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Oocyte Retrieval under Ultrasound Guidance: A Step-by-Step Review from Preoperative Evaluation to Post-Procedure Care

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1: Pre-operative Evaluation & Counseling

2:Pre-Procedure Preparation and Monitoring Before Oocyte Pick-Up (OPU)

3)Intra-Procedure Measures During Oocyte Pick-Up (OPU)

4)Post-Oocyte Retrieval Care (Post-Procedure Care)

1: Pre-operative Evaluation & Counseling

A)Pre-procedure Counseling

Objective:

To fully inform the patient about the procedure, associated risks, benefits, alternatives, and realistic expectations; this is a continuous process, not just a signed form. The patient should have adequate time to ask questions and receive information in a clear and understandable manner.

•ASRM Ethics Committee. Informed Consent in Assisted Reproduction: An Ethics Committee Opinion. 2023.

Key Points:

1. Consent process (Informed Consent):

•Must be obtained formally and documented

•Should include explanation of:

- **Steps of oocyte retrieval (OPU) under ultrasound guidance**
- **Potential risks (e.g., bleeding, infection, injury to surrounding organs, anesthesia complications)**
- **Benefits and goals of treatment**
- **Available alternative treatment options**

•Essential because informed consent is a fundamental principle of medical ethics.

Decisions must be based on sufficient information.

ASRM Ethics Committee. Informed Consent in Assisted Reproduction: An Ethics Committee Opinion. 2023.

B)Medical & Anesthesia Evaluation

Objective:

To minimize the risks of anesthesia and any intra- or post-procedural complications, and to ensure that the patient is in the optimal physical condition for oocyte retrieval (OPU).

ASRM Practice Committee. Oocyte Retrieval Safety. 2019.

Key Points:

1. General Medical Evaluation:

- **Assess history of cardiovascular, pulmonary, hepatic, or renal disease.**
- **Review past pelvic or abdominal surgeries.**
- **Review current medications (e.g., anticoagulants, hormone therapy, etc.).**

- **These assessments should be conducted systematically to reduce potential risks during anesthesia and the procedure**

ASRM Practice Committee. Oocyte Retrieval Safety. 2019.

2. Basic Laboratory Tests:

- CBC (Complete Blood Count)
- Blood type and Rh factor
- Blood glucose and electrolytes
- Screening for transmissible infections (HIV, HBV, HCV) according to the local protocol
- While ASRM has not published specific pre-OPU lab guidelines, general ART principles recommend a comprehensive medical evaluation prior to any fertility procedure.

ASRM Practice Committee. Oocyte Retrieval Safety. 2019

3. Anesthesia Clearance:

- Consultation with an anesthesiologist to assess anesthesia risks.
- Evaluate airway status, vital signs, and current medications.
- This evaluation is crucial for determining the type of anesthesia (e.g., IV sedation vs. general anesthesia).

ASRM Practice Committee. Oocyte Retrieval Safety. 2019

c)Fertility Evaluation & Preparation

Objective:

To obtain comprehensive information about the patient's reproductive status

before deciding on oocyte retrieval (OPU), especially if this is the first cycle

Key Points:

1. Assessment of Ovarian Reserve:

- Tests: AMH (Anti-Müllerian Hormone) and AFC (Antral Follicle Count)
- These evaluations help predict the ovarian response to stimulation and guide medication dosing.

- ASRM Practice Committee. Ovarian Reserve Assessment. 2020

2. Pre-procedure Ultrasound:

- Evaluate pelvic anatomy
- Determine size and number of follicles
- Assess adnexal status

- These assessments are essential for precise OPU planning and are emphasized in ESHRE guidelines for optimal ultrasound practice in ART.

- ESHRE Guideline: Ultrasound in ART. 2022.

2:Pre-Procedure Preparation and Monitoring Before Oocyte Pick-Up (OPU)

A)Clinical Preparation of the Patient

✅**Follicular Monitoring and Trigger Injection Timing (hCG or GnRH Agonist):**

One of the key steps prior to Oocyte Pick-Up (OPU) is determining the optimal timing for trigger administration.

The main goal is to maximize the number of mature oocytes and improve assisted reproductive outcomes.

•ESHRE Guideline for Ovarian Stimulation in IVF/ICSI, 2020
•Gardner DK, Weissman A, Howles CM, Shoham Z. Textbook of Assisted Reproductive Techniques, 6th Edition

⏱️ Standard Timing of OPU:

Oocyte retrieval is typically performed: 34–36 hours after trigger administration

📌Importance of Proper Timing:

The timing of OPU plays a crucial role in oocyte quality and maturation:

•Performing retrieval too early may increase the proportion of immature oocytes.

•Performing retrieval too late increases the risk of spontaneous ovulation and reduction in the number of retrievable oocytes.

Studies have demonstrated that adherence to this time interval improves the number of mature (MII) oocytes and IVF outcomes.

•ESHRE Guideline for Ovarian Stimulation in IVF/ICSI, 2020

•Humaidan P. et al. Timing of oocyte retrieval after hCG administration. Fertility & Sterility, 2011

Factors Influencing OPU Timing (OPU Timing Modifications:

Although the standard OPU timing is 34–36 hours after trigger, certain clinical conditions may require modification.

1)Ovarian Hyperstimulation Syndrome (OHSS) Risk / High Ovarian Response

2)Use of GnRH Agonist Trigger

3)Advanced Maternal Age

4)Type of Ovarian Stimulation Protocol

5)Hormonal Levels (Estradiol and Progesterone)

•Oktay K. et al. Timing of oocyte retrieval after hCG administration. Fertility & Sterility, 2010
•Gardner DK. Textbook of Assisted Reproductive Techniques, 6th Editio

1)Ovarian Hyperstimulation Syndrome (OHSS) Risk / High Ovarian Response

In patients at risk of OHSS:

OPU is usually performed approximately 34–35 hours after trigger administration

Rationale:

- **Reduces the risk of spontaneous ovulation**
- **Helps reduce follicular fluid accumulation**
- **Assists in controlling OHSS symptom**

- ESHRE Guideline for Ovarian Stimulation in IVF/ICSI, 2020
- Humaidan P. et al. GnRH agonist trigger and OHSS prevention. Fertility and Sterility, 2011

2)Use of GnRH Agonist Trigger

In cycles where final oocyte maturation is induced using a GnRH agonist:

OPU is typically performed 34–36 hours after trigger.

Some centers prefer performing OPU closer to 34 hours due to the shorter hormonal surge.

Rationale:

- **LH surge induced by GnRH agonist is shorter compared to hCG**
- **Delayed retrieval may reduce oocyte maturation**

- Humaidan P. et al. GnRH agonist for final oocyte maturation. Fertility and Sterility, 2010
- ASRM Practice Committee. Prevention of OHSS, 2019

3)Advanced Maternal Age

In patients with advanced maternal age:

OPU is generally performed within 34–36 hours after trigger, with some evidence suggesting that retrieval closer to 36 hours may improve oocyte maturation.

Rationale:

- **Potentially slower oocyte maturation**
- **Reduced oocyte quality in older patients**

(However, evidence remains limited and there is no universal consensus.)

