CooperSurgical Fertility Companies

CooperGenomics a CooperSurgical company

Volume 8 (July, 2018)

NEXUS

Indian Fertility Society & ORIGIO India Initiative

OVUM PICK UP

Editor
Dr. Pankaj Talwar

Dr M Gouri Devi
President - IFS

It is a great privilege to write this message for the E- bulletin of the IFS- NEXUS. The Ovum Pick up technique was first developed by Pierre Dellenbach and colleagues in Strasbourg, France, and reported in 1984 (Lancet). Steptoe and Edwards used laparoscopy to recover oocytes when IVF was introduced, and laparoscopy was the major method of oocyte recovery until TVOR (Trans-vaginal oocyte recovery) was introduced. TVOR was a big milestone on the path to ART. Ultrasound guided retrieval which was started then, is now widely accepted in all ART units all over the world. This volume of NEXUS will take us through the prerequisites, procedure, and complications etc. of oocyte retrieval.

It is an IFS- Origio initiative and these E- bulletins are highly appreciated by IFS members. I congratulate Dr. Pankaj Talwar for the great efforts he puts in to keep the NEXUS going. Hope all of you will be enlightened.

Prof (Dr) Pankaj Talwar
Secretary General - IFS
Editor NEXUS

At the very onset, the editorial team would like to thank all of you for positively appreciating our previous E- bulletins of NEXUS. The bulletin has been named NEXUS which means bridging gaps

Such bulletins are call of the day and enormously bridge the gap between the existing knowledge and recent advances. Our present edition is focused on simplifying the process of Ovum Pick-up and covers all essential details.

Ovum pick-up (OPU), which in medical term is called follicular or follicle puncture, is a key step in the process of in-vitro fertilization. It is a surgical procedure required for harvesting the oocytes from the ovarian follicles. The technique is a simple, short intervention which is done under mild anesthesia or intravenous sedation thus, lowering the number of risks involved during the procedure. Still potential risk like pelvic organ injury has been derived from surgery which may lead to bleeding and infection of the reproductive organs.

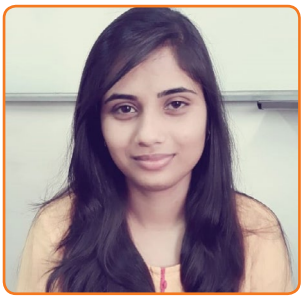
The aim of this bulletin is to educate the ART professionals about the right protocol to be followed and the complications involved in the procedure of ovum pick-up.

M: +91 9810790063
E: pankaj_1310@yahoo.co.in

The OPU NEXUS is a complete guideline of the ovum pick-up for the beginners as well as the practitioner's because it covers various points which are involved in OPU and gamete handling. The complete making of the NEXUS was a learning experience for me and it's an honor to be a part of it.

Through this edition, we have tried to summarize all the information available to enhance our understanding of the problem associated with OPU and gamete handling. I would like to thank Prof. Dr. Pankaj Talwar for this opportunity and helping me in designing the bulletin.

Ram Dayal
Sr Embryologist
Dayanand Medical College & Hospital
Ludhiana, Punjab



Ovum Pick-up (OPU) is a technique used in in-vitro fertilization (IVF) in order to remove oocytes from the ovary of a woman, enabling fertilization outside the body. It can be performed either to collect a single egg released during natural menstrual cycle, or, most often, in conjunction with hyperovulation. The successful retrieval of mature oocytes is a prerequisite for in-vitro fertilization, and so, advances in retrieval techniques have also represented major advances in ART.

With this comprehensive bulletin we have tried to explore all the aspects of Ovum Pick-up ranging from its history to recent advances along with the detailed protocol and complications associated with it.

Sapna
B.Tech (Biotechnology)

INDEX

Part - 1

OVUM PICK UP - Basic concepts

SUB-INDEX - Part:1

1 Introduction

Early seventies brought the escalating scientific interest in culturing human oocytes in-vitro. There was a sudden surge in interest in clinical embryology research and the methodology of Oocyte harvesting. Laparoscopy was another developing science in that era and subsequently, laparoscopy became the technique of choice for oocyte aspiration during the first decade of this ART era. With the introduction of ultrasound in monitoring follicular growth and subsequent developments in reproductive sonology, it is not surprising that ultrasound-guided follicle aspiration became a very attractive substitute technique.

2 Brief history

Assisted reproductive techniques (ART) have transfigured the management of childless couples. The elementary part of any IVF-ET procedure is the harvesting of mature Oocyte cumulus complexes in the minimal traumatic way and the ensuing development and transfer of an embryo.

The technique's used for ovum harvesting have made considerable progress over the past three decades. Laparotomy was used initially for a transitory period, but discarded swiftly because of the morbidity associated with it. [1]

Laparoscopic assisted ovum pickup was earliest documented by Steptoe and Edwards in 1970 and was used commonly as an efficient practice. [2] The proficiency of Patrick Steptoe in laparoscopy and his successful collaboration with Bob Edwards resulted in the birth of Louise Brown in 1978. Unfortunately Due to the requirement of frequent invasive procedures and the related morbidity, the need for an equally successful, but less invasive procedure was felt.
(Table 1.1 & 1.2)

Songraphically guided retrieval of human oocytes for IVF was introduced by Lenz in 1981. [4] In early 1980, the oocyte cumulus complexes were harvested by the use of Trans-abdominal ultrasound. Diverse techniques using ultrasonography such as transvaginal and transrectal approach were introduced over the next few years. By the end of that decade transvaginal ultrasound guided aspiration of oocyte cumulus complexes was well accepted and presently it has become the most extensively used practice in ART units all over the world.

Table 1.1 : Comparison of the Various Techniques

	Laparoscopic ovum harvesting	Trans abdominal approach	Transvaginal ovum Harvesting
Advantages	Clear view of the pelvic organs possible Day care surgery Minor procedures such as adhesiolysis, fulguration of endometriotic implants can be combined with the oocytes retrieval procedure.	**Transabdominal transvesical approach** [7] A sector scanner equipped with a 3.5 MHz transducer is used. They found that the oocyte recovery rate per follicles was more than 80 percent. **Transabdominal transurethral approach** [8] The bladder is pre-filled with saline the culture medium and the needle is introduced through the urethra under the guidance of the abdominal transducer.	Ultrasound machine with a vaginal transducer of 5 -15 MHz is used with a focal range of 10-60 mm from the tip of the probe. The biopsy guideline line on the screen allows the needle to enter the follicle under ultrasound guidance.
Disadvantages	Invasive procedure requiring general anesthesia. The carbon dioxide that is used in the procedure makes the follicular aspirate acidic, and may thereby harm the mature oocytes. The CO_2 may affect fertilization, but once this has occurred, there is no effect on the rate of cleavage of the embryos. [5] Excessive manipulation of this ligament can cause unnecessary bleeding and adhesion formation. In 5-10 percent of the patients, it is difficult to perform laparoscopic guided oocyte retrieval because of severe pelvic adhesion Only the follicles that are seen on the surface of that ovary are aspirated as the ones deep in the tissue cannot be seen.	A short-lasting hermaturia, which was observed in 5 percent of the cases with **transabdominal transvesical approach.** **Trans-abdominal transurethral approach** With this technique the ultrasound beam is not in the same plane as the needle making it difficult to judge the position of the retrieval.	Complications following TVS guided oocyte retrieval are rare. [9] The vaginal bleeding occurs as a result of trauma to the vaginal wall vessels, and usually settles with local pressure. Hemoperitoneum can occur due to damage to the pelvic blood vessels. We should avoid multiple punctures in the ovary and try to aspirate all follicles without withdrawing the needle. Injury can occur to the uterus, bladder, colon

Table 1.2 : Summary of Comparative Analysis of the Various Available Techniques

Parameters	Laparoscopic	Trans abdominal Ultrasound	Transvaginal Ultrasound
General anesthesia	Required	Required	May be done under local anesthesia with sedation
Oocyte and Pelvic adhesions	Difficult	Yes	Yes
Visualization of follicles and accessibility	Only follicles on ovarian surface	Most of the follicles	All the follicles
Exposure of follicles and oocytes to CO_2	Yes	No	No
Screening of the pelvic organs	Yes	No	No
Complication rates of the procedure.	Low	Very Low	Minimal
Discomfort level	Moderate to severe	Moderate	Low
Amount of time	High	Less	Less
Acceptance of patient	Low	Good	Very Good
Day care procedure	Not advisable	Possible	Possible
Cost of IVF program	High	Low	Low

3 Relevent issues regarding OVUM pick up

1. Timing

Oocyte retrieval is performed after hyperstimulation, where oocytes are pharmacologically stimulated to mature. When ovarian follicles have reached a certain degree of development, induction of final oocyte maturation is performed, generally by an intramuscular or subcutaneous injection of human chroinic gonadotropin (hCG). It is performed approximately 36 hours after HCG injection, i.e. just before the time of ovulation. The oocyte retrieval can be done anytime from 34 to 38 hours after 10,000IU of hCG administration without affecting the results of in vitro fertilization. Study carried out with OPU done at 34 and 38 hrs revealed no significant difference in the frequency of spontaneous ovulation, number of oocytes retrieved, oocyte cumulus complex quality, embryo quality, and implantation and pregnancy rates. [10]

2. Preparation Of Vagina

Initially Betadine was used to cleanse the vagina but later use of normal saline was proposed. The outcome of 334 oocyte retrievals was studied. In 160 cases, Betadine was used and in the remaining 174 cases, normal saline was used. There was no difference in the fertilization and cleavage rates (fertilization rates 45.5% versus 47.8%, cleavage rates 49.8% versus 52.1 % in the Betadine and normal saline groups respectively). However, the pregnancy rate was significantly higher in the normal saline group (17.2% versus 30.3% clinical pregnancies per embryo transfer) [11]

There was no increase in infection risk in the saline group. Today, most IVF units use only normal saline for vaginal preparation before oocyte retrieval, to avoid any effects of the betadine on the oocyte and on the outcome of the procedure. We recommend use of normal saline which has been maintained at the 37°C temperature.

However, supportive evidence comes from a recent study from Osaka, Japan.[12] They compared 956 infertile patients undergoing vaginal preparation with saline alone versus 1216 infertile patients undergoing a combination of povidone iodine disinfection and subsequent saline in an IVF program. They recorded four infections in the saline alone group and none in combination group, which was a statically significant difference. There was no significant difference in the rate of fertilization, morphologically good embryo development and clinical and ongoing pregnancy rates between the two groups. They advocated the use of vaginal povidone iodine disinfection and subsequent saline douching to prevent infection, and concluded that the regime had no evidence of harming oocyte quality.

