acid biosynthesis, decreasing the incidence of colon cancer.

The North American Menopause Society has stated that for women at increased risk of venous thromboembolism (VTE) who request hormone therapy, a non-oral route of therapy at the lowest effective dose is recommended, if not contraindicated. Hormone therapy increases the risk of VTE by twofold. Transdermal ET and the natural progesterone may not have an effect and are considered to be safe.

If the equivalence of doses and routes of different formulations of estrogens are compared, the dose equivalent of oral conjugated equine estrogens is 0.625 mg,[5] 17 β-estradiol is 1 mg, and Ethinyl estradiol is 0.005 mg [Table 1].

## TRANSDERMAL HORMONE THERAPY

Transdermal MHT does not modify markers of coagulation, has a more favourable effect on serum triglycerides and does not increase the incidence of stroke. Hence, the recent literature supports the use of transdermal MHT rather than oral therapy. It eliminates hepatic first-pass metabolism and much lower doses of hormone therapy will successfully alleviate symptoms. It provides a more consistent level of hormones. There is no increase in sex hormone binding globulin (SHBG) and thus does not reduce the bioavailability of testosterone and is useful in women with diminished libido

Patches, vaginal pessaries, creams, and gels are other transdermal preparations. Estradiol spray 0.06% 1.25 g/day is the single approved dose for the treatment of moderate to severe vasomotor symptoms due to menopause. For mild symptoms 2 m doses of estradiol gel will be enough. Thus, the tube will last for 26 days.

The following are the serum levels of estradiol and

**Table 1: Equivalence of doses and routes of different formulations ofestrogens**

| Route | Dose equivalent (mg) |
|---|---|
| Oral | |
| Conjugated equine estrogens | 0.625 |
| 17 beta-estradiol | 1 |
| Ethinyl estradiol | 0.005 |
| Transdermal | |
| 17 beta-estradiol Patch | 0.05 |
| 17 beta-estradiol gel | 1.5 mg/$m^2$ doses |
| Vaginal | |
| Conjugated equine estrogens | 0.3125 |
| 17 beta-estradiol | 0.5 |

**Table 2: The serum levels of estradiol and estrone with differentdoses and routes of estrogen**

| Formulation | Estradiol level (pg/ml) range | Estrone level (pg/ml) median value |
|---|---|---|
| Oral (mg) | | |
| Conjugated equine estrogens 0.625 | 30–50 | 153 |
| 17 beta-estradiol | 30–50 | 160 |
| Transdermal (mg) | | |
| 17 beta-estradiol patch 0.05 | 30–40 | 45 |
| 17 beta-estradiol gel 1.5 | 60–90 | 90 |
| Vaginal (mg) | After 4 weeks | |
| Conjugated equine estrogens 0.625 | 13 | 40 |
| 17 beta-estradiol 0.01 | 5 | |

estrone with different doses and routes of estrogen [Table 2]. The oral estrogen reaches 30–50 estradiol level. Transdermal also reaches approXimately the same level. 17 beta-estrogen gel reaches higher and vaginal local formulations after 4 weeks do not reach as high as other transdermal preparations. This means they will not have systemic side effects

## PROGESTERONE

Progestins and estrogens can be combined in various regimens. Starting in the middle of the 1960s and continuing for nearly 20 years, particularly in the US, estrogens were the sole active ingredient even for non-hysterectomized women, to avoid menstrual-like bleedings,[6] later we identified it can cause endometrial cancer. From the second half of the 1980s in the US and in Europe, progestin was added to estrogen in a sequential regimen. Subsequently, the so-called continuous-combined regimen was increasingly adopted, first in Europe and then in the US. Ideal hormone therapy should include a progestin molecule. Progesterone protects the endometrium. It does not reverse the positive effects of estrogen on the cardiovascular system.[7]

The cyclical administration of medroxyprogesterone acetate (MPA) at high doses abolishes the beneficial effect of estrogens on vasodilation and exercise-induced myocardial ischemia. Estrogen cannot be given alone as it will cause hyperplasia when the uterus is intact. No effect is observed when lower doses of MPA are administered in a continuous combined regimen, thereby suggesting that the cardiovascular effect of this progestin[8] may be related to the dose and regimen.

The androgen-derivative progestins have a detrimental effect in postmenopausal women. Addition of dydrogesterone to estradiol does not reverse the beneficial effect of estrogen. Hence, at present, the use of dydrogesterone in menopausal hormone therapy is recommended. Micronized progesterone is also recommended. MPA can be used but we recommend dydrogesterone and micronized progesterone due to better evidence than other progesterone. They are considered heart friendly, and they do cause reversal of endometrial hyperplasia caused by estrogen.

The following are the types of progesterone and insulin-like growth factor (IGF)-I level [Figure 2]. Interestingly, if only estrogen is given, it will not cause much increase in IGF-I level. On the other hand, MPA and Norethindrone acetate cause a significant increase in IGF-I levels, so it not advisable to give these two. Dydrogesterones and other progesterone cause relatively less increase in IGF-I levels.