- Oktay K. et al. Timing of oocyte retrieval after hCG administration. Fertility and Sterility/2010
- Gardner DK. Textbook of Assisted Reproductive Techniques, 6th Edition/2023

International Guidelines on OPU Timing in AMA:

- **ESHRE (2020):**

While the standard interval is 34–36 hours, OPU timing should be individualized; in patients with a history of low oocyte maturation (often seen in AMA), extending the interval towards 36 hours may be considered to optimize maturation rates.

- **ASRM(2021):**

There is no rigid mandate for AMA, but clinical consensus suggests that a longer interval (up to 36 hours) may compensate for the potentially slower meiotic progression in older oocytes.

4)Type of Ovarian Stimulation Protocol

Different stimulation protocols may slightly influence retrieval timing:

Antagonist Protocol:

OPU is usually performed 34–36 hours after trigger

Long Agonist Protocol:

OPU is often performed closer to 35–36 hours

Rationale:

- **Differences in follicular dynamics**
- **Variations in mechanisms of final oocyte maturation**

- ESHRE Ovarian Stimulation Guideline, 2020
- Al-Inany HG et al. GnRH antagonist versus agonist protocols. Cochrane Review

5)Hormonal Levels (Estradiol and Progesterone)

Hormonal profiles may influence clinical decision-making regarding OPU timing.

Elevated Estradiol Levels:

OPU is usually performed around 34–35 hours after trigger to reduce the risk of premature ovulation and OHSS.

Premature Progesterone Elevation:

OPU timing is generally maintained at 34–36 hours, although alternative strategies such as freeze-all may be considered.

Rationale:

- **High estradiol levels are associated with increased OHSS risk**
- **Progesterone elevation may negatively affect endometrial receptivity and cycle outcomes**

Venetis CA. Elevated progesterone and IVF outcomes. Human Reproduction Update, 2013
ESHRE Guideline for Ovarian Stimulation, 202

Comparative Table: OPU Timing Based on Clinical Conditions

Reference	Clinical Condition	Recommended OPU Timing	Clinical Considerations
ESHRE Ovarian Stimulation Guideline, 2020	Normal Response	34–36 hours after trigger	Standard interval to achieve the highest number of mature (MII) oocytes
Humaidan P. Fertility & Sterility, 2011 / ESHRE Guideline, 2020	OHSS Risk / High Ovarian Response	34–35 hours after trigger	Reduces the risk of spontaneous ovulation and helps control OHSS severity
Humaidan P. Fertility & Sterility, 2010 / ASRM OHSS Prevention Guideline, 2016	GnRH Agonist Trigger	34–36 hours (often closer to 34 hours in some centers)	Shorter LH surge may reduce oocyte maturation if retrieval is delayed
Oktay K. Fertility & Sterility / Gardner DK. Textbook of Assisted Reproductive Techniques, 6th Ed	Advanced Maternal Age	34–36 hours (sometimes closer to 36 hours)	Possible slower oocyte maturation in older patients
ESHRE Ovarian Stimulation Guideline, 2020	Antagonist Protocol	34–36 hours after trigger	Most commonly used timing in antagonist cycles
Al-Inany HG. Cochrane Review / ESHRE Guideline	Long Agonist Protocol	35–36 hours after trigger	Some studies suggest improved oocyte maturation with slightly longer intervals
ESHRE Guideline, 2020	Elevated Estradiol Levels	34–35 hours after trigger	Reduces OHSS risk and prevents premature ovulation
Venetis CA. Human Reproduction Update, 2013	Premature Progesterone Elevation	Usually 34–36 hours after trigger	OPU timing usually unchanged; freeze-all strategy may be considered

B)Basic Monitoring Before Oocyte Pick-Up (OPU)

Oocyte retrieval is a minimally invasive procedure usually performed under sedation or light anesthesia. Therefore, baseline patient assessment is essential for procedural safety

Baseline Vital Signs Monitoring:

This evaluation is typically performed by the nursing and anesthesia team to ensure patient safety.

•ESHRE Guideline for Ovarian Stimulation in IVF/ICSI, 2020
•ESHRE Good Practice Recommendations for Oocyte Pick-Up/2020

1)Blood Pressure

Importance:

- **Assesses the patient’s hemodynamic status**
- **Identifies patients at risk of hypotension during sedation**

Sedative medications can cause vasodilation and hypotension, making baseline blood pressure measurement essential.

- **Practice Committee of the ASRM. Guidelines for sedation and anesthesia in ART procedures**
- **Gardner DK, Weissman A, Howles CM, Shoham Z. Textbook of Assisted Reproductive Techniques, 6th Edition**

2)Heart Rate

Importance:

- **Evaluates cardiac status**
- **Detects arrhythmias or tachycardia due to anxiety, pain, or dehydration.**

3)Oxygen Saturation (SpO_2)

mportance:

- **A key safety parameter during sedation.**

Sedative drugs may depress respiration and reduce oxygen saturation; therefore, continuous SpO_2 monitoring before and during the procedure is mandatory.

Practice Committee of the ASRM. Guidelines for sedation and anesthesia in ART procedures
UpToDate – Oocyte Retrieval and Anesthesia in ART
ESHRE Good Practice Recommendations for Oocyte Pick-Up

4)Respiratory Assessment

Parameters to evaluate:

- **Respiratory rate**
- **Breathing pattern**
- **Presence of underlying pulmonary conditions**

5)Pain Assessment

Importance:

Determines baseline pain level

Assists in selecting the appropriate analgesia method and dose

- ESHRE Good Practice Recommendations for Oocyte Pick-Up
- Gardner DK, Weissman A, Howles CM, Shoham Z. Textbook of Assisted Reproductive Techniques, 6th Edition
- Practice Committee of the ASRM. Guidelines for sedation and anesthesia in ART procedures

6)Level of Consciousness

Assessment tools:

- **AVPU Scale (Alert, Voice, Pain, Unresponsive)**
- **Glasgow Coma Scale(GCS)**
- **Sedation Scales**

This evaluation ensures proper monitoring of the patient's response to sedative drugs and helps prevent oversedation.

- **Practice Committee of the ASRM. Guidelines for sedation and anesthesia in ART procedures/2021**
- **UpToDate – Oocyte Retrieval and Anesthesia in ART/2024**

3)Intra-Procedure Measures During Oocyte Pick-Up (OPU)

A)Oocyte Retrieval Technique

📌 **Preferred Method: Transvaginal Ultrasound-Guided Retrieval**

The transvaginal ultrasound-guided oocyte retrieval is currently considered the gold standard worldwide for oocyte pick-up.

Rationale & Advantages:

- **Minimally invasive**
- **High oocyte yield**
- **Low complication rate**
- **Real-time guidance**

- ESHRE Guideline for Oocyte Retrieval, 2020
- Practice Committee of the ASRM. Guidelines for sedation and anesthesia in ART procedures, 2017
- Silber SJ. Atlas of Human Assisted Reproductive Techniques, 3rd Edition, 2018

📌 Anesthesia / Sedation During OPU

Oocyte retrieval is typically performed under intravenous sedation (IV sedation) or light anesthesia, ensuring that the patient:

- Experiences minimal or no pain during the procedure

Sedation Options:

1.IV Sedation / Conscious Sedation – Most common approach in outpatient settings.