3. Anesthesia/Analgesia

Anesthesia technique is important in a successful IVF program. Patient's comfort and safety are important considerations. There are many options available to the anesthesiologist. General anesthesia, monitored sedation with or without local anesthesia, and regional technique have all been used and studied.

The anesthetic, which is important to the comfort of the patient and for the gynecologist to maximize the harvesting of oocytes, plays an important role in a successful outcome. The anesthetic agents must be short acting, with minimal side effects. They should have little penetration into the follicle, and the oocyte should not be harmed by their presence. The key is short exposure to the least toxic agent. Neuroleptanesthesia is not recommended, and there remains some controversy over the use of nitrous oxide and the inhalatory agents. [13] The majority of anesthetic agents have been deemed safe for use.

4. Equipment

Any high-resolution ultrasound equipment with a vaginal transducer can be used for safe and accurate puncture of follicles during ovum pickup procedure.

a. Ultrasound and Probe:

i. Frequency: The probe should have frequency of 5–7 MHz giving the equipment a sufficient penetration depth and enough resolution for accurate visualization of the uterus and the adenxa.

ii. Biopsy Guide: The vaginal transducer should have a snuggly fitting biopsy guide, which should allow easy gliding movement of the ovum pickup needle through the needle channel.

iii. Length: The probe should be long (total length of approximately 40–50 cm) with a gentle curve, which allows for easy handling for the clinician and also does not cause discomfort to the patient during the scan. **(Fig. 1)**

Shape: The transducer probe should have a shape that is easy to place into a sterile probe cover, which are commercially available and should also permit firm fixation of biopsy guide after the sterile cover has been placed over the vaginal probe.

Fig:1 Ultra sound machine with TVS probe. Probe and the exterior of the machine should be cleaned in the morning of the ovum pickup using 70% alcohol and then with normal saline

b. Suction Apparatus

In the initial days, manual aspiration of follicular fluid was often performed by means of a syringe connected to the pickup needle created uneven pressure which was harmful to oocyte. [14] Creating a negative pressure by means of a suction pump where the pressure can be controlled in a standardized manner is probably the safest and the best way. Today there are several such suction pumps available with foot-pumps specifically designed for oocyte complex aspiration. **(Figs: 2 and 3)** Sophisticated suction pumps with adjustable aspiration pressure are widely available commercially.

— **Suction Pressure**: It was shown earlier that a negative pressure of 90–120 mmHg seems to be optimal for a good recovery and exerts no harm on the oocyte cumulus complex when aspirating mature follicles with intrafollicular volume of 3-4 ml. However, aspirating immature oocytes from follicles of 5-8 mm diameter that have a very small volume of follicular fluid needs less negative pressure, only around 40–60 mmHg. [15, 16]

Fig: 2 Rocket suction pump. Vacuum source for oocyte aspiration. It provides smooth, low volume vacuum at pre-determined negative pressures thus allowing safe, simple, low turbulent flow oocyte recovery. Simply, safe operation with air-operated foot controls. High vacuum foot control is available on Duo-Vac Suction Pumps. There super quiet diaphragm pumps make it easy to live within the OR and means low maintenance service. The pump can build up fully variable vacuum from 0-400 mmHg and single use water trap set provides cost effective solution to regular processing of reusable water traps and tubing. This creates negative suction between 90-100 mmHg for aspiration of the mature Oocyte Cumulus Complex

Fig: 3 Foot control of the rocket suction pump

c. Ovum Pickup Needle

Ovum pickup needle play an important role in the procedure. Large numbers of needles are commercially available to us. A number of factors have to be considered while choosing a needle.

i. Needle sharpness: The sharpness of the needle is the most important factor. A sharp needle means less trauma in the ovarian cortex and follicles, thus reducing postoperative pain and bleeding from the ovarian surface **(Fig: 4)**

Fig: 4 The ovum pickup needles. These needles have sharp, non-coring bevel, have highly echogenic markings at the needle tip for easy identification on ultrasound, smooth internal lumens and external surfaces to prevent damage to the oocyte cumulus complex and for easy insertion through the vaginal wall and ovarian stroma. Tight fitting PTFE tubing ensures no changes in lumen diameter between the needle cannula and aspiration tubing which could cause turbulence in the fluid flow, ergonomically designed handle allows rotation of the needle tip to "curette" the follicle wall to improve oocyte recovery rates. Extensive washing processes followed by proven sterilization methodology is fully validated by endotoxin (LAL) testing and mouse embryo testing, to ensure a sterile, non-toxic finished product

ii. Echogenic tip: It is important that the surface of needle tip has etchings, making the tip echogenic sonologically. Echogenic tip is easy to identify while doing ovum pickup procedure allowing us to know the position of the needle with respect to the follicle, ovarian tissue and pelvic viscera **(Fig: 5).**

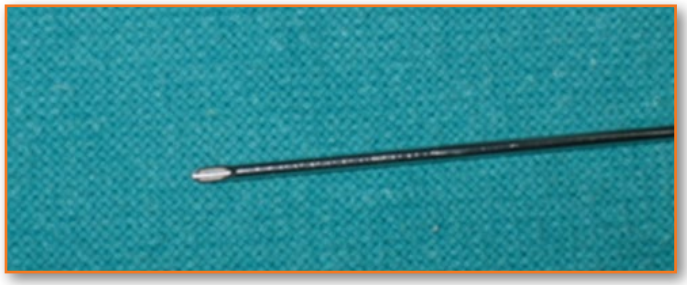


Fig: 5 Tip of the ovum pickup needle. The tip has got serrations to make it Echogenic

iii. Diameter: The diameter of the needle is significant for two reasons. A thin needle 18–20 gauge means less pain when analgesia only is used. However, a needle with too small inner diameter may be harmful to the oocyte cumulus complex. [17] As long as the inner diameter of the needle is 0.8–1 mm, it seems as if the oocyte cumulus complex is unaffected, provided that the aspiration pressure is less than 120 mmHg. In our opinion, a needle with an outer diameter of 18 gauge which is thin walled and has an inner diameter of 20 gauge is ideal.

iv. Needle handle: An adequately shaped fingertip handle on the distal end of the needle is preferable because it makes it possible to puncture with a good clinical touch.

v. Connecting tubing: To increase the recovery, it was shown earlier that Teflon tubing between the needle and the sampling tube was important. Commercially available follicle aspiration needles do have such tubing along with a sampling tube which is sterile and mouse embryo tested. The set is ready to use and only needs to be connected to the suction pump. The set is made for single use and thereby guarantees sterility and non-toxicity to the oocyte. Over the last 15 years, our group has used such follicle aspiration sets and found them to be very convenient.

5. Temperature control

Another important point is to transport oocytes to the laboratory in the best condition. The clinician should be aware of sudden pH and temperature changes that the oocytes undergo during and immediately after they have been harvested. It has been documented that the temperature of the follicular fluid dropped by 7.7 ± 1.3^{0}C upon aspiration as the fluid is transported to the collection tubes via the needle and the tubing. Dissolved oxygen levels rose by 5 ± 2 vol.% and the pH increased by 0.04 ± 0.01. They concluded that these changes could be detrimental to the oocyte's survival, and attempt should be made to minimize these detrimental changes. The collection tubes must be kept in a test tube warmer while they are waiting to be connected to the collection system and rest disposables in a body incubator. [17] **(Figs. 6 & 7)** The tubes should not be filled above the level of alloy blocks and should be transported immediately to the embryologist.

Fig: 6 Test tube warmer. For preheating of slides, petri-dishes, pipettes, etc. at desired temperatures. The dimensions of anodized aluminum heating plate are 300 mm (L) x 100 mm (W) x 40 mm (H). Bigger size plate also can be supplied with separate digital temperature controller. The temperature range is from ambient to 110°C. The tubes are kept here just before the OPU procedure. Roughly we require 1 tube for 2-3 follicles. Only the calculated number of tubes should be opened

Fig: 7 A baby incubator to warm up the disposable's for the embryology laboratory. This ensures that the tubes and plates are at 37° C before the ovum pickup procedure

6. Follicle Flushing

Flushing follicles or not has been debated for years. Flushing follicles with a double channel needle might result in the recovery of 20 percent more oocytes than would be obtained by aspiration alone, and therefore a higher potential for pregnancy. However, it has been reported that the time taken for the procedure and the amount of anesthesia required for aspiration and flushing was significantly more than for aspiration only.

Initial randomized trials demonstrated that when performing transvaginal ultrasonically guided oocyte recovery, there were no significant differences in number of oocytes retrieved, fertilization rate, or pregnancy rate between those where flushing had been used as compared to no flushing. [18]

In our IVF program, we do not flush follicles and have had a recovery rate of 70% per punctured follicle and routine flushing would seem redundant in IVF practice. Instead of flushing the follicles, the oocyte could the recovered by rotating the ultrasound probe and maintaining suction until the last drop of follicular fluid is aspirated. It was soon recognized that most oocyte can be recovered by just aspirating, and that the follicular fluid from the next follicle will often flush the oocyte into collection tube. This was called the ROC technique **(Rapid Oocyte Recovery).**

It is important to carry out flushing of the needle and the tubing before the procedure to remove dead space in the aspiration set. This avoids frothing in the collected follicular fluid. Reflushing of the needle and the tubing with the suitable media should follow egg collection. Standard needle and tubing has nearly one ml of dead space and till the follicular fluid being aspirated does not exceed this quantity dead space will remain. This is important when we do ovum pickup in IVM as the fluid contained in a follicle 6-8 mm is 0.1 -0.2 ml and multiple follicles have to be emptied before we can obliterate this dead space and collect fluid in the collecting tube.