The International expert panel states that oral micronized progesterone provides endometrial protection if given sequentially for 12–14 days a month at 200 mg/day for up to 5 years.[8] Vaginal micronized progesterone may provide endometrial protection if applied sequentially for at least 10 days a month at 4% or every other day at 100 mg/day for up to 3–5 years.[8]

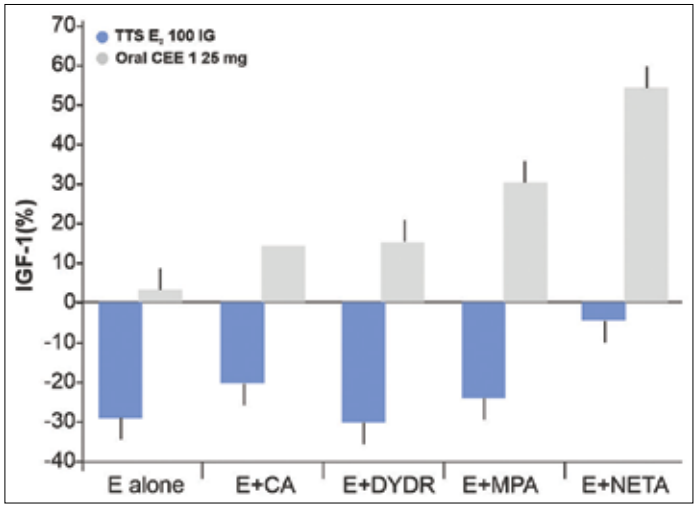



**Figure 2: Types of progesterone and insulin-like growth factor-I level**

## ROLE OF PROGESTOGENS IN HORMONE THERAPY

The postmenopausal estrogen / progestin interventions trial has documented that giving progesterone does cause atrophy of the endometrium, and it is helpful in preventing the endometrial hyperplasia and endometrial cancer. Hence, progesterone must be given when the uterus is intact.

When taken orally, androgenic progestins (19-nortestosterone and to a lesser extent MPA) provoke an increase in the risk of breast cancer by increasing circulating IGF-I levels and reducing SHBG production. Androgenic progestins, and to a much lesser extent MPA, also oppose the estrogen induced increase in SHBG secretion by the liver.[9]

When the patient is on MHT, the patient may have symptoms, one must know what to do and what is at fault, is it estrogen or progesterone? If the patient experiences breast tenderness and bleeding, reduce the estrogen dose. If the patient experiences irritability, depression, water retention, and headaches, reduce progesterone dose or change progestogen.

Overall, the combination of 0.5 mg 17 beta-estradiol and 2.5 mg dydrogesterone is currently considered to be safer than other progesterone. If the uterus is intact, the patient can be offered Levonorgestrel intrauterine system to prevent hyperplasia.

## CURRENT SCENARIO

For women with confirmed COVID-19 using MHT who meet the criteria for hospitalization [Figure 3]:

a. The general recommendation is to withdraw any type of systemic MHT, because it will increase the risk of thromboembolism and to immediately administer low molecular weight heparin (LMWH) at prophylactic doses.

b. When the general condition is not serious and the symptoms require continued treatment with MHT, switch from oral to transdermal therapy and add prophylactic LMWH.

c. If the patients have other risk factors (diabetes, high blood pressure or heart disease), it is recommended that MHT is withdrawn and add LMWHs at prophylactic doses.

d. In severe cases or in women admitted to an intensive care unit, it is recommended that MHT is withdrawn and LMWHs are administered according to hospital protocol.

For outpatient confirmed COVID-19 patients using MHT:

a. If the patient has mild COVID-19 symptoms, withdraw MHT.

Oral MHT may be replaced with transdermal MHT.

b. If the patient has persistent respiratory symptoms that require only outpatient monitoring and self-isolation:

- Withdraw systemic MHT and add prophylactic LMWH.
- If using MHT, then it is advisable to switch to transdermal MHT and add LMWH at a prophylactic dose. If the patient is receiving tibolone therapy, this may be continued with the use of LMWH at prophylactic doses.