A)Drugs often used: Midazolam, Fentanyl, Propofol

B)Advantages: Quick recovery, minimal respiratory depression

2.Light General Anesthesia – Sometimes preferred for anxious patients, low pain tolerance, or multiple simultaneous procedures.

A)Requires an anesthesiologist and continuous monitoring

ESHRE Good Practice Recommendations for Oocyte Pick-Up, 2020
Practice Committee of the ASRM. Guidelines for sedation and anesthesia in ART procedures, 2017
UpToDate: Oocyte Retrieval and Anesthesia in ART, 2023

B)Vital Signs Monitoring

Why Monitoring Is Essential:

- **Core component of patient safety during puncture**
- **Critical in OPU and outpatient procedures with sedation**
- **Enables early detection of cardiopulmonary complications**

During the Procedure:

⏱️ **Every 5–10 minutes or per institutional protocol**

Monitor:

- **Blood Pressure (BP)**
- **Pulse / Heart Rate**
- **Oxygen Saturation (SpO_2)**
- **Respiratory Rate and Pattern**
- **Level of Consciousness**

- ASA. Standards for Basic Anesthetic Monitoring
- ASA. Practice Guidelines for Moderate Procedural Sedation and Analgesia, 2018
- Royal College of Anaesthetists. Guidelines for Monitoring During Sedation
- Miller's Anesthesia, 9th Edition

Key Safety Alerts

- ↓ BP → drug effect, bleeding, vasovagal response
- ↑/↓ HR → pain, anxiety, hypoxia, medications
- ↓ SpO_2 → respiratory depression
- ↓ RR → early sign of respiratory suppression
- ↓ Consciousness → excessive sedation

Outcome

- Reduced anesthesia-related complications
- Improved cardiopulmonary safety
- Enhanced quality of outpatient care

- ASA. Standards for Basic Anesthetic Monitoring
- ASA. Practice Guidelines for Moderate Procedural Sedation and Analgesia, 2018
- Royal College of Anaesthetists. Guidelines for Monitoring During Sedation
- Miller's Anesthesia, 9th Edition/2020

C)Importance of Infection Control

Strict adherence to infection control measures during puncture procedures is essential to minimize the risk of procedure-related infections.

This is particularly important in OPU and other transvaginal or minimally invasive outpatient procedures, where breach of natural barriers may facilitate microbial transmission.

.World Health Organization (WHO). Global Guidelines for the Prevention of Surgical Site Infection, 2018.
•Centers for Disease Control and Prevention (CDC). Guideline for Prevention of Surgical Site Infection, 2017.

Surgical Cap:

According to ESHRE standards, all personnel present in the Oocyte Pick-Up (OPU) room including clinicians, nurses, and embryologists must wear a surgical cap. The cap must be worn in a manner that ensures **complete hair coverage**.

Rationale: Hair is a primary source of particle shedding and bacterial dispersion. The shedding of even a single hair or skin flake into the oocyte collection vessel can lead to sample contamination

ESHRE emphasizes that surgical caps should be made of **lint-free** materials to minimize particle release. If reusable fabric caps are used, they must be laundered using fragrance-free and chemical-free detergents to prevent the emission of **VOCs(Volatile Organic Compounds)**, which are known to be toxic to oocytes and embryos.

Hand Hygiene:

Surgical scrubbing with standard antiseptic solutions is mandatory before donning sterile gowns and gloves for OPU.

This procedure minimizes microbial load and prevents the translocation of skin flora to the vaginal environment and follicular aspirates.

ASRM Practice Committee Opinion: Recommendations for reducing the risk of viral transmission (2021).

Nail Hygiene and No Nail Polish During Puncture

Why Nail Hygiene Matters:

- **Hands are a major source of microbial contamination in sterile procedures.**
- **Long or artificial nails, or nail polish, harbor bacteria and fungi, even after handwashing.**
- **Contaminated nails can transfer microbes to gloves, instruments, and the sterile field.**

- **WHO. Guidelines on Hand Hygiene in Health Care, 2009**
- **Tartari et al., Impact of Nail Polish on Hand Microbiota, 2019**

Recommendation for All Staff:

- **All personnel involved in puncture must:**
  - **Keep nails short and clean**
  - **Avoid nail polish, gel, or artificial nails**
- **This reduces microbial load and prevents contamination of gloves and the sterile field.**

- **WHO Guidelines, 2009**
- **CDC. Hand Hygiene Recommendations, 2017**

Sterile Attire of the Medical Team:

All members of the medical team involved in the procedure must adhere to standard operating room attire, including:

- Surgical mask
- Sterile gloves(Powder-free)
- Sterile gown
- .Face Shield/ Goggles

The use of appropriate sterile barriers significantly reduces the transmission of microorganisms from healthcare providers to the patient and the procedural field.

Compliance with aseptic technique is a fundamental principle of infection prevention in invasive procedures.

- Association of periOperative Registered Nurses (AORN). Guidelines for Perioperative Practice, 2023.
- Mangram AJ et al. Guideline for Prevention of Surgical Site Infection. CDC, 2017.

1)Surgical Mask Use During Puncture

Why Surgical Masks Are Essential During Puncture:

•Puncture is an invasive procedure with a potential risk of infection transmission.

•Talking, breathing, and coughing can generate respiratory droplets.

•Saliva and oral secretions can contaminate the sterile field and puncture instruments.

•Wearing a surgical mask is one of the simplest and most effective ways to reduce microbial spread.

•CDC. Guideline for Isolation Precautions, 2017
•WHO. Infection Prevention and Control Guidelines, 2009

Surgical Mask for the Primary Operator:

- The operator is closest to the sterile field.
- There is a high risk of direct microbial transmission via droplets.
- Surgical masks:
  - Prevent contamination of the puncture needle and ovarian tissue.
  - Protect the operator from contact with blood and bodily fluids.
- Continuous mask use throughout the procedure is recommended.

- Bennett et al., Infection Control During Invasive Procedures, 2016
- Cochrane Review, 2016

Surgical Mask for the Assisting Physician/Nurse:

- Assistants are close to the patient and instruments.
- Frequent contact with sterile equipment increases the risk of cross-contamination.
- Surgical masks:
  - Prevent respiratory droplet transmission to the sterile field.
  - Play a key role in maintaining asepsis.

- **Recommended by international infection control guidelines.**

- ESHRE Guideline, Good Practice in OPU, 2020
- CDC Infection Control Recommendations

Mask + Face Shield/ Goggles in High-Risk Situations:

- When there is a risk of blood or bodily fluid splashes:
  - A surgical mask alone is insufficient.
  - Simultaneous use of a face shield or protective goggles is recommended.
- Prevents mucous membrane exposure (eyes, nose, mouth) to patient fluids.

- CDC. Personal Protective Equipment Guidelines, 2017
- WHO. IPC Recommendations

2)Sterile Gloves During Puncture

Why Sterile Gloves Are Essential:

- **Puncture involves direct contact with tissues and fluids, including ovarian tissue in OPU.**
- **Bare hands can easily transfer microbes to needles, instruments, and the patient.**
- **Wearing sterile gloves provides a critical barrier to prevent cross-contamination and maintain asepsis**

- **ESHRE Guideline, 2020**
- **Bennett et al., 2016**

Application for All Team Members:

- All team members working in the sterile field must wear sterile gloves.
- Gloves must be:
  - Properly donned using aseptic technique
  - Changed immediately if contaminated or torn
- Reduces the risk of infection both to the patient and the healthcare provider

- Always maintain the sterile-to-sterile principle: gloves must not touch non-sterile surfaces.