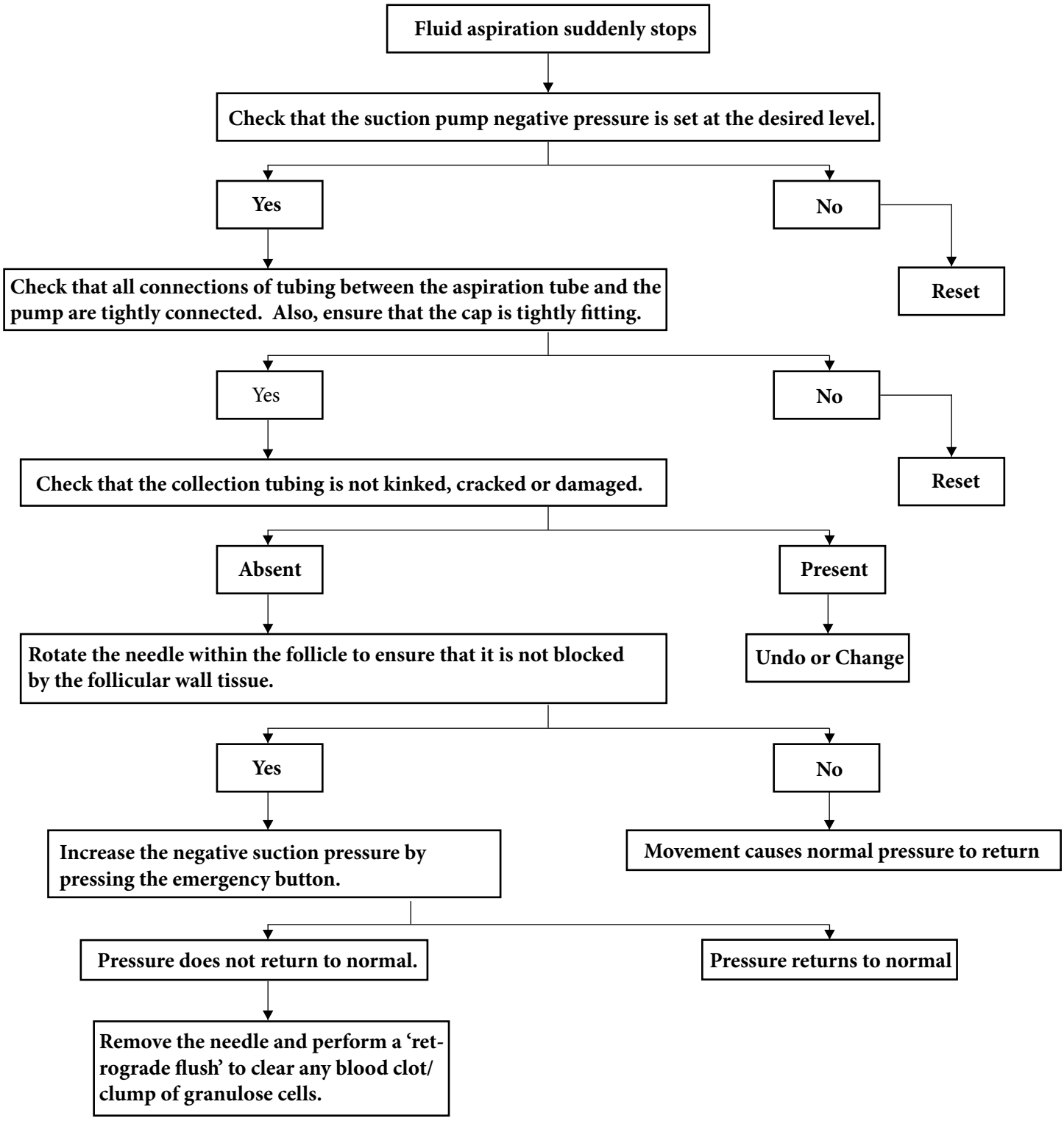
4 Common problems encountered during OVUM pick up

a. Failure to Aspirate the Follicular Fluid

Before the ovum pickup is commenced we must flush the needle and the tubing with suitable (HEPES/MOPS) based media. This ensures that there is no air in the aspiration system and we have laminar flow of the follicular fluid.

If rarely fluid aspiration suddenly stopsdiving OPU. without wasting any times the steps in Flow chart 1.1 should be carried out.

Flowchart 1.1 : Management of Failure to aspirate the follicular fluid



b. No Oocytes Retrieved

Sometimes, post aspiration no oocytes are harvested. In such cases, the fluid collected is very clear and devoid of cells (granulosa and cumulus). This can be due to two reasons:

i. Empty follicle syndrome: Such clinical condition occurs if the patient has not taken her ovulation trigger and normally should have negative pregnancy card test. If the test is negative, it is feasible to forsake the ovum pickup from the other ovary, administer hCG, and reschedule the collection 36 hours later.

ii. Follicles that have an adequate exposure to hCG and do not contain retrievable oocytes: It may be due to an intrinsic defect in folliculogenesis that leads to early oocyte atresia. This notion is supported by the finding that empty follicles recur in subsequent IVF cycles for some affected women.

iii. Although a relatively rare phenomenon, additional research is needed to determine the exact cause(s) of this syndrome and whether factors that indicate a normal follicle such as perifollicular blood flow values, can predict the occurrence

5 Complications

Despite all the advantages with transvaginal oocyte retrieval during IVF treatment, the aspiration needle may injure pelvic organs and structures leading to serious complications. The most common complications are hemorrhage, trauma, and injury of pelvic structures and pelvic infection. Other complications described include adnexal torsion, rupture of endometriotic cysts, and even vertebral osteomyelits [19] (Table 1.3).

Table 1.3: Diagnosis and management of complications occurring during OPU

Diagnosis		Management
Vaginal Hemorrhage	Bleeding from the vaginal vault is the most common consequence and has been reported to occur between 1.4% and 18.4% [20]	However, such a bleeding generally ceases spontaneously at the end of the procedure. Sometimes, the bleeding site needs to be identified and application of a pressure with a sponge is necessary
Pelvic hemorrhage	Injury to intraperitoneal or retroperitoneal pelvic blood vessels and subsequent bleeding have been reported to occur from 0% to 1.3% . Retroperitoneal bleeding can be difficult to diagnose due to the absence of free fluid in the pouch of Douglas and can be present several hours after oocyte pickup. [21]	Acute severe intraabdominal bleeding is often detected by symptoms like weakness, dizziness, dyspnoea, abdominal pain, tachycardia, and low blood pressure typical for any severe bleeding, immediately after the OPU. In such cases, early hemodynamic monitoring with serial measurement of hemoglobin concentrations is needed.
Trauma to pelvic structures	Rare. Can occur if the gut is adherent due to chronic pelvic infections or endometriosis	Antibiotics. Laparoscopic evaluation and surgical intervention may be required.
Pelvic infection, tubo-ovarian or pelvic abscess.	Pelvic infections after TVOR have been reported to occur between 0.2% and 0.5%	Antibiotics and treatment for tubo ovarian abscess.
Acute abdomen	Commonly occurs due to injury to ovarian tissue.	Painkillers and observation for features of hemodynamic instability is necessary.
Post operative nausea and vomiting	Commonly occur due to effect of anesthesia	IV fluids and ondensetron

6 The learning curve

It is recommended that prior to undertaking oocyte collection, a structured training program is carried out. One approach is that the instructor aspirates one side and, having collected some eggs, the trainee should do the other side. The number of supervised collections probably varies between 20 and 40 before trainees should be credentialed to perform collections on their own.

The collection rates are then compared between clinicians working within the unit. Other indicators that could be recorded are the time taken for the oocyte collection and the complication rate, although the incidence of bleeding and infection is so low that it is probably meaningless unless a very large number of oocyte collections are available for analysis

The technique is easy to learn. In only 3 % of patient's follicles could not be aspirated follicles because of method-related problems (i.e., localization of ovaries too high above the vaginal top and/or ovaries too mobile). The mean duration of the procedure decreased from more than 30 minutes to less than 20 minutes in the first 7 months of the program.

Part - 2

Frequently Asked Questions (FAQs)

INDEX - Part:2

1 What is a follicle?

This is a fluid filled structure which houses the developing egg (oocyte). The covering of the follicle contains cells which produce the female hormone (estrtogen) called Estradiol 17 beta. After release of the egg (ovulayion), these hormone producing cells switch to producing the implantation supporting hormone called Progesterone. This structure is yellow in color and is called the Corpus Luteum.

2 What is an Antral Follicle count?

This is the total number of small fluid-filled structures seen in both ovaries which are about 2-8 mm in diameter detected by vaginal probe ultrasound scan on the second day of the menstrual cycle. Each follicle contains one oocyte (egg). The higher the count, the more the number of eggs which can be harvested after stimulation. A low count is one with less than 10 antral follicles. This indicates a poorer response to ovarian stimulation. A high count is one with 30 or more follicles. This indicates a condition called Polycyctic ovaries. There is a higher chance of hyperstimulation in such patients.

3 Is the egg harvesting process painful?

Ovum pick-up is done under anesthesia, and therefore it does not hurt at all. However, it is possible for patients to feel a mild discomfort before the procedure due to an increased ovarian size caused by ovarian stimulation.

4 When is egg retrieval required?

Follicle puncture is done only when retrieving the eggs from the ovary is needed, either for in vitro fertilization with own or donated eggs. It is also done for fertility preservation, as it involves obtaining and freezing the eggs for later use.

5 Can egg retrieval be done without anesthesia?

It is a possibility, but the procedure would be too painful. Besides, if it hurts, the gynecologists cannot proceed with aspiration accurately, so the results would be poorer, the number of complications would increase, and the process would take longer.

6 What happens on the day of the egg pick-up?

On the day of the egg pick-up, patient is required to come to the hospital at least 90 minutes before the allocated time. Patient will need to fast for six hours. The anesthetist will usually see patient before administering the general anesthetic. Male partner will be required to produce semen sample either at home or the allocated men's room. He should deliver the specimen in the Pre- OP ward preferably just before patient go into theatre for the general anesthesia.

7 Can stress level affect the outcome of ART?

There is evidence in literature to suggest that stress level influence the outcomes of infertility treatment as well as contribute to a patient decision to continue treatment. Physiological distress is associated with treatment failure and interventions to relieve stress are associated with increased pregnancy rate.

8 What is diameter to volume ratio of a typical follicle?

During controlled ovarian stimulation (COH), follicles of different size develop. These follicles can be categorized as small, medium or large follicles depending on the size of the fluid- filled cavity, the antrum. No direct role of the antrum in follicular function has so far been identified and it is an open question why the size of the antrum (and thus that of the follicle) is so variable among species. The Table 2.1 provides the respective volumes contained in follicles.

Table 2.1: Diameter to volume ratio of follicles [22]

Follicle	Follicle diameter (mm)	Follicle volume (ml)
Small follicle	10-16	1-1.8
Ideal follicle	17-20	3-4

9 Does the size of the needle matter in Ovum pick up?

Mostly a 17 guage needle is used for egg retrieval whereas many attempts have been made to optimize the oocyte yields during IVF. Decreasing needle diameters from 15 to 17 or 18 gauge (G) has been shown to decrease pain, without affecting number of oocytes, their quality, or clinical pregnancy rates. [22] A prospective study by Kushnir and colleagues [23] concluded that needle diameter does not affect oocyte yield, including in obese patients and patients with diminished ovarian reserve, rather small diameter needles appeared to significantly prolong operating time.