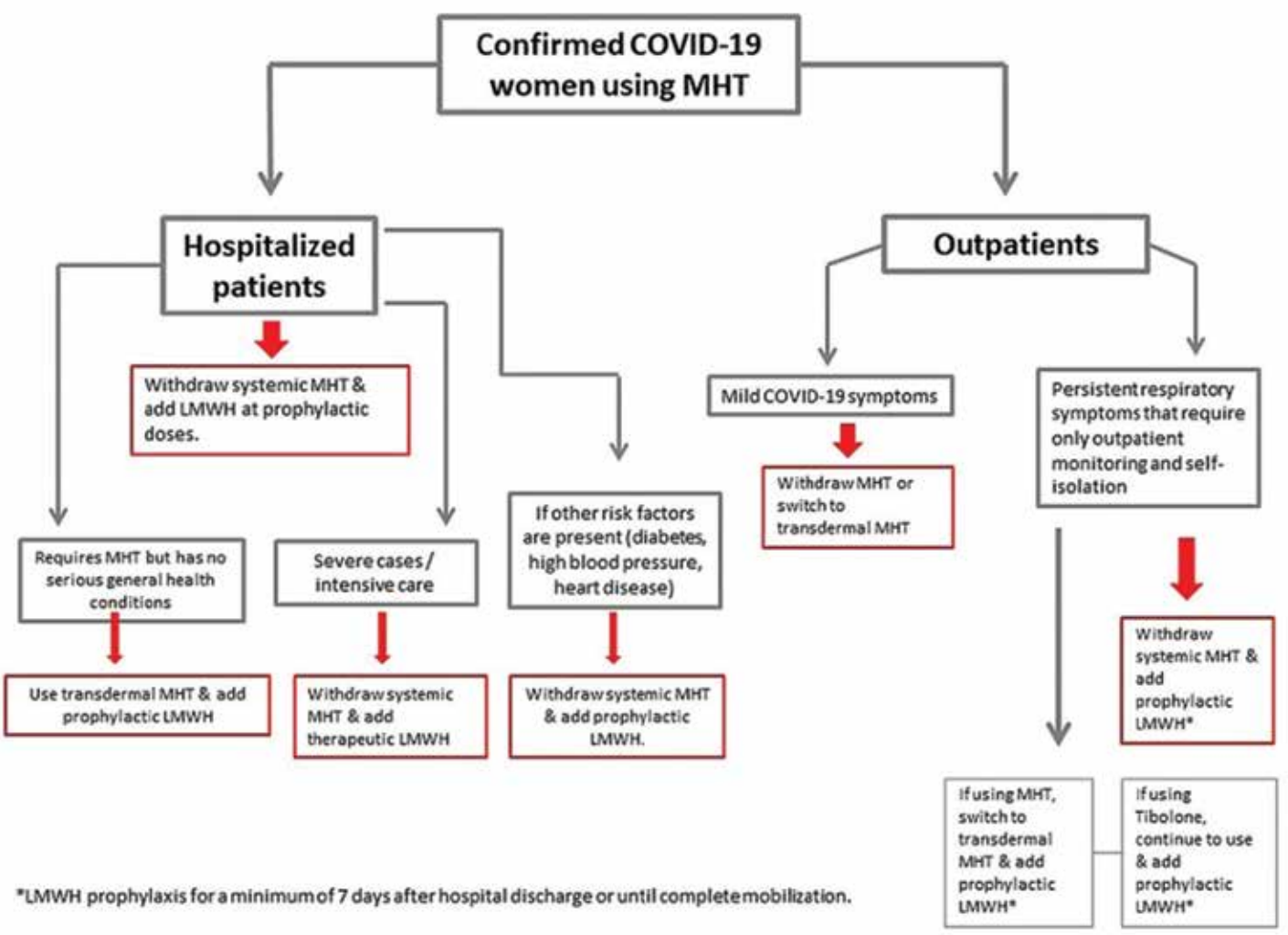



**Figure 3: Management of confirmed COVID-19 women using MHT**

For symptomatic patients with suspected COVID-19 using MHT [Figure 4]:

a. If the patient has mild symptoms, withdraw or switch from oral MHT to transdermal MHT. If the woman is receiving tibolone therapy, this may be continued.

b. If the patient shows persistent respiratory symptoms:

   i. Withdraw systemic MHT and add LMWH at prophylactic doses.

   ii. If the patient requires MHT, then it is advisable to switch to transdermal MHT and use LMWH at a prophylactic dose. If the patient is receiving tibolone therapy, this may be continued if required.

For suspected COVID-19 perimenopausal women using combined hormonal contraception (CHC) [Figure 5]:

a. For mild COVID-19 symptoms, continue the use of CHC or switch to progestogen-only contraception (POC).

b. If the patient has persistent respiratory symptoms that require only outpatient monitoring and self-isolation:

   - Discontinue CHCs and use prophylactic LMWH.
   - If contraception is required, it is advisable to switch to POC or non-hormonal contraception and add LMWH at prophylactic doses.

## COMORBIDITIES THAT AFFECT POSTMENOPAUSAL WOMEN

Cardiovascular and cerebrovascular morbidities, deep venous and pulmonary embolism, dyslipidemia/obesity, diabetes, dementia is some of the comorbidities that affect women of postmenopausal age. They may be worried