- WHO. Hand Hygiene and Glove Use Guidelines, 2009
- CDC. Guideline for Isolation Precautions, 2017
- Bennett et al., 2016
- ESHRE Guideline, 2020

3)Sterile Gown During Puncture

Why Sterile Gowns Are Essential:

- **Puncture procedures involve exposure to blood and body fluids.**
- **Sterile gowns provide a protective barrier for clothing and skin.**
- **They help maintain a sterile field and reduce the risk of patient contamination**

CDC/WHO Guidelines, 2009–2022

Application for All Team Members:

- All team members in the sterile field should wear a full-body sterile gown.

- Key points:
  - Must be worn before entering the sterile field
  - Must cover arms, torso, and front of the body
  - Prevents contamination of patient, instruments, and gloves

CDC/WHO Guidelines, 2009–2022

•PPE(Personal Protection Equipment: mask, gloves, gown, face shield) must be properly removed after the procedure to avoid self-contamination.

•CDC/WHO Guidelines, 2009–2022
•Bennett et al., 2016

Operating Room Footwear Standards:

Dedicated Footwear: Staff should use clean, dedicated OR shoes that are washable and slip-resistant.

Shoe Covers: Routine use of shoe covers is **not recommended** for preventing Surgical Site Infections (SSI).

Cross-Contamination: Manual handling (putting on/removing) of shoe covers can increase hand contamination.

Indication for Covers: Shoe covers should only be used when high-volume fluid exposure (blood/follicular fluid) is expected to protect the wearer

AORN (Association of periOperative Registered Nurses) Guideline for Surgical Attire, 2021; and EORNA Best Practice for Perioperative Attire, 2024.

Summary

•All PPE (mask, gloves, gown, face shield) and nail hygiene are essential to maintain sterility and patient safety.

•Proper adherence ensures:

- Reduced procedure-related infection risk
- Increased safety for both patients and healthcare providers

•These measures are recommended according to international infection control standards.

Correct Sequence for Donning PPE in Oocyte Retrieval (OPU):

1. **Cap → Mask → Eyewear/Shield** (Non-sterile phase)
2. **Surgical Hand Scrub** (Sanitization phase)
3. **Sterile Gown** (Sterile phase)
4. **Sterile Gloves/Powder-free** (Final sterile barrier)

Correct Sequence of Removing PPE after Oocyte Retrieval(OPU):

1. **Gloves** (Glove-to-glove, skin-to-skin technique)
2. **Gown** (Roll inside-out away from the body)
3. **Eyewear / Face Shield** (Handle by straps/earpieces only)
4. **Surgical Mask** (Handle by loops/ties only)
5. **Surgical Cap**
6. **Final Hand Hygiene** (Essential final decontamination)

References	Team Member	PPE Type	Explanation / Purpose
Cochrane Review, 2016; Bennett et al., 2016; CDC/WHO Guidelines 2009–2022	Primary physician (operator)	Surgical mask	Prevents respiratory droplets and aerosols from contaminating the sterile field; protects the operator from blood and bodily fluids.
ESHRE Guideline, 2020; CDC/WHO Guidelines	Assisting physician/nurse	Surgical mask	Protects the sterile field and provides personal protection, similar to the operator.
ESHRE Guideline, 2020; Bennett et al., 2016	All team members in the sterile field	Sterile disposable gloves	Prevents microbial transmission to the needle and ovarian tissue; maintains asepsis.
CDC/WHO Guidelines 2009–2022	All team members in the sterile field	Sterile gown (full-body)	Protects clothing and skin from blood and bodily fluids; maintains the sterile field.
CDC/WHO Guidelines 2009–2022	When risk of blood or fluid splash is present	Face shield / protective goggles	Prevents exposure of eyes, nose, and mouth to patient fluids.
WHO Guidelines, 2009; Tartari et al., 2019	All team members	Short, unpolished nails	Reduces microbial load on hands and prevents contamination of gloves and the sterile field.

D)Aspiration Technique

1)Ultrasound-Guided Aspiration:

Oocyte retrieval is performed as Transvaginal Ultrasound-Guided Oocyte Retrieval (TVOR). In this technique, the needle is introduced through the vaginal fornix under direct ultrasound guidance into the ovarian follicle, and the follicular fluid is aspirated.

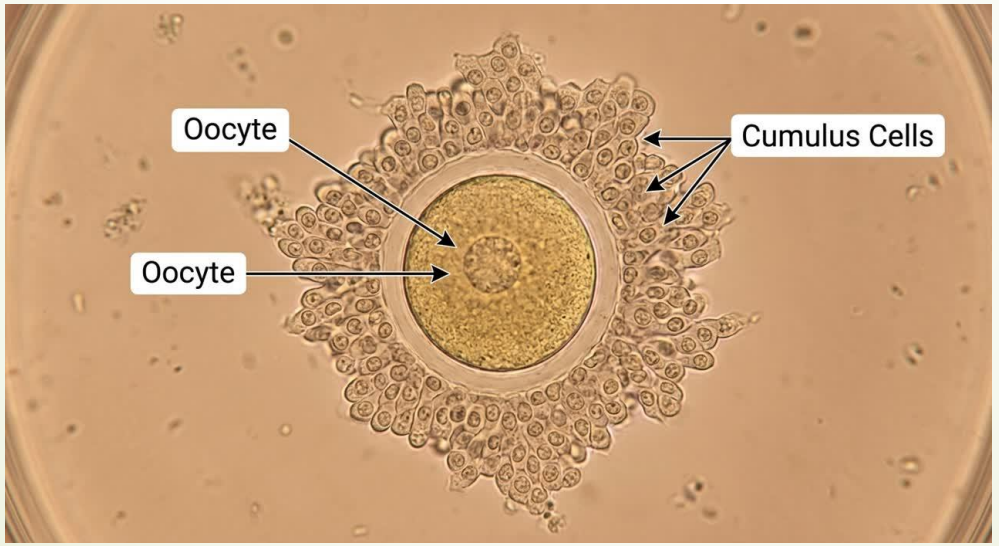
Advantages of ultrasound guidance:

- Reduced vascular injury
- Lower risk of damage to pelvic organs
- Increased accuracy of follicular entry
- Reduced complication rates

- ESHRE Guideline Group. Ovarian Stimulation for IVF/ICSI. Hum Reprod Open. 2020.
- ASRM Practice Committee. Prevention and management of complications during oocyte retrieval. Fertil Steril. 2022.
- De los Santos MJ, et al. ESHRE good practice recommendations for ultrasound-guided oocyte retrieval. Hum Reprod Open. 2023.
- Gardner DK, et al. Textbook of Assisted Reproductive Techniques, 5th ed

2)Vacuum Pressure Regulation:

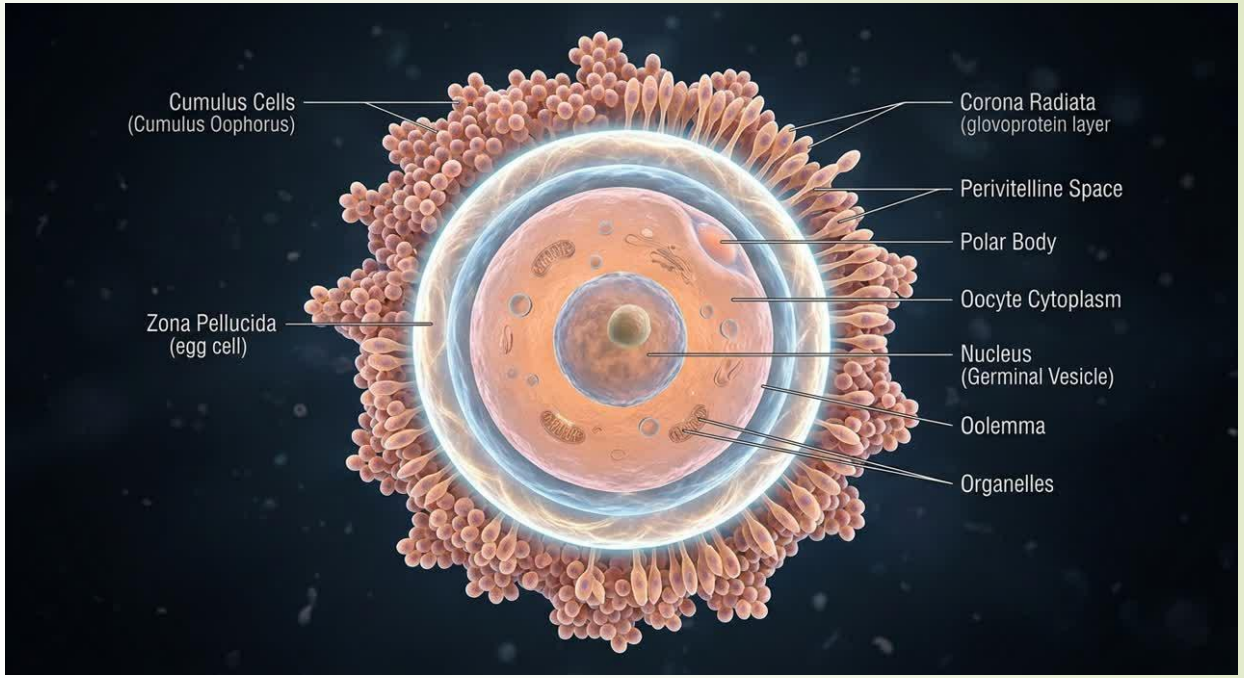
Aspiration pressure is typically set between 100-150 mmHg, depending on the center's protocol. The goal is to create a steady and controlled flow(Flow Rate:20-25 ml/min) in order to preserve the integrity of the Cumulus–Oocyte Complex (COC).



•Wikland M, et al. Hum Reprod. 1990.
•Lainas GT, et al. Follicular flushing increases the number of oocytes retrieved compared to single aspiration. Hum Reprod. 2023.
•Mbaye M, et al. Impact of aspiration technique and pressure on oocyte competence. J Clin Med. 2025.
•Alpha Scientists in Reproductive Medicine. Key performance indicators for oocyte retrieval. Hum Reprod Open. 2024

The oocyte consists of:

- **Oolemma (cell membrane)**
- **Zona pellucida**
- **Cumulus cells**



Turbulent flow may cause mechanical injury to these structures, potentially affecting embryo quality and fertilization rates.

- **Albertini DF. Hum Reprod Update. 2015.**
- **Conti M, Franciosi F. Acquisition of oocyte competence. Reproduction. 2018.**

High pressure may cause:

- Mechanical damage to the COC
- Premature denudation of cumulus cells
- Damage to the zona pellucida

Low pressure may result in:

- Incomplete follicular emptying
- Prolonged procedure time
- Reduced oocyte retrieval efficiency

- Rienzi L, et al. Oocyte quality and IVF outcomes: current evidence. Hum Reprod Update. 2022.
- ESHRE SIG Embryology recommendations on oocyte handling. Hum Reprod Open. 2023

Technical Specifications of OPU Needles:

1. Needle Gauge Selection

Definition: Gauge indicates the outer diameter of the needle; a higher gauge number represents a thinner needle.

Standard Range: Typically varies between **16G and 20G**.

Thick Needles (16G & 17G): Traditionally used for faster aspiration. Reduced risk of mechanical **Shear Stress** on the oocyte. Associated with higher levels of patient pain and vaginal bleeding.

D'Angelo A, et al. "Recommendations for good practice in ultrasound: oocyte pick up." Human Reproduction Open, 2019 (4): hoz025.

Thin Needles (19G & 20G): ESHRE Recommendations Thinner needles (e.g., 19G) significantly reduce post-operative pain and risk of vaginal bleeding.

Studies confirm that the **Oocyte Recovery Rate (ORR)** with thin needles is comparable to thicker ones, provided that suction pressure is accurately calibrated.

D'Angelo A, et al. "Recommendations for good practice in ultrasound: oocyte pick up." Human Reproduction Open, 2019 (4): hoz025

Selecting the Optimal Gauge: Efficiency vs. Patient Comfort

The Most Common Gauges: 17G and 18G According to most clinical guidelines, 17G and 18G are the primary choices because they strike an ideal balance between aspiration speed and trauma reduction.

17G: Due to its larger internal diameter, it allows for aspiration at lower vacuum pressures, which is safer for oocyte health.

18G: Being thinner, it significantly reduces post-operative pain and vaginal bleeding for the patient.

ESHRE Manual 2022, Section 4.2

Clinical Preference and Comparison

Research indicates no significant difference in the number of oocytes retrieved between 17G and 18G needles. However, 18G is generally more comfortable for the patient. On the other hand, ultra-thin needles like 20G are less recommended due to increased procedure time and the higher pressure exerted on the oocytes.

According to ESHRE and ASRM guidelines, while 17G remains the traditional and popular standard for maintaining oocyte health, there is a clear trend in advanced centers toward 18G to minimize patient trauma and pain without compromising clinical outcomes."

ASRM Practice Committee 2021

OOCYTE PICK-UP (OPU) NEEDLE GAUGE COMPARISON

A Visual Guide to Diameter Differences for Clinical Reference

16G

1.65mm OD / 1.19mm ID
Cross-section diameters

17G

1.47mm OD / 1.07mm ID
Cross-section diameters

18G

1.27mm OD / 0.84mm ID
Cross-section diameters

19G

1.07mm OD / 0.69mm ID
Cross-section diameters

20G

0.90mm OD / 0.60mm ID
Cross-section diameter

2: Tubing System & Aspiration Dynamics(Tubing Length and Dead Space)

Thermal Control: Oocytes are highly sensitive to temperature fluctuations. Short tubing is essential to minimize cooling of the follicular fluid during its transit to the test tube.

Dead Space Management: Longer tubing increases "Dead Space," requiring higher flushing volumes and potentially trapping the oocytes within the tube.

Flow Resistance: Based on physical laws, longer and narrower tubing increases flow resistance. ESHRE advises minimizing length to prevent **Turbulence**, which can be detrimental to the oocyte.