10 What is the effect of Hydrosalpinx on Assisted reproductive outcomes and how it can be treated?

Hydrosalpinx is a chronic situation and has a detrimental effect on the outcomes of IVF. Since 1994, numerous studies have been published on hydrosalpinx and its relation to IVF outcomes. The majority of these studies indicated impaired IVF outcomes comprising decreased pregnancy, delivery and implantation rate, a doubling of spontaneous early pregnancy loss and a significant increase in ectopic pregnancy. [24]

However, in order to obtain increased success rates, the preferred treatment option is laproscopic salpingectomy for hydrosalpinges prior to IVF. Three randomized controlled trials involving 295 couples in a Cochrane review [25] showed that the rates of ongoing pregnancy and live birth were increased with laparoscopic salpingectomy. Pregnancy has also increased, but there was no significant difference in the incidence of ectopic pregnancy. They recommended that laparoscopic salpingectomy should be considered for all women with hydrosalpinges prior to IVF treatment.

11 How clinical competence can be assessed for Ovum Pick up?

Clinical competence can be assessed on the basis of:

- Oocyte collection rate i.e. the number of oocytes aspirated per follicle (>18 mm) on the pre-hCG scan.
- Time taken for oocyte collection
- Complication rate, although the incidence of bleeding and infection is so low that this is probably meaningless unless there is large number of cases that can be studied.

12 List the parameters need to be checked before ovum collections?

- Check that operating list is in the correct order.

See patient in preadmission room

- Check patient's name, ID number.
- Check for any allergies.
- Check most recent ultrasound.
- Check most recent hormone levels.
- Check consent form signed.
- Check whether any limit on the number of oocytes inseminated.
- Check whether it is standard in vitro fertilization or intracytoplasmic sperm injection.

Check equipment

- Ensure ultrasound machine works and check orientation of image
- Check tubes connected to needle and suction pump.
- Test that suction is working and adjust pressure.
- Fill collection tube with media.

Procedure

- Double-check that patient ID and names on collection tubes.
- Proceed with collection.
- Complete notes about the number of eggs collected, insemination technique etc.
- Contact partner with outcome.

Part - 3

Protocol followed at our centre

INDEX - Part:3

1 Initial checks

Before commencing oocyte collection, make sure the availability of OPU trolley instruments, 6.5 MHZ vaginal USG probe, vagina cleaning trolley and biospsy guide is ready. The system is then tested by aspirating some culture medium . This also provides a coloumn of fluid to collect the follicular fluid, thus encouraging laminar flow.

FIGURE NO. 1	DISCRIPTION
	OPU trolley instruments - Biopsy guide, sponge holder, speculum, drapes

FIGURE NO. 2	DISCRIPTION
	6.5 MHZ vaginal USG probe

FIGURE NO. 3	DISCRIPTION
	Vagina cleaning trolley - NS bottles, disposable gloves

FIGURE NO. 4	DISCRIPTION
	Stainless steel biopsy guide being cleaned

FIGURE NO. 5	DISCRIPTION
	The distal end of the biopsy guide

FIGURE NO. 6	DISCRIPTION
	Proximal end of biopsy guide

FIGURE NO. 7	DISCRIPTION
	Mounted biopsy guide with needle on the TVS probe. Biopsy guide should be attached firmly so that the needle always follows the desired path in the ovary. Probe is always covered with polyethylene and designed with a welded seam along its length to inhibit accidental breakage. Each cover is individually wrapped and packaged in a sterile barrier with two cable clips. The covers are e-beam sterilized.

FIGURE NO. 8	DISCRIPTION
	HEPES/MOPS based media being aspirated in the needle to rinse the interior of the needle. This will protect the Oocyte complex from the temperature and osmotic shock.

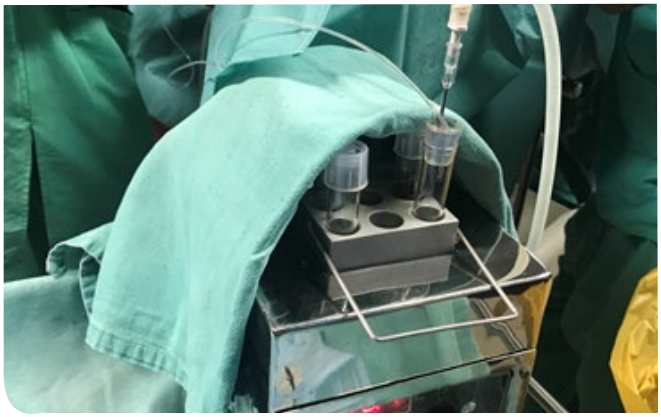
FIGURE NO. 9	DISCRIPTION
	Aspirate being collected in the tube

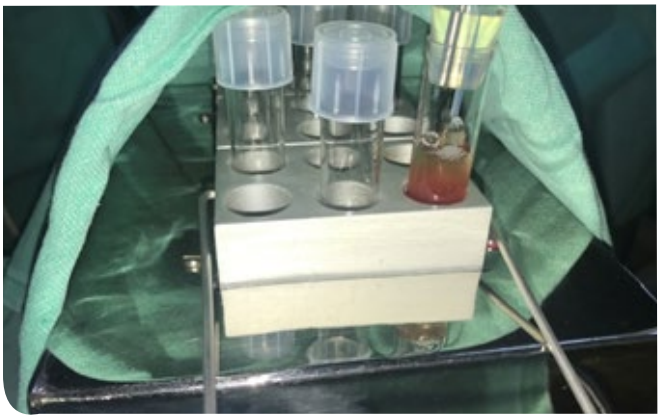
FIGURE NO. 10	DISCRIPTION
	Tubes with aspirate are plate in the tube warmer till the embryologist sees them. This should be done quickly to avoid the shock to the egg. A replacement of messy water bath for heating all sizes of test tubes is removable, autoclavable anodized aluminum blocks, ideal for transporting samples from one place to another with minimum of temperature loss. Digital display and control of temperature with +/-0.2°C accuracy from ambient to 110°C Comes with anodized aluminum blocks of 75 X 50 X 50 mm to accommodate specified test tubes. Additional blocks of different dimensions as per customer's requirement can be bought.

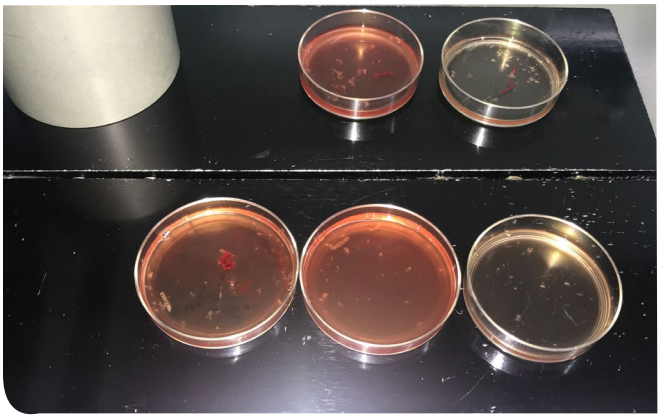
FIGURE NO. 11	DISCRIPTION
	Follicular fluid in 60 mm dishes prior to OCC hunting

FIGURE NO. 12	DISCRIPTION
 **Fornax test tube warmer**	**Base station for 4 portable warmers.** The warmer is a handheld device with Li-ion rechargable battery. It is equipped with heating element, Digital sensor, microcontroller, nonvolatile memory and LED indicators. When placed on base station, it gets connected electrically by its contacts. These contacts help base station and the mobile device communicates with each other and also charge the battery. The mobile nest when in mobile mode continuously monitors the temperature with a 14 bit accuracy, corrects it several times a second. This yields a rock steady temperature profile even in varying surroundings. The mobile nest continues to log for the power consumption index and temperature abnormalities. These are downloaded to the base station when the nest is docked. With monitoring and reporting features, the user can be assured about the mobile nest working accurately at every step. A transparent window facilitates easy viewing of the follicular fluid.

FIGURE NO. 13	DISCRIPTION
	**The cracked tube.** Pressure leak occurs leading to non-aspiration of the fluid.

FIGURE NO. 14	DISCRIPTION
	**The loose cap.** This also leads to pressure leak and thus follicular fluid is not aspirated. Whenever we realize that the pressure is not building up we must check the cap connection and tighten it.

2 Identifying Follicles

The ovaries are visualized on transvaginal sonography and ovarian follicles should be differentiated from other pelvic anatomical structures that may give the impression of being similar. Both, the preovulatory ovarian follicles and iliac vessels look hypoechoeic (dark), and thus iliac vessels on cross section may be confused with a follicle. The aim should be to view the vessels in the longitudinal view with ovaries lying in the plane adjacent to them. The bowel lumen is echogenic and will show peristaltic movements if observed for few seconds. Encysted peritoneal collections, hydrosalphinx and persistent ovarian cysts would have been documented on previous scans and do not cause any confusion. **(Fig: 1, 2 & 3)**

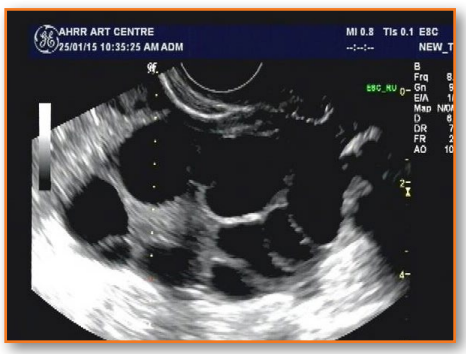


Fig : 1

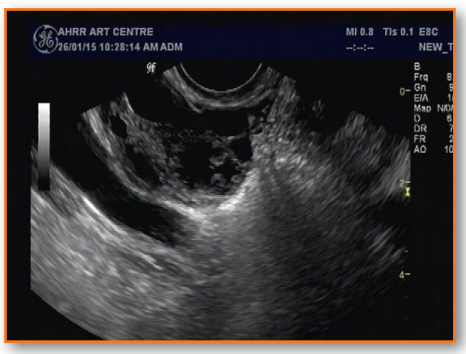


Fig : 2

Fig : 3

3 Preparation of needle and tubing

a. Needle is inserted in the biopsy guide fixed over the vaginal transducer, which has been covered with the sterile vaginal probe cover. **(Fig : 1)**

Fig : 1

b. We flush the needle with MOPS/ HEPES based media to eradicate the dead space. **(Fig : 2)**

Fig : 2

4 Aspiration of Follicle

Transducer is inserted in the vagina and ovary is brought in the focus. We ensure that very minimal tissue lies between the follicles and the transducer. In situation where the ovaries are adherent and follicles cannot be approached, perforation of endometrial cavity should be avoided. It is my practice to always commence with the right ovary, and then to aspirate follicles sequentially. It is best to keep the needle within the ovary if possible minimizing the amount of trauma to the ovarian capsule. When all follicles within the right ovary are aspirated, the needle is withdrawn from the vagina and the needle is flushed with medium to clear any blood. The pressure is retested, and the left ovary is then aspirated. Follicle is focused in direction of biopsy guide probe line. Needle is briskly inserted in the nearest follicle. The pressure within the follicle, before penetration, varies, depending on the size, shape, and position of the follicle. The internal pressure increases, correlating with size. However, due to the pressure caused by the needle deforming the surface of the follicle at the time of puncture, the pressure within the follicle may be much higher. The more blunt the needle, the higher the resultant pressure. Suction pressure should be on during thus movement. Allow the suction to occur uniformly. Keep the needle tip under vision in the middle of the follicle. Always keep the pressure on and allow the follicle to collapse around the needle tip till the time follicle is completely emptied.