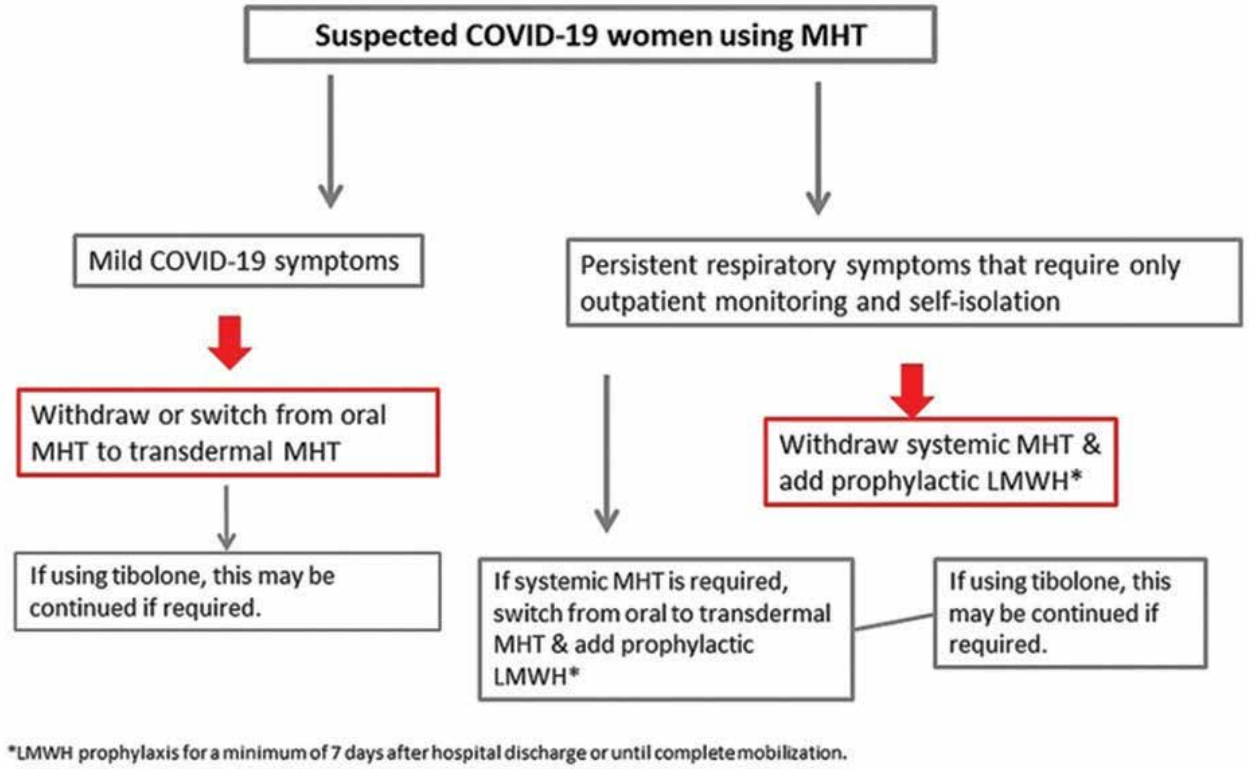



**Figure 4: Management of suspected COVID-19 women using MHT**

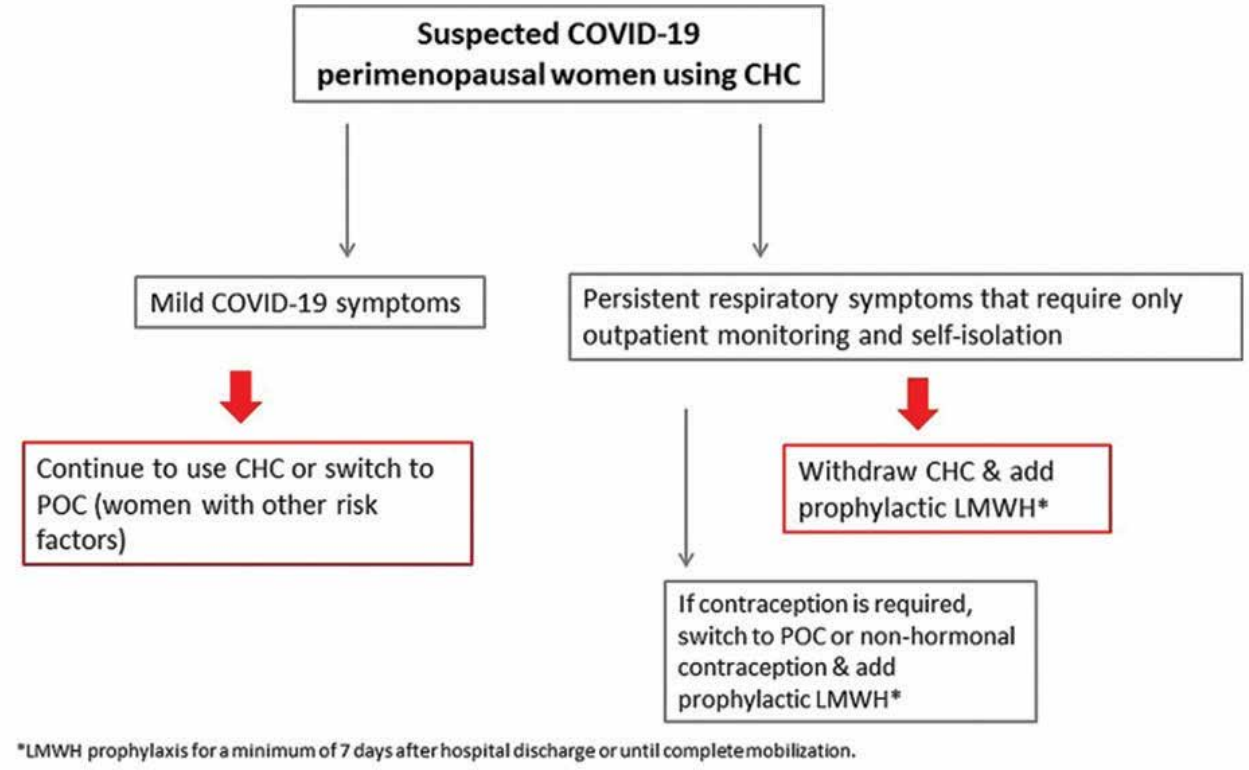



**Figure 5: Management of suspected COVID-19 perimenopausal women using combined hormonal contraception**

about risks of developing certain types of cancer. Sometimes the women may be at risk, MHT is initiated and then she develops certain cancer. At present, online, and offline menopause risk assessment models have been developed to identify potential risks before starting MHT.