ESHRE Guideline Group on Good Practice in IVF Labs; D'Angelo A, et al. (2019).

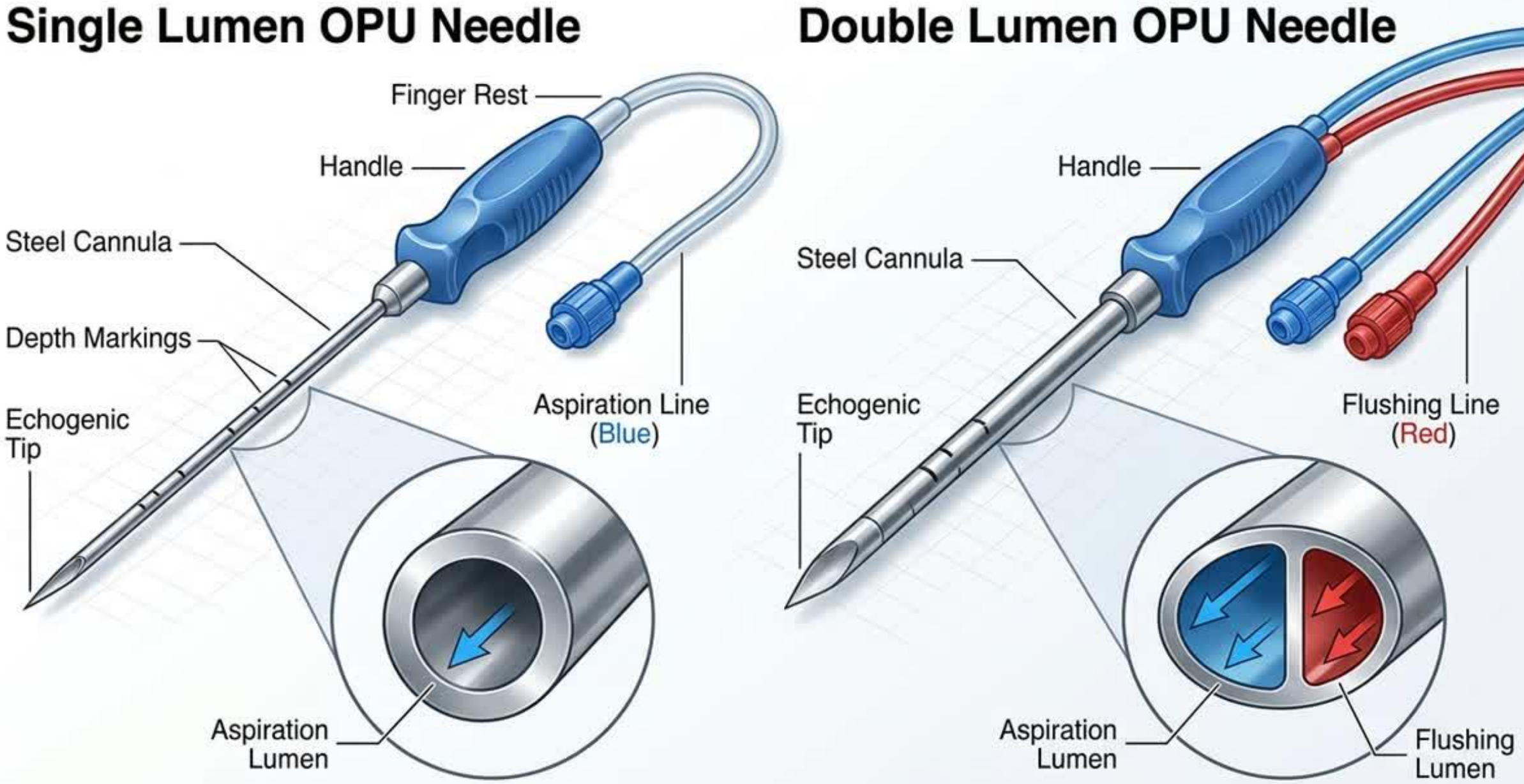
3: Needle Design Comparison (Single-Lumen vs. Double-Lumen Needles)

Single-Lumen Needle (SLN): The standard choice for routine OPU. Features a smaller outer diameter, leading to less tissue trauma and shorter procedure times.

Double-Lumen Needle (DLN): Equipped with an auxiliary channel for continuous or simultaneous follicular flushing. Mainly indicated for "Poor Responders" or cases with very few follicles.

ESHRE : Follicular flushing using Double-Lumen needles does not necessarily increase oocyte yield in normal responders.

D'Angelo A, et al. (2019). Section 4.2: Aspiration Needles.


Single Lumen OPU Needle
Finger Rest
Handle
Steel Cannula
Depth Markings
Echogenic Tip
Aspiration Line (Blue)
Aspiration Lumen
Double Lumen OPU Needle
Handle
Steel Cannula
Echogenic Tip
Flushing Line (Red)
Aspiration Lumen
Flushing Lumen

4)Follicular Flushing

Follicular flushing refers to the injection of culture medium into the follicle after initial aspiration, followed by re-aspiration.

Recent studies and meta-analyses have shown:

- **Some RCTs reported an increase in the number of retrieved COCs**
- **However, larger meta-analyses did not demonstrate a significant improvement in pregnancy or live birth rates**
- **Procedure time is prolonged**

Therefore, follicular flushing is not routinely recommended in standard IVF cycles, except in selected cases such as poor responders.

- Georgiou EX, et al. Cochrane Database Syst Rev. Updated 2021.
- Lainas GT, et al. Hum Reprod. 2023.
- El-Goly N, et al. Follicular flushing vs direct aspiration: systematic review & meta-analysis. Contracept Reprod Med. 2025.
- ASRM Practice Committee. Role of follicular flushing in IVF. Updated Committee Opinion. Fertil Steril. 2023

5)Practical Considerations and Sample Transfer:

- Ultrasound confirmation of complete follicular emptying
- Immediate transfer of follicular fluid to the embryology laboratory
- Maintenance of temperature at 37°C

Delays in transfer or temperature fluctuations may negatively affect oocyte quality.

- Alpha Scientists in Reproductive Medicine & ESHRE SIG Embryology. Revised laboratory performance indicators. Hum Reprod Open. 2024.
- ESHRE Guideline on Good Practice in IVF Labs. 2023 update.
- Rienzi L, et al. Handling of human oocytes and impact on developmental competence. Hum Reprod Update. 2022

Is it mandatory to collect each follicle's fluid in a separate tube during OPU ?

Based on **ESHRE** and **ASRM** guidelines, there is no mandatory requirement to collect the aspirate of *each* individual follicle into a separate test tube. In standard clinical practice, the follicular fluid from several follicles is typically pooled into a single tube (usually 10ml or 14ml) until it reaches capacity.

ESHRE guideline: focuses primarily on **time efficiency** and **temperature maintenance** rather than the number of tubes used.

Constantly changing tubes for every single follicle (e.g., in a patient with 20 follicles) would unnecessarily prolong the procedure and increase the frequency of tube handling, which raises the risk of temperature fluctuations

ASRM (2021) : emphasizes the "**complete emptying**" of each follicle to maximize oocyte yield.

Is Changing the Test Tube Mandatory Between Ovaries?