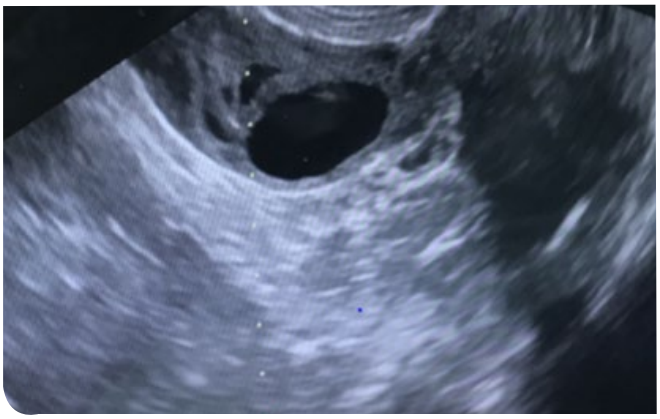
FIGURE: 1	DISCRIPTION
	The ovaries are visualized on transvaginal sonography and ovarian follicles are brought in focus.

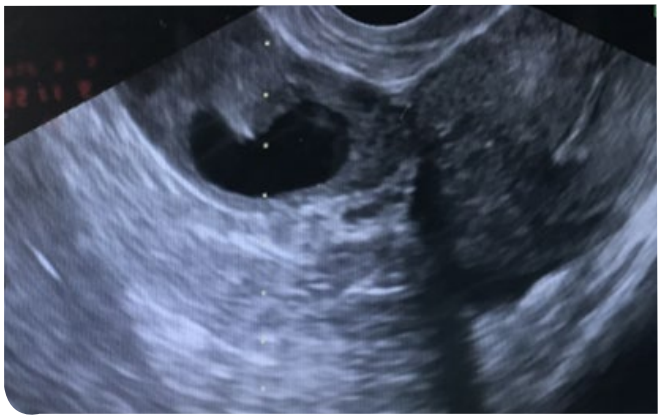
FIGURE: 2	DISCRIPTION
	The needle is briskly inserted in the nearest follicle, deforming the surface of the follicle at the time of puncture.

FIGURE: 3	DISCRIPTION
	Keep the pressure on and allow the follicle to collapse around the needle tip till the time follicle is completely emptied.

5 Suction pressure

It is recommended that pressures be kept less than 120 mmHg. The higher the speed of travel, the more is chance of damage to the oocyte. Apart from the speed of travel, turbulent non-laminar flow can also damage the oocyte, either stripping its cumulus mass or fracturing the zona. It is believed that an intact cumulus may be important in preventing damage to oocytes. **(Fig: 1)**

Fig: 1

Part - 4

Comparison of Ovum pick up needles from different OEMs

INDEX - Part:4

4.1. Table: Comparison of Ovum Pick up needles from different OEMs

S.No.	OEM	Specifications	Characteristics	Other details
1	**Wallace (Single lumen oocyte recovery system)**	**Needle length** - 33cm **Available single lumen needle** - 16g, 17g and 18g Inner catheter OD – 1.52 mm, 1.52 mm **Needle ID** – 1 mm, 1.24 mm, 0.95 mmg **Needle OD** – 1.7 mm, 1.42 mm, 1.25 mm **Volume of needle not including hub** – 0.435 ml, 0.283 ml, 0,255 ml **Volume per cm length of needle** – 0.012 ml, 0.008 ml, 0.007 ml **Length of echogenic markings-** 22mm, 22 mm, 22 mm **Aspiration tubing ID** – 1.52 mm, 1.31 mm, 1.14mm	The single lumen needle range features a tri-faceted tip ensuring optimal sharpness and accuracy during placement. The needle is available as a stand alone unit and with a variety of tubing lengths to suit clinical preferences.	**Benefits:** Sharp, non-coring needle tip to minimize patient trauma. Echo marked to the very tip for accurate placement under ultrasound guidance. Available with a leur lock connected at the bung for intermittent flushing of the follicle. Silicone bung for an easy and secure fit with test tubes. Color coded tubing sleeves: **16g = Blue** **17g = Red** **18g = White**

S.No.	OEM	Specifications	Characteristics	Other details
2	**Wallace (Dual lumen oocyte recovery system)**	**Needle length** – 33 cm **Available dual lumen needle** – 16g, 17g **Needle OD** – 1.7 mm, 1.5 mm **Volume of aspiration lumen not including hub** – 0.411 ml, 0.251 ml **Volume of flushing lumen not including hub** – 0.044 ml, 0. 046 ml **Volume per cm length of aspiration lumen** – 0.011 ml, 0.001 ml **Volume per cm length of flushing lumen** – 0.001 ml, 0.001 ml **Length of echogenic markings** – 10 mm, 10 mm **Vacuum tubing length** – 512 mm, 512 mm **Flushing tubing length** – 712 mm, 712 mm **Aspiration tubing ID** – 1.52 mm, 1.52 mm	The dual lumen needle range features a fully integrated flushing line running from hub to needle tip, giving maximum protection to the oocyte during extraction.	**Benefits:** Flushing lumen extends to needle tip providing a consistent flow. Non-coring needle tip to minimize risk of blockages. Echo marked to the very tip for accurate placement under the ultrasound guidance. Silicone bung for an easy and secure fit with test tubes Allows for continual or intermittent flushing during oocyte recovery. Color coded tubing sleeves: **16g = Blue** **17g = Red** Pump adapter

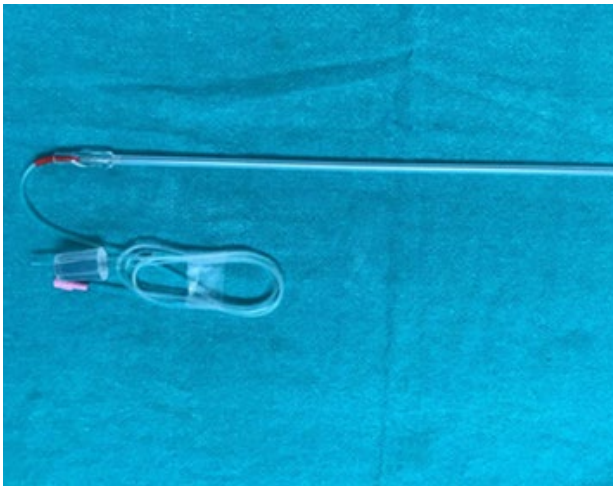
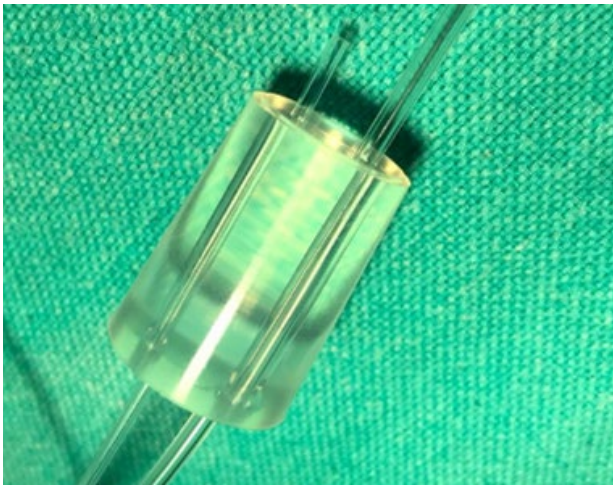
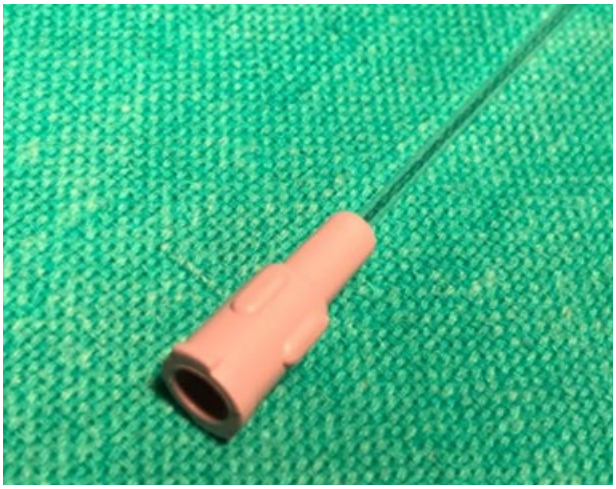
S.No.	OEM	Specifications	Characteristics	Other details
2	**COOK Medical (Single lumen needle- OSN)**	**Reference no.-** K- OSN-1633-R-B-90 **Needle gage** – 16 **Needle length** – 33 cm **Aspiration line length** – 90 cm	The needle features a B bevel. The design of the handle facilitates the rotation of the needle during aspiration. The thumb notch indicates the orientation of the bevel.	EchoTip® technology enhances the visualization of the needle tip under ultrasound
	COOK Medical (Double- lumen needle)	**A bevel:** **Reference no**.- K- OPSD-(1630, 1633, 1635,1730, 1733, 1735)- A-S **Needle gage** – 16, 16, 16, 17, 17, 17 **Needle length** – 30cm, 33 cm, 35 cm, 30 cm, 35 cm, 35 cm **Aspiration line length** – 70 cm, 100 cm, 100 cm, 100cm, 70 cm, 100 cm **B Bevel:** **Reference no.- K- OPSD-**(1630, 1635,1730, 1735)- B- S **Needle gage –** 16, 16, 17, 17 **Needle length –** 30cm, 35 cm, 35 cm, 35 cm **Aspiration line length** – 70 cm, 100 cm, 70 cm, 100 cm	The double-lumen design allows simultaneous or intermittent flushing of media and aspiration of the follicular fluid. The needle features both A and B bevel.	The needle's EchoTip echogenic tip enhances the visualization under ultrasound