## MENOPAUSE RISK ASSESSMENT

After assessing the risk factors, if the woman has low risk for CVD, MHT is safe. If she is at moderate risk for CVD, then transdermal MHT can be given and if the woman is at high risk for CVD, it is

advisable to avoid MHT. MHT is not to be started beyond 10 years of menopause or beyond 60 years of age to avoid the risk factors. It is not indicated for primary or secondary prevention of cardiovascular disease. If the patient is at high risk of VTE, avoid MHT. It is very important to know when not to give MHT.

## HOW TO GIVE MHT?

When there is no uterus, give continuous estrogen, there is no tablet break and no regular bleeding. If the uterus is present and when the patient wants regular bleeding, give continuous sequential MHT. After perimenopausal age is complete give continuous combined MHT, and there is usually no bleeding seen at the end of the cycle.

All guidelines recommend administering MHT in healthy women <60 years of age or within 10 years of menopause as the CVD risk is lower.

## CONCLUSION

Menopause management has gone through various phases over the last several years and universal MHT is far gone by. Do not start MHT for every woman. It is essential to choose the optimal MHT preparation for the given patient. Research is ongoing in this field, but currently, MHT is recommended for symptomatic relief and is to be used for the shortest possible duration in the smallest possible dose to minimize the risks involved.

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# Report of SAFOG FOGSI MOGS UNICEF World Breastfeeding Week CME - 3rd August 2022

Mumbai Obstetrics & Gynaecological Society along with SAFOG, FOGSI and UNICEF organised a virtual WORLD BREASTFEEDING WEEK CME on 3rd August 2022, 5pm-8pm IST.

The Convenors for this program were Dr. Shyam Desai and Dr. Niranjan Chavan.

Dr. Shantha Kumari FOGSI President and Dr. Rohan Haththotuwa, President SAFOG graced the occasion as Chief Guests and delivered the Presidential speech. MOGS President Dr Niranjan Chavan delivered the Presidential address and welcomed all faculties and delegates. Guests of honour - Dr. P K Shah and Dr. Almeida Fernandez shared pearls of wisdom. Dr. Reena Wani, Dr. Pradnya Changede and Dr. Madhuri Mehendale were the coordinators for this program. Dr. Rajashree Tayshete and Dr. Zubin Sheriar were Masters of Ceremony.

Session 1 was Chaired by Dr. Shyam Desai, Dr. Madhuri Patel and Dr. Hema Diwakar. In this session, Prof Sameena Chowdhury from SAFOG spoke on Excellence in breastfeeding through education and support. Dr Farhana Dewan from SAFOG explained the Position and Techniques of BF and Dr. Md Ziaul Matin from UNICEF enlightened the audience with his talk on QOC IN MNH.

Session 2 was chaired by Dr Suvarna Khadilkar, Dr Tarini Taneja, Dr. Sujata Kanhere and Dr. Radha Ghildiyal. In this session Dr. Jayshree Mondkar spoke on Human Milk Bank and Dr. Reena Wani explained Breastfeeding in COVID. Dr Prashant Gangal spoke on the topic of the Baby Friendly Hospital initiative.

Session 3 was a Panel Discussion on Breastfeeding in Special Situations

Moderators for this panel were Dr. Pradnya Changede and Dr. Madhuri Mehendale.

Dr. Padmaja Sawant, Dr. Swati Manerkar (Neonatologist) ,Dr. Sujata Pol (PSM),

Dr. Pradnya Supe, Dr. Deepali Kale and Dr. Rajashree Tayshete were the panelists.

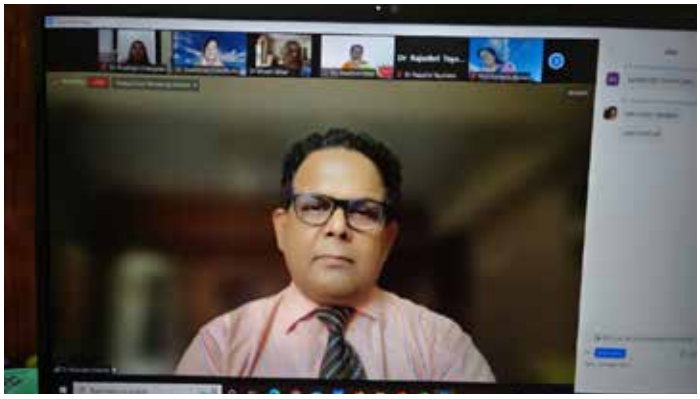
This panel discussion provided practical tips to deal with special situations in breastfeeding.

Prize Distribution of MOGS Poster & Slogan Competition was done by esteemed faculties. The program concluded with a vote of thanks by MOGS Secretary Dr Rajendra Sankpal.