Per ESHRE and ASRM standards, changing the collection tube between ovaries is not mandatory. However, a system flush is highly recommended to prevent clotting and ensure maximum oocyte recovery. Tube replacement remains a technical choice based on fluid quality and institutional protocols."

D)Vaginal Preparation Before Oocyte Pick-Up (OPU) :

Purpose: To minimize vaginal bacterial contamination and prevent pelvic infection during needle aspiration.

Preferred Method: Mechanical cleansing(Steril gauze soaked in saline) with **Sterile Normal Saline** (0.9% NaCl).

Temperature: Saline should ideally be warmed to body temperature to maintain thermal stability for the oocytes.

Benefit: Effective at removing secretions and reducing microbial load without compromising oocyte quality.

D'Angelo A, et al. "Recommendations for good practice in ultrasound: oocyte pick up." Human Reproduction Open, Volume 2019, Issue 4, 2019.

The Risk of Disinfectants (Povidone-Iodine):

Embryotoxicity: Povidone-Iodine (Betadine) is highly toxic to human oocytes and embryos.

The Risk: Small amounts of residual disinfectant can be carried into the follicular fluid by the aspiration needle.

Clinical Impact: Exposure can significantly decrease fertilization rates and impair embryonic development.

Precaution: If disinfectants are used, the vagina must be extensively rinsed with large volumes of saline to ensure complete removal.

Practice Committee of the American Society for Reproductive Medicine (ASRM). "Prevention of infection during in vitro fertilization: a committee opinion." Fertility and Sterility, 2014/2018.

Comparative Efficacy: Saline vs. Disinfectants Evidence

Infection Rates: Meta-analyses show no significant difference in the incidence of pelvic infection or abscess between saline irrigation and povidone-iodine disinfection.

Safety Profile: Sterile saline provides a superior safety profile for the oocyte-cumulus complex (OCC).

Recommendation: Given the embryotoxic risks of iodine and the equivalent infection control, **Saline Irrigation** is the "Gold Standard" for routine OPU.

Pelzer V, et al. "Vaginal disinfection with povidone-iodine before oocyte retrieval." (Cited by ESHRE/ASRM Guidelines); Fertility and Sterility.

E)Routine Antibiotic Prophylaxis in OPU Current Consensus:

Infection Risk: Pelvic infection after Oocyte Pick-Up (OPU) is rare, with an incidence rate between **0.02% and 0.5%**.

ESHRE : Routine administration of systemic antibiotics for all patients undergoing OPU is **not strictly recommended** due to insufficient evidence that it significantly reduces the already low infection rate.

ASRM : While routine prophylaxis is common in many centers, it is not considered mandatory for low-risk patients.

Vaginal Preparation: Both guidelines emphasize that meticulous vaginal preparation (e.g., using aqueous solutions or saline) is the most critical step in preventing the transfer of vaginal flora into the peritoneal cavity.

D'Angelo A, et al. "Recommendations for good practice in ultrasound: oocyte pick up." Human Reproduction Open, 2019(4): hoz025.
Practice Committee of the ASRM. "Antibiotic prophylaxis for GI and GU procedures." Fertility and Sterility, 2014

Indications for Mandatory Antibiotic Use High-Risk Categories:

Antibiotic prophylaxis is strongly recommended for patients with specific clinical histories where the risk of pelvic abscess or severe infection is elevated:

1)**Endometriosis:** Specifically when an **endometrioma** is present or likely to be punctured.

2) **History of Pelvic Inflammatory Disease (PID):** Patients with previous pelvic infections.

3)Hydrosalpinx: Presence of infected or inflammatory fluid in the fallopian tubes.

4) **Pelvic Adhesions:** Patients with extensive adhesions due to previous surgeries, increasing the risk of accidental bowel injury.

ESHRE Guideline Group on Good Practice in IVF Labs (2015).

D'Angelo A, et al. (2019). Section 5.1: Prophylactic Antibiotics.

Recommended Antibiotic Regimens Pharmacological Options:

The goal is to provide coverage against common vaginal flora and Gram-negative bacteria.

Doxycycline: The most widely used regimen (e.g., 100 mg twice daily for 3–5 days, starting on or before the day of OPU).

Azithromycin: Often administered as a single 1g oral dose prior to the procedure.

Cefazolin: A common choice for intravenous (IV) prophylaxis (1-2g IV) administered immediately before the procedure starts.

Metronidazole: May be added to the regimen if there is a high risk of anaerobic infection (e.g., in severe endometriosis).

Practice Committee of the ASRM. "Antibiotic prophylaxis for gynecologic procedures." Fertility and Sterility, 2016.
D'Angelo A, et al. (2019).

4:Post-Oocyte Retrieval Care (Post-Procedure Care – Detailed):

1)Recovery&Monitoring

A)Vital Signs Monitoring:

•Purpose: Early detection of any complications following oocyte retrieval and sedation/anesthesia.

•Actions:

•• Check blood pressure, pulse rate, respiratory rate, and SpO_2 every 10–15 minutes during the first hour.

•• After the first hour, continue monitoring according to the center's protocol.

•Importance: Any drop in blood pressure, abnormal heart rate, or oxygen desaturation may be an early sign of internal bleeding or drug reaction.

•ESHRE Guideline Group. Ovarian Stimulation for IVF/ICSI. Hum Reprod Open. 2020.
•ASRM Practice Committee. Prevention and management of complications during oocyte retrieval. Fertil Steril. 2022

B)Level of Consciousness

•Patients should be monitored until full consciousness is restored and they can respond to simple commands.

•Assessment includes: opening eyes, responding to simple questions, moving hands and feet.

•Goal: Ensure complete recovery from sedation and safe discharge readiness.

C)Respiratory Monitoring & Oxygenation:

•Continuous use of a pulse oximeter is essential until the patient is fully recovered.

•ASRM Practice Committee. Prevention and management of complications during oocyte retrieval. Fertil Steril. 2022.
•De los Santos MJ, et al. ESHRE good practice recommendations for ultrasound-guided oocyte retrieval. Hum Reprod Open. 2023

D)Pain Management:

•Symptoms: Pelvic or abdominal pain, cramping similar to menstrual pain.

•Assessment: Pain Score (VAS or NRS) during recovery and prior to discharge.

•Management:

•• Simple analgesics, such as paracetamol.

•• If severe pain occurs, clinical evaluation is required to rule out bleeding or OHSS.

•Severe or unusual pain may indicate a serious complication.

•Gardner DK, et al. Textbook of Assisted Reproductive Techniques, 5th ed. CRC Press, 2020.
•ASRM Practice Committee. Prevention and management of complications during oocyte retrieval. Fertil Steril. 2022

E)Nausea and Vomiting:

•Common after sedation or short-acting anesthesia.

•Supportive measures include:

•• Adequate hydration

•• Anti-emetic therapy if needed

•Persistent or severe nausea requires evaluation for systemic disorders or drug reactions.

•Gardner DK, et al. Textbook of Assisted Reproductive Techniques, 5th ed. CRC Press, 2020.
•De los Santos MJ, et al. ESHRE good practice recommendations for ultrasound-guided oocyte retrieval. Hum Reprod Open. 2023.