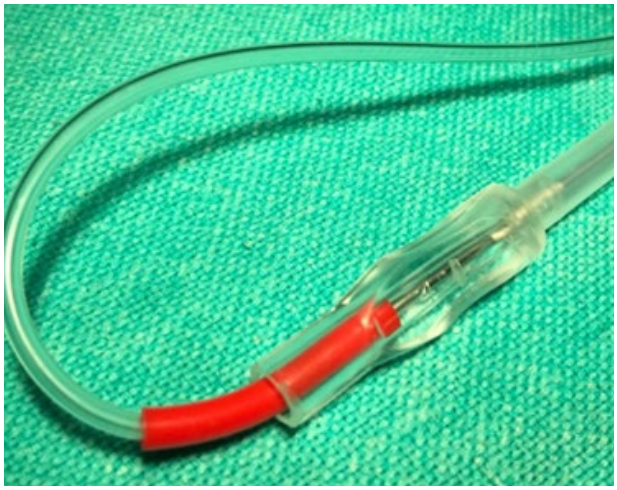
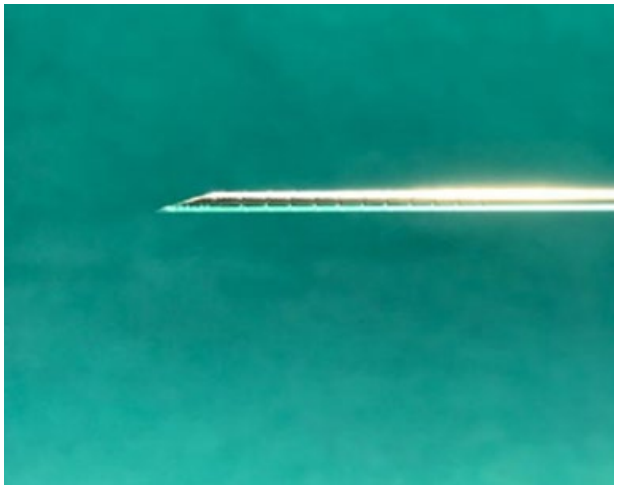
S.No.	OEM	Specifications	Characteristics	Other details
3	**CCD OPS®** **Classic with valve**	**Order code.**- 1301021 **NEEDLE:** **Type** – triple bevel - simple flux **Dimension –** • **Usable length** - 30 cm • **OD** - 1.5 mm G 17 • **ID** - 1.2 mm **Echogenic zone**- ground surface on 2 cm and 5 mm **COLLECTION TUBE:** **Dimension –** • **Usable length** - 60 cm • **OD** - 2 mm • **ID** - 1.1 mm **Component** – PU **VACUUM TUBE**: **Dimension** – • **Usable length** - 100 cm • **OD** - 5.6 mm • **ID** - 3.8 mm **Component** – PU **BUNG**: **Compatibility OPS®** - Falcon® type 15 ml tube **CONNECTION TO PUMP:** **Type** – Luer lock	**The device feature:** • An echogenic triple bevel single lumen needle. • A thin tube connecting the needle to a bung. • A vacuum tube connecting the bung to the aspiration source. • A flushing valve for the model concerned, to choose between aspiration or rinsing the follicles. These sets limit the risk of fracturing the zona pellucida by controlling the aspiration with the use of a pump.	The complete sets (needle + tubing) provide adapted storage conditions for the oocytes during the collection, particularly being able to maintain the vials at an appropriate temperature using heating systems. The needle has a Luer-lock to connect a syringe, with ergonomic shape for easy handling. **Packaging** – 10 needles per box

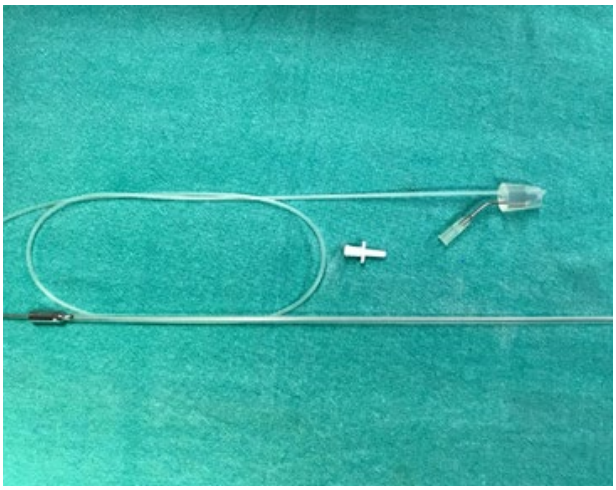
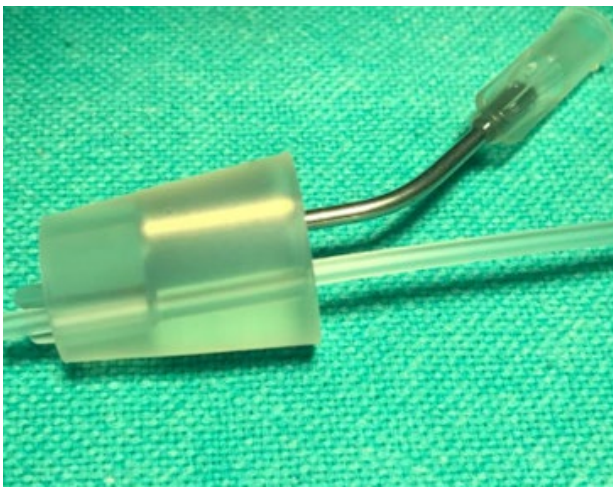
S.No.	OEM	Specifications	Characteristics	Other details
3	**OPS® Classic without valve**	**Order code.**- 1301021 **NEEDLE:** **Type** – triple bevel - simple flux **Dimension –** • **Usable length** - 30 cm • **OD** - 1.5 mm G 17 • **ID** - 1.2 mm **Echogenic zone**- ground surface on 2 cm and 5 mm **COLLECTION TUBE:** **Dimension –** • **Usable length** - 60 cm • **OD** - 2 mm • **ID** - 1.1 mm **Component** – PU **VACUUM TUBE:** **Dimension –** • **Usable length** - 100 cm • **OD** - 5.6 mm • **ID** - 3.8 mm **Component** – PU **BUNG:** **Compatibility OPS®** - Falcon® type 15 ml tube **CONNECTION TO PUMP:** **Type** – Luer lock	**The device feature:** • An echogenic triple bevel single lumen needle. • A thin tube connecting the needle to a bung. • A vacuum tube connecting the bung to the aspiration source. The resilient properties of polyurethane ensure flexibility without kinking for a regular flow rate, with no loss of suction. These sets can be connected to an oocyte aspiration pump through luer connectors.	The needle has a Luer-lock to connect a syringe, with ergonomic shape for easy handling. **Packaging** – 10 needles per box

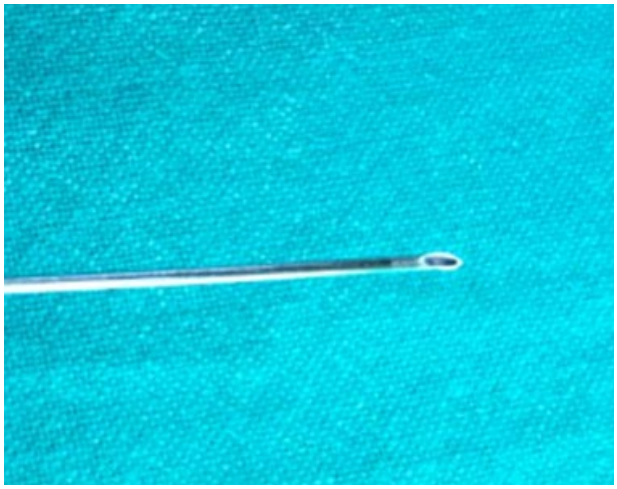
S.No.	OEM	Specifications	Characteristics	Other details
4	**Vitrolife Conventional Single lumen**	• **Reference no.** – 17130 • **OD (mm)** – 1.4 • **OD (gauge)** – 17 G • **ID (mm)** – 1.0 • **Needle length (mm)** – 350 • **Aspiration tubing** (mm) – 900 **Needle comprises of:** i. Stainless steel needle ii. Silicone cork iii. A length of tubing for aspiration and flushing iv. An adapter for flushing	The handle has a marking for bevel point indication. The needle tip is designed to meet needs by providing extraordinary sharpness, exact precision and the utmost safety. The bevel grinding ensures low resistance penetration and distinctive backpoint grinding prevents deviation. The new needle cork is designed to facilitate easier flushing using a single lumen needle. To flush, a standard Luer slip syringe is also needed. The bent cannula prevents kinking of the tube	All needles, including the handle and side connections, are made of surgical grade stainless steel AISA 304. The echomarking is created through innovative laser etching giving you the high visibility you need during oocyte retrieval. Friction free tubing for easier handling Double sterile pack to meet surgical standards. Store in room temperature.

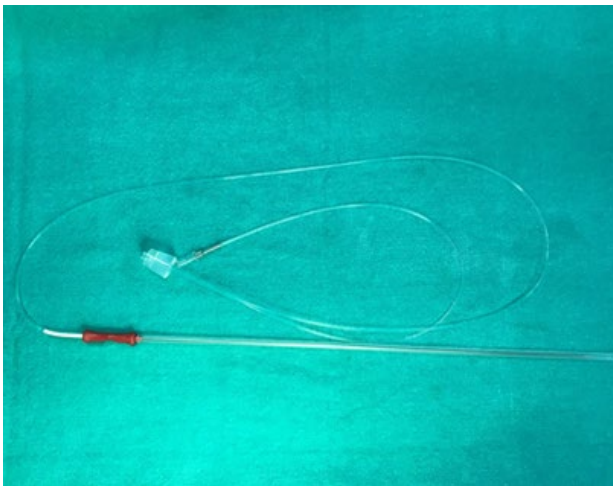
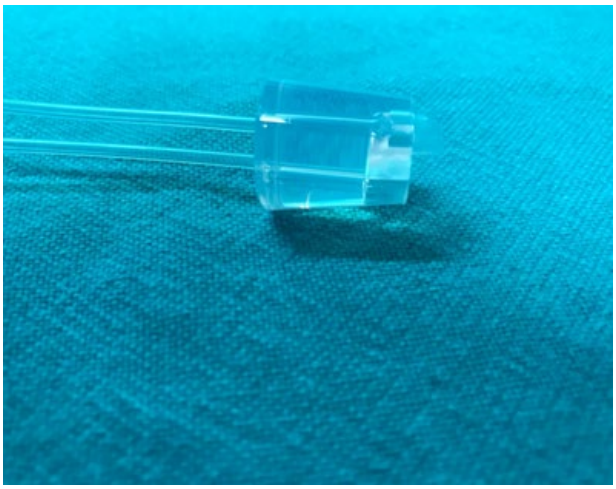
4.2 Table : Needles from different OEMs