It was the vision and efforts of MOGS president Dr Niranjan Chavan which got umbrella organisations under one roof for this wonderful program on breastfeeding for delegates and MOGS members.

1 MMC and 3 ICOG Points were granted for this program. The program was attended by 961 delegates. Onference team Mr Tirup, Mr Abhyunjay and Mr Makrand Desai from Variance made it possible for all of us to reach out to the audience through an online platform.


zoom

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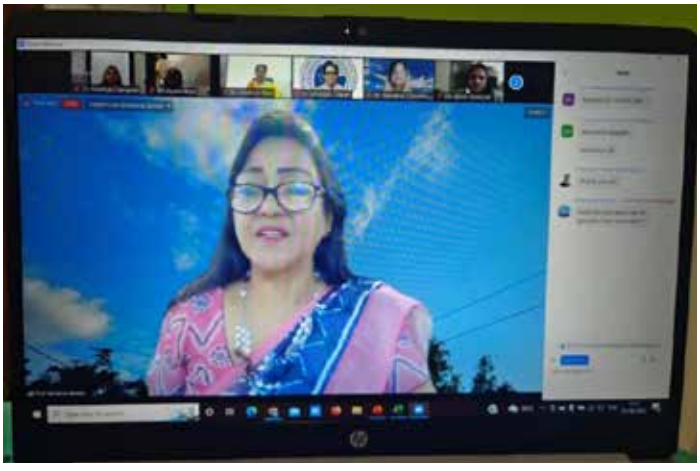


MUMBAI OBSTETRICS & GYNAECOLOGICAL SOCIETY
SAFOG - FOGSI - UNICEF
Dr. Md Ziaul Matin


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# Quiz Time

## Dr. Ashwini Sakhalkar

1. What was the weight of the heaviest baby at birth ?

   a. 9kg  b. 11kg  c. 10kg  d. 12kg

2. Who performed the World's first abdominal hysterectomy?

   a. Charles Clay  b. Ellis Burnham  c. Johanns Pfannensteil  d. Soranus

3. Strawberry skull is seen in which aneuploidy?

   a. Trisomy 21  b. Trisomy 18  c. Trisomy 13  d. Monosomy

4. Who was the first female midwife?

   a. Aspasia  b. Hypatia  c. Hydna  d. Agnodice

5. In which year was FIGO founded ?

   a. 1933  b. 1945  c. 1954  d. 1962

# Sudoku

## Dr. Zubin Sheriar

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 6 | | 9 | | 2 | | |
| | | | 7 | | 2 | | | |
| | 9 | | 5 | | 8 | | 7 | |
| 9 | | | | 3 | | | | 6 |
| 7 | 5 | | | | | | 1 | 9 |
| 1 | | | | 4 | | | | 5 |
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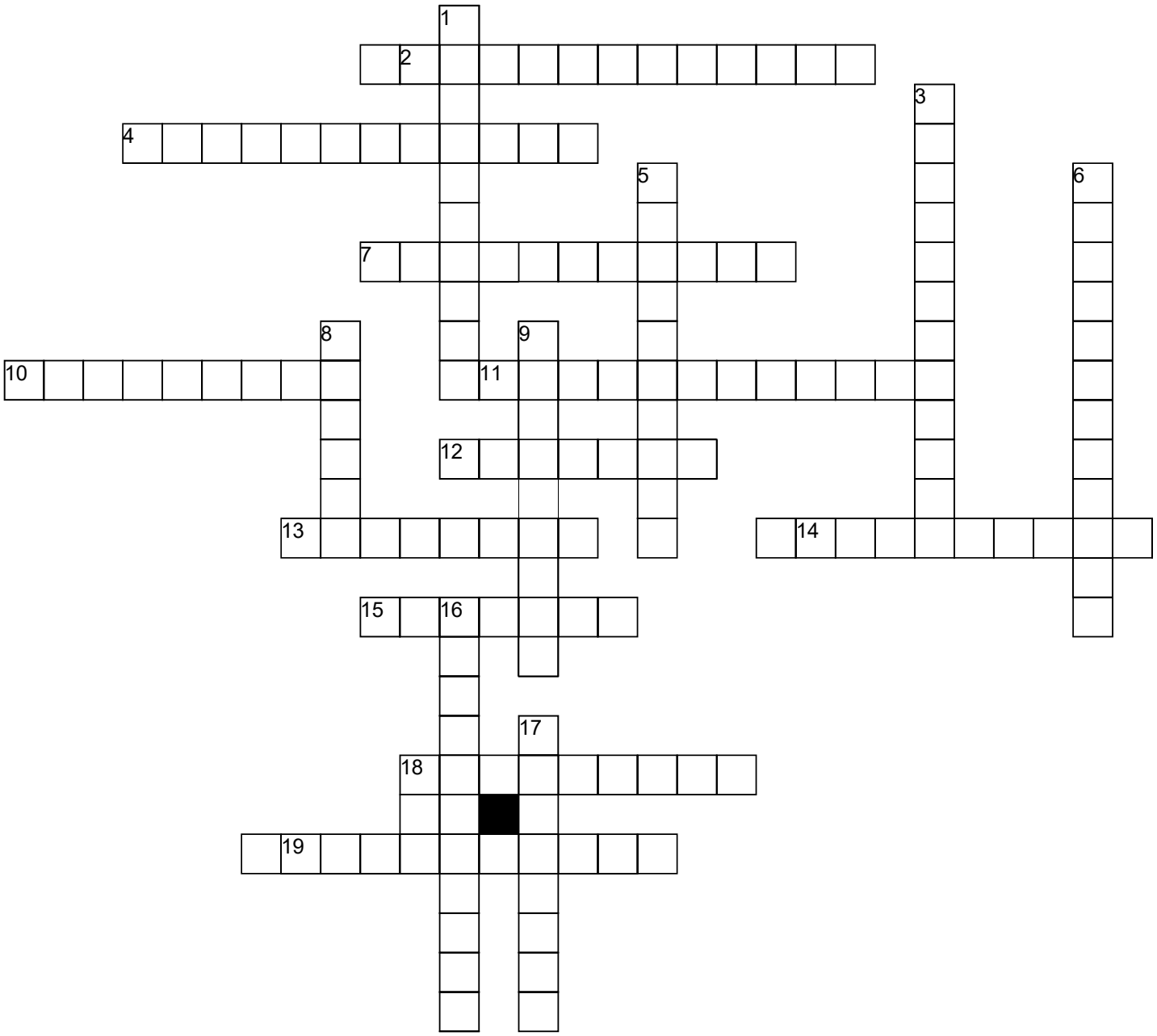
# Crossword