Initial Recovery Monitoring

Reference	Item	Action	Frequency
ESHRE 2020; ASRM 2022	Vital Signs (BP, HR, RR, SpO_2)	Check and record	Every 10–15 min first hour, then per protocol
ASRM 2022; De los Santos 2023	Level of Consciousness	Response to commands, eye opening, movement	Every 10–15 min first hour
Gardner 2020; ASRM 2022	Pain	Assess with VAS/NRS	Every 15–30 min
Gardner 2020; De los Santos 2023	Nausea/Vomiting	Observe, hydrate, antiemetics if needed	Every 30 min
Gardner 2020	Respiration & Oxygen	Pulse oximetry, capnography if deep sedation	Continuous

2)Assessment of Common Post-OPU Complications

A)Vaginal Bleeding

•Mild bleeding after oocyte retrieval is common and usually limited to spotting or a few drops.

•Heavy, progressively increasing bleeding or bleeding accompanied by pain may indicate internal bleeding or damage to ovarian/uterine vessels.

•Actions:

•• Monitor hemodynamic status (blood pressure, pulse)

•• Assess need for ultrasound to detect internal bleeding

•• Emergency intervention if severe bleeding occurs

- ASRM Practice Committee. Prevention and management of complications during oocyte retrieval. Fertil Steril. 2022.
- De los Santos MJ, et al. ESHRE good practice recommendations for ultrasound-guided oocyte retrieval. Hum Reprod Open. 2023

B)Pelvic Pain

•Pelvic pain is common after oocyte retrieval and usually resembles mild menstrual cramps.

•Persistent or severe pain may indicate internal bleeding, injury to pelvic organs, or infection.

C)Nausea & Vomiting

•Nausea is common after short-acting sedation or general anesthesia.

•Prolonged or severe nausea may indicate drug reaction, fluid depletion, or onset of OHSS.

Gardner DK, et al. Textbook of Assisted Reproductive Techniques, 5th ed. CRC Press, 2020.
• ASRM Practice Committee. Prevention and management of complications during oocyte retrieval. Fertil Steril. 2022

D)Ovarian Hyperstimulation Syndrome (OHSS)

OHSS is a significant post-OPU complication, typically occurring in high-risk patients (high ovarian response, high AFC, elevated AMH).

Common signs and symptoms include:

- Nausea and vomiting
- Abdominal pain and bloating
- Rapid weight gain
- Decreased urine output
- Shortness of breath and limb edema

- **RCOG Green-top Guideline No. 5. Management of OHSS. 2016.**
- **ASRM Practice Committee. Prevention and management of complications during oocyte retrieval. Fertil Steril. 2022.**
- **ESHRE Guideline Group. Ovarian Stimulation for IVF/ICSI. Hum Reprod Open. 2020.**

•**Assessment & Monitoring:**

- **Daily or every few days: monitor weight, abdominal girth, urine output**
- **Laboratory: electrolytes, hematocrit, creatinine**
- **Ultrasound: assess fluid accumulation in abdomen or pelvis**

•**Management & Prevention:**

- **High-risk patients: GnRH antagonist protocol and GnRH agonist trigger**
- **Elective frozen embryo transfer instead of fresh transfer**
- **IV fluids and supportive treatment according to severity**

- RCOG Green-top Guideline No. 5. Management of OHSS. 2016.
- ASRM Practice Committee. Prevention and management of complications during oocyte retrieval. Fertil Steril. 2022.
- ESHRE Guideline Group. Ovarian Stimulation for IVF/ICSI. Hum Reprod Open. 2020.

Common Post-OPU Complications

Reference	Complication	Assessment / Symptoms	Actions / Management
ASRM 2022; De los Santos 2023	Vaginal Bleeding	Spotting to heavy bleeding, hemodynamic monitoring	Monitor BP and pulse; if severe → ultrasound and emergency intervention
Gardner 2020; ASRM 2022	Pelvic Pain	Menstrual-like cramping, assess with Pain Score	Simple analgesics; severe pain → clinical evaluation and ultrasound
Gardner 2020; De los Santos 2023	Nausea & Vomiting	Post-sedation nausea, persistent vomiting	Hydration; antiemetics if needed
RCOG 2016; ASRM 2022; ESHRE 2020	OHSS (Ovarian Hyperstimulation Syndrome)	Nausea, abdominal pain, rapid weight gain, decreased urine output, shortness of breath	Monitor weight & urine, labs, ultrasound; prevention with GnRH antagonist protocol and agonist trigger; elective frozen embryo transfer; supportive treatment

3)Discharge Education

Patient Instructions & Red Flags:

Discharge education is one of the most important aspects of post-oocyte retrieval care. The goal is to inform the patient and their companion about warning signs (Red Flags) so that prompt action can be taken, preventing serious complications.

Warning Signs and Their Significance:

1.Severe or worsening pain

.. Mild pain after oocyte retrieval is normal, but severe pain may indicate internal bleeding, injury to pelvic organs, or OHSS.

..If this symptom occurs, the patient should immediately contact the clinic or emergency services.

- Gardner DK, et al. Textbook of Assisted Reproductive Techniques, 5th ed. CRC Press, 2020.
- ASRM Practice Committee. Prevention and management of complications during oocyte retrieval. Fertil Steril. 2022

2.Fever or chills

•Fever may be an early sign of pelvic or systemic infection.

•Even mild fever within 24–48 hours after retrieval should be taken seriously.

3.Uncontrolled vaginal bleeding

•Spotting or light bleeding is common, but heavy or progressively increasing bleeding may indicate internal bleeding or vascular injury to the ovary/uterus.

•The patient should be immediately assessed for hemodynamic stability, and ultrasound or emergency intervention should be performed if needed

- De los Santos MJ, et al. ESHRE good practice recommendations for ultrasound-guided oocyte retrieval. Hum Reprod Open. 2023.
- ASRM Practice Committee. Fertil Steril. 2022
- De los Santos MJ, et al. Hum Reprod Open. 2023

4.Shortness of breath or chest pain

- **May result from fluid accumulation, severe OHSS, thromboembolism, or cardiopulmonary complications.**
- **These symptoms require emergency evaluation**

5.Reduced consciousness or dizziness

- **May indicate hypotension, internal bleeding, or drug reaction.**
- **The patient should receive immediate assessment and supportive care**

- RCOG Green-top Guideline No. 5. Management of OHSS. 2016.
- ASRM Practice Committee. Fertil Steril. 2022

Key Points for Discharge Education:

- **All patients should receive written and verbal instructions.**

- **Patient companions should also be educated to quickly recognize warning signs.**

- **Advise immediate contact with the clinic or emergency services if any of the above symptoms occur.**

- **Patients should have emergency or clinic contact information and a schedule for post-OPU follow-up**

F)Discharge :

Discharge Criteria:

1. Fully conscious
2. Stable vital signs
3. Pain under control
4. Limited nausea or vomiting
5. Ability to mobilize with assistance
6. Received discharge instructions and awareness of red-flag symptoms

- ASRM Practice Committee. Prevention and management of complications during oocyte retrieval. Fertil Steril. 2022.
- De los Santos MJ, et al. ESHRE good practice recommendations for ultrasound-guided oocyte retrieval. Hum Reprod Open. 2023


Thanks for your attention