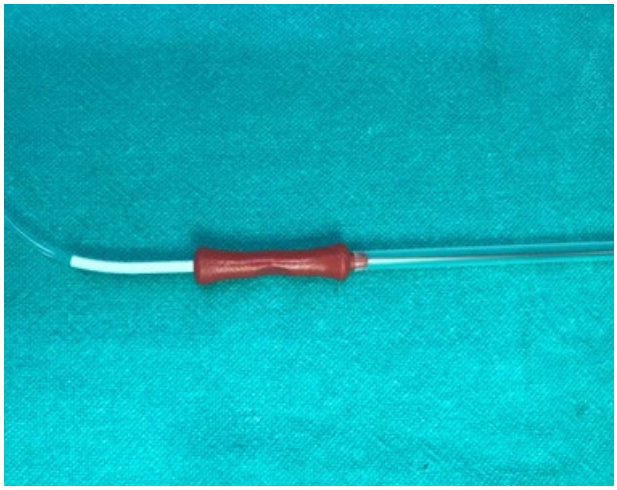
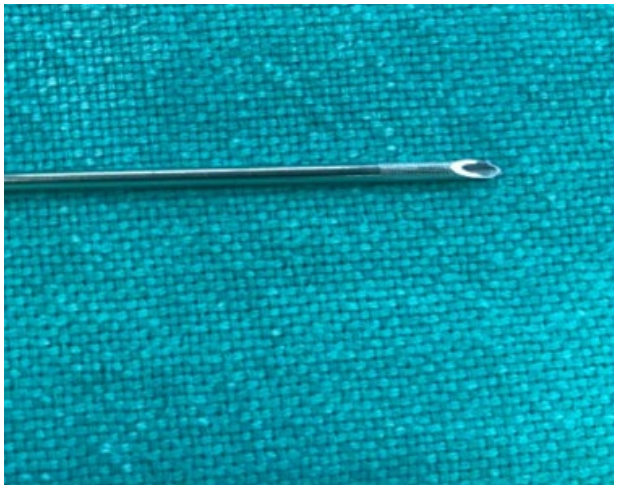
S.No	OEM	FIGURE	LEGEND
1	ORIGIO (Wallace)		**Wallace® Single Lumen Oocyte Recovery Systems**
			**Silicone bung** for an easy and secure fit with test tubes.
			**Luer lock** compatible connections

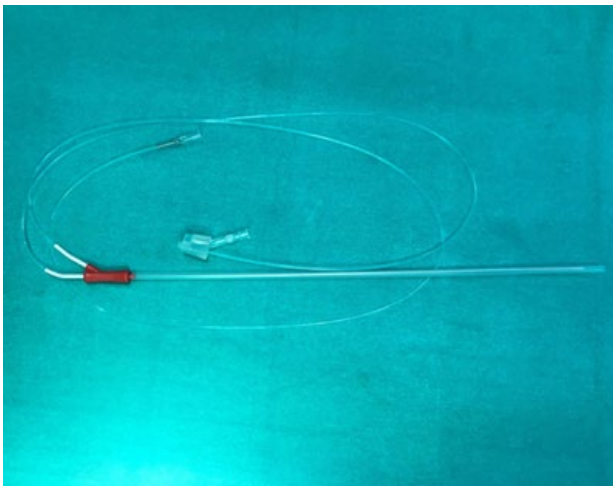
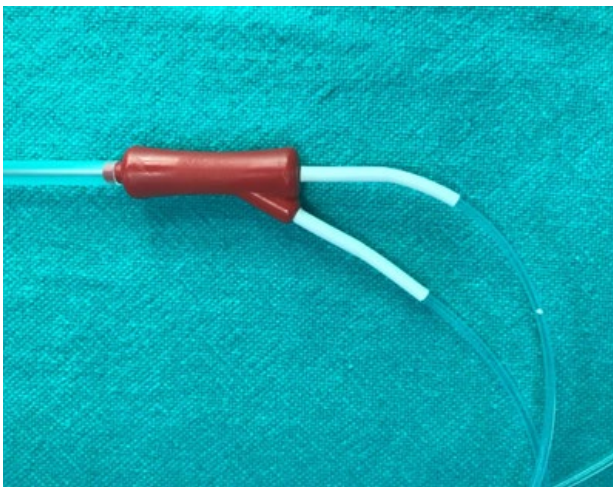
S.No	OEM	FIGURE	LEGEND
1	ORIGIO (Wallace)		**Colour coded** tubing sleeves
			**Triple ground needle** tip for optimum sharpness with Echo markings at needle tip

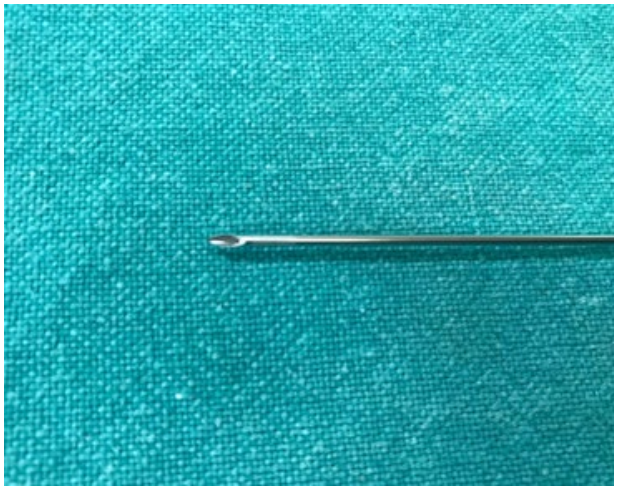
S.No	OEM	FIGURE	LEGEND
2	Vitrolife		**Vitrolife Single lumen** ovum pick up needle.
			**Cork for easier flushing** and a bent cannula prevents kinking of the tube.
			An **adapter** for flushing.

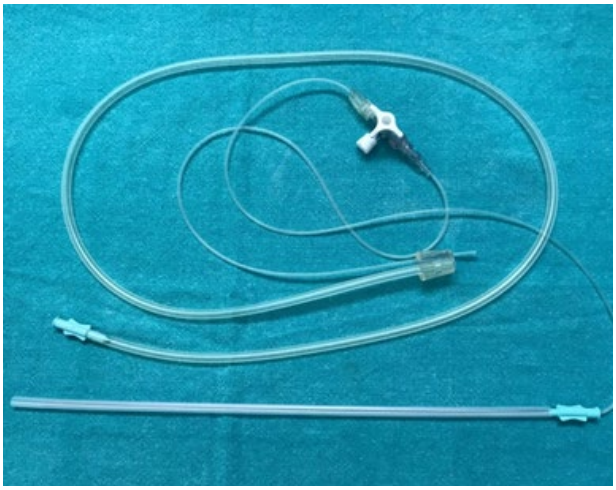
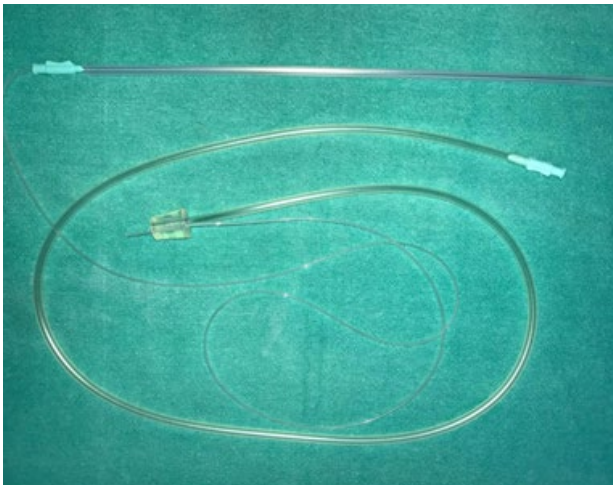
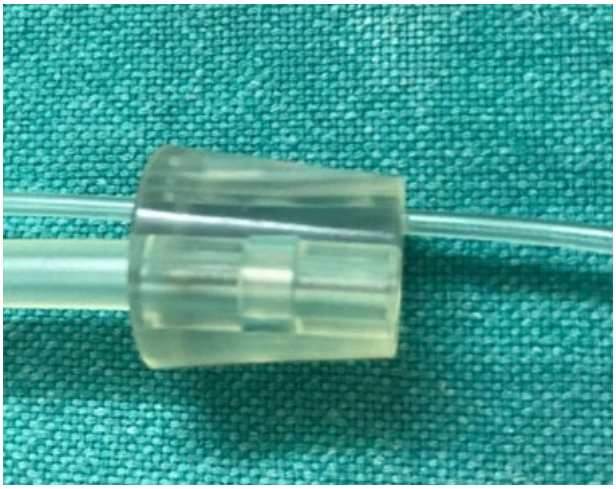
S.No	OEM	FIGURE	LEGEND
2	Vitrolife		**Stainless steel hub** with precision grip design.
			**Ultra sharp design** for low penetration resistance and exact precision with innovative echomarkings for perfect control

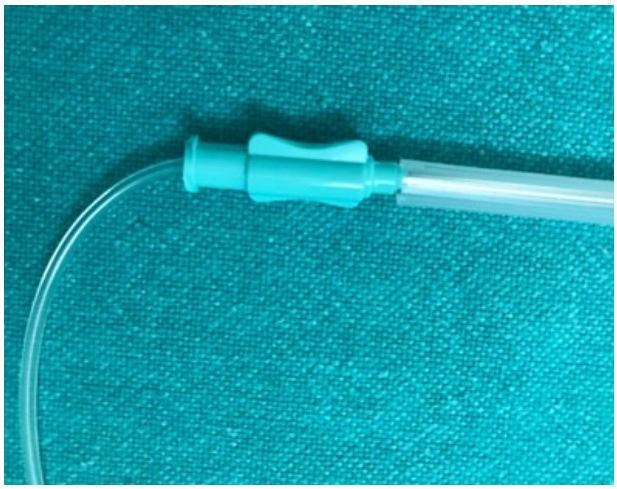
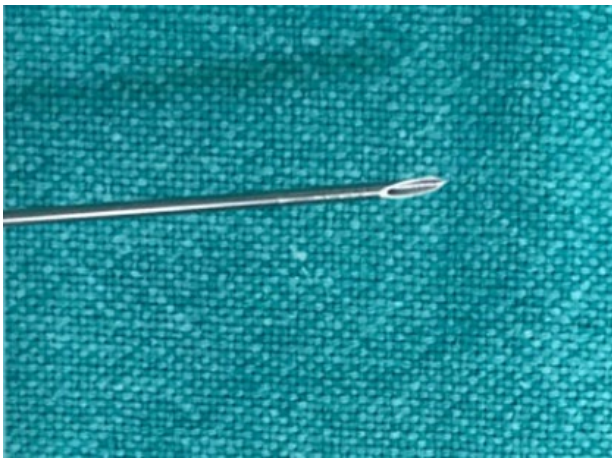
S.No	OEM	FIGURE	LEGEND
3a	COOK		**COOK Single lumen** ovum pick up needle
			**Luer seal** silicone stopper with aspiration and vacum line
			**Luer lock** compatible connections

S.No	OEM	FIGURE	LEGEND
3a	COOK		**The handle** is designed to facilitate the rotation of the needle during aspiration. The thumb notch indicates the orientation of the bevel
			**The needle** features a B bevel with echomarkings to enhance the visualization of the needle tip under ultrasound.