Dr. Akanksha Barkase



**Across**

**2.** the process of giving birth
**4.** bleeding between menstrual periods
**7.** Outpatient procedure in patients with abnormal pap smear
**10.** sexually transmitted that is passed down through sex
**11.** Main symptom in adenomyosis
**12.** oxygen deficiency
**13.** time period between fertilization and birth
**14.** pregnancy induced hypertension with convulsion
**15.** Post-partum vaginal discharge
**18.** vessel sealing device
**19.** describes a woman who has not carried a pregnancy to viability

**Down**

**1.** Cephalic replacement maneuver for Shoulder dystocia
**3.** women who have been pregnant more than once
**5.** Purple discolouration of vagina in pregnancy - sign
**6.** painful intercourse
**8.** Supraumbilical access point used in Laparoscopy
**9.** abnormal development of tissue
**16.** Curdy white vaginal discharge is seen in
**17.** Drug used for endometriosis

# Forthcoming Events

| Date | Program | Venue |
|---|---|---|
| 2nd September 2022 | MOGS Infertility Pre-Congress Workshop | MET Auditorium, Bandra, Mumbai |
| 2nd September 2022 | MOGS Minimal Access Gynaecological Surgery Pre-Congress Workshop | LTMC & Hospital Auditorium, 3rd Floor, Sion, Mumbai. |
| 2nd September 2022 | MOGS Gynaecological Oncology Pre-Congress Workshop | CPS Hall, Parel, Mumbai. |
| 3rd & 4th September 2022 | MOGS - SHARP Global Gynaecology Conference 2022 | Hotel St. Regis, Lower Parel, Mumbai |
| 13th September 2022 | Happy Learning CME | Online event |
| 17th September 2022 | MOGS FOGSI Out of The Box | Hotel St. Regis, Lower Parel, Mumbai |
| 24th September 2022 | MOGS DR N A Purandare Teaching Program | Bombay Hospital Online event |
| 25th September 2022 | MOGS Teacher's Day program | Western Mumbai |
| 1st October 2022 | MOGS Outreach Program | South Mumbai |
| 5th & 6th November, 2022 | 35th Annual Conference of MOGS - AICC RCOG West Zone 2022 with FOGSI | Taj Lands End, Bandra, Mumbai. |

# Quiz Answer Key

1. Giantess Anna Bates gave birth to a boy weighing 9.98 kg (22 lb) and measuring 71.12 centimetres (28 in) at her home in 1879 who sadly died 11 hours later.
2. The first abdominal hysterectomy was performed by Charles Clay in Manchester, England in 1843.
3. Prenatal ultrasound findings of strawberry shaped skull i.e. flat occiput and pointing of frontal bones are characteristically seen in Trisomy 18 (Edward's Syndrome).
4. Agnodice was the first female midwife in ancient Athens in the 4th Century BC. As females could not practise midwifery or medicine, she disguised herself: she cut off her hair, dressed as a man and went to Alexandria.
5. FIGO was founded in 1954 with representatives from 42 national OBGYN member societies. The first meeting was convened by Professor Hubert de Waterville from Berne, Switzerland, on 26th July, 1954.

# MOGS TRENDZ


MOGS - HER WORLD CONGRESS ON
Labour & Delivery
Letoval


Abbott
MEYER

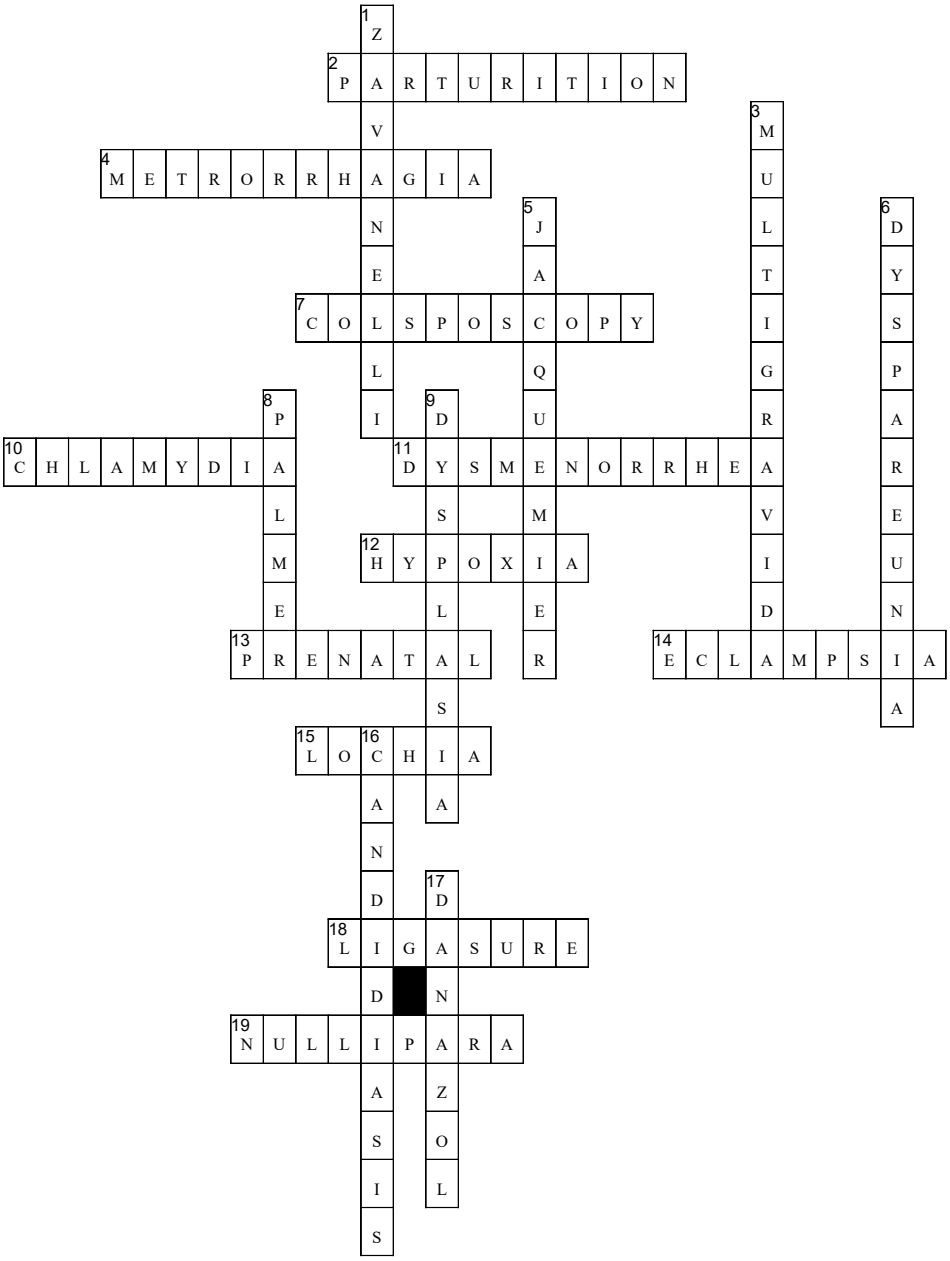

HER


MOGS MENSTRUAL HYGIENE DAY AWARENESS PROGRAM


VISION FOR
HER


FIGO
PARIS 2022

# Crosswords Answer Key




# Sudoku Answer Key

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
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| 3 | 4 | 5 | 7 | 1 | 2 | 9 | 6 | 8 |
| 2 | 9 | 1 | 5 | 6 | 8 | 4 | 7 | 3 |
| 9 | 8 | 2 | 1 | 3 | 5 | 7 | 4 | 6 |
| 7 | 5 | 4 | 8 | 2 | 6 | 3 | 1 | 9 |
| 1 | 6 | 3 | 9 | 4 | 7 | 8 | 2 | 5 |
| 4 | 1 | 7 | 3 | 5 | 9 | 6 | 8 | 2 |
| 6 | 3 | 8 | 2 | 7 | 1 | 5 | 9 | 4 |
| 5 | 2 | 9 | 6 | 8 | 4 | 1 | 3 | 7 |

# MOGS ACADEMIC PARTNERS

## PLATINUM

SUN PHARMA

Emcure
SUCCESS THROUGH INNOVATION

## DIAMOND

MEYER

torrent PHARMA

Alembic
Touching Lives over 100 years

## GOLD

Zuventus
Healthcare Limited

Eris

AstraZeneca

SECRETARIAT

**Mumbai Obstetrics & Gynecological Society**

C-14, 1st Floor, Trade World, D-wing Entrance, S. B. Marg, Kamala City, Lower Parel (W), Mumbai 400013.
Tel. : 022-24955324 / 24975035 / 35114384 / 85 ▪ Mobile: 9022361841 ▪ email: mogs2012@gmail.com

**www.mogsonline.org**