S.No	OEM	FIGURE	LEGEND
3b	COOK		**COOK** double lumen ovum aspiration needle.
			**Silicon stopper** with vacum cannula
			**Ergonomic handle** with one aspiration line and other flushing line

S.No	OEM	FIGURE	LEGEND
3b	COOK		**Echotip enhances** visualization of needle tip when used with ultrasonic imaging equipment

S.No	OEM	FIGURE	LEGEND
4	CCD		**CCD single lumen** ovum aspiration needle with valve
			**CCD Single lumen** ovum aspiration needle without valve
			**A thin tube** connecting the needle to a silicone bung and a thick vacuum tube connecting the bung to the aspiration source

S.No	OEM	FIGURE	LEGEND
4	CCD		**A flushing valve** for the model concerned, to choose between aspiration or rinsing the follicles.
			**The needle** has a Luer-lock to connect a syringe, with ergonomic shape for easy handling
			**Single lumen**, triple bevel needle, echogenic on the last 2 cm, then on 5 mm as of the 3rd distal cm

3. Suction pump for Ovum Aspiration

ORIGIO SUCTION PUMP

- The **SPUMPV1** is a vacuum pump intended for the Suction Pump of body fluids and cells; in particular oocyte aspiration.
- Designed to maintain a vacuum accurately at a user specified setting within **±5mmHg.**
- Can also boost the vacuum to approximately -500mmHg from any setting (Boost).
- **Dual Display:** Actual pump pressure and set pump pressure
- Reduced noise level from 80 dB to 46 dB (background room noise level) and sound signal when the boost is on.
- **SPUMPV1 includes :**

I. Suction pump (Fig: 1 & 2)

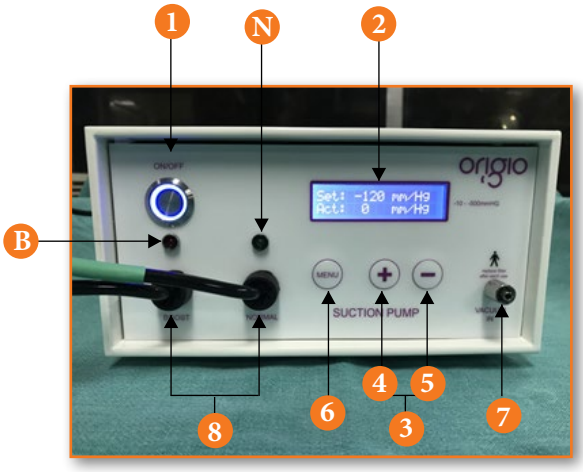


Fig: 1 Front side of the suction pump

Fig: 2 Back side of the suction pump

1. On / Off Switch	7. Vacuum In- Patient Tube Connection
2. Vacuum Display	8. Foot Pedal Connection
3. Vacuum Adjust Indicators	N. Normal Vacuum Indicator
4. Vacuum Adjust Touch-Pad	B. Boost Vacuum Indicator
5. Vacuum Adjust Touch-Pad	P. Main Power Inlet
6. Menu Touch-Pad	NO. Ehhaust Opening

II. Pedals (Fig: 3)

Fig: 3

III. A bag of 25 disposable hydrophobic filters. **(Fig: 4)**

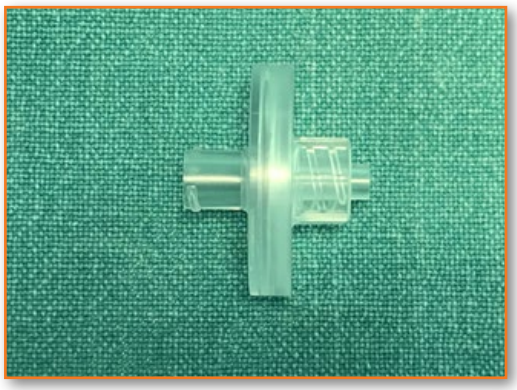


Fig: 4

IV. A set of two adapters. **(Fig: 5 & 6)**

Fig: 5 Female / Female Adaptor

Fig: 6 6mm Push Fit / Female Adaptor

Connection of hydrophobic filter and adapters

- Always remember that before commencing any procedure, the hydrophobic filter should be replaced and not to operate the suction pump without a filter. **(Fig: 7)**

Fig: 7 Filter directly on the pump for connection with ORIGIO needle sets

- If SPUMPV1 suction pump system is not used with ORIGIO Oocyte Follicle Aspiration needle sets then an adaptor is required, which should be connected to the VACUUM IN port on the front panel of the device. (Fig: 8 & 9)

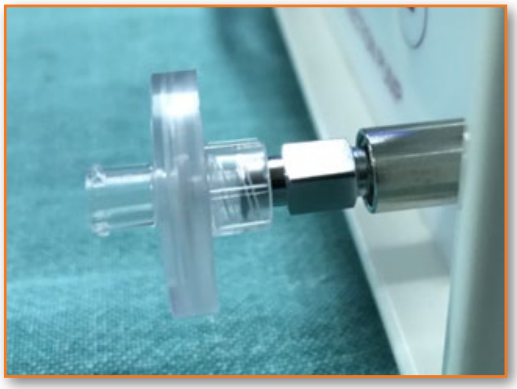


Fig: 8 Female/female adaptor and filter for connection with male tubing line sets

Fig: 9 6mm push fit/female adaptor for connection with tubing line sets with filters built in

Part - 5

Original Equipment Manufacturers (OEMs) details

Table- OEM & Vendor Related Contact Information for OPU needles

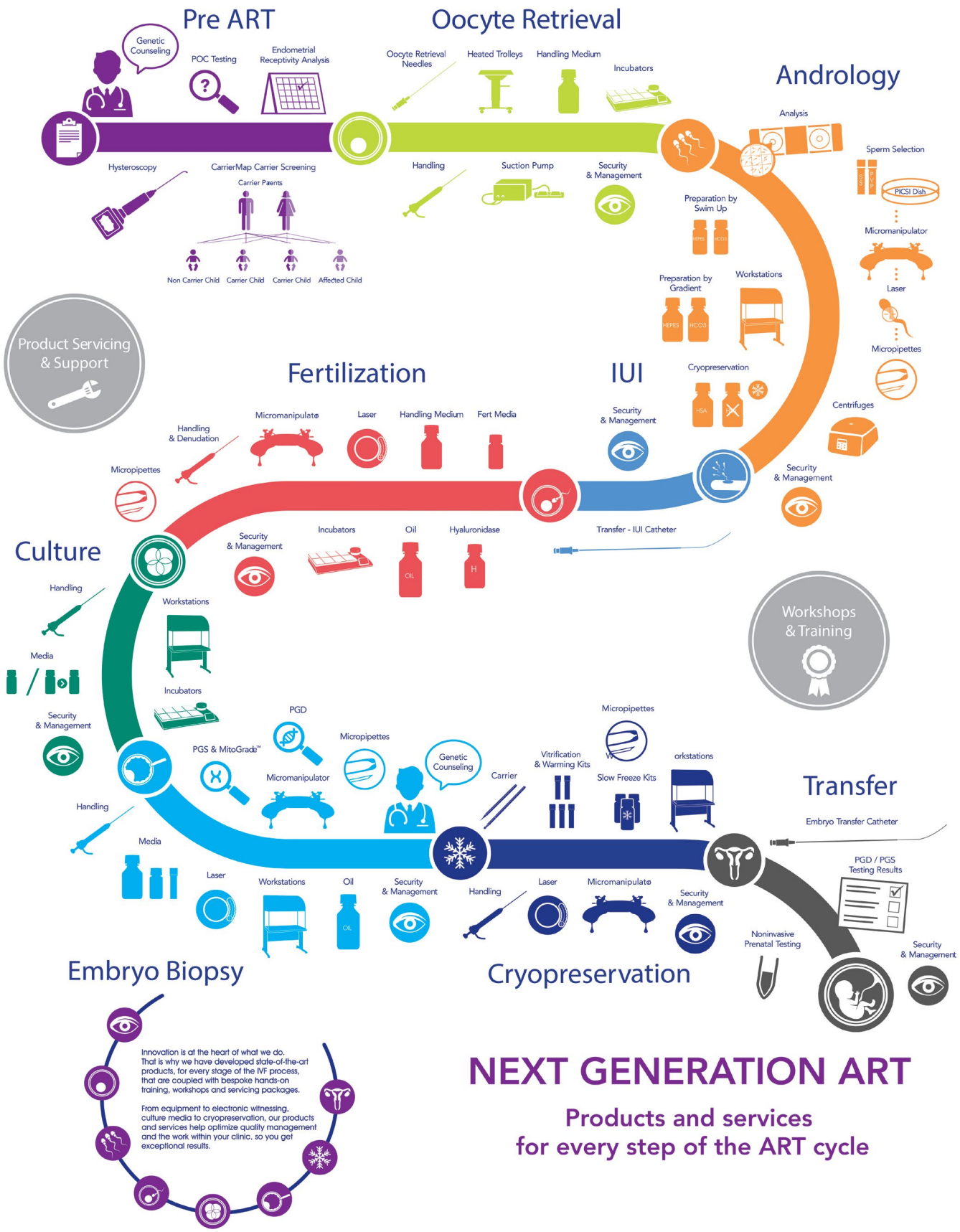
S. No	ORIGINAL EQUIPMENT MANUFACTURER (OEM)	INDIA DISTRIBUTER	DEVICE BRAND	PRICE PER DEVICE	CONTACT PERSON	PHONE	EMAIL
1	**Smiths Medical International Ltd.** Boundary Road, Hythe, Kent, CT21 6JL, UK	Shivani Scientific India Pvt. Ltd.	**Wallace** needles	Not disclosed	Mr. Amol Sharan	+91 9990199933	amols@shivanisci-entific.com amolsharan@gmail.com
2	**Vitrolife Sweden** AB Gustaf Werners gata 2 SE-421 32 Vasta Frolunda Sweden	Vision Diagnostics Pvt. Ltd.	**Vitrolife** needles	Not disclosed	Mr. Punit Khatnani	+91 9910188771	punit@vi-sion-groups.com
3	**CryoBio System** Groupe I.M.V Technologies France	CryoBio System India	**CCD** needles	Not disclosed	Mr. Jitender Kumar	+91 9650602424	jitender@cryobio-systemindia.com
4	**COOK Medical Inc.** P.O Box 4195, Bloomington, In 474024195, USA	Intermedics	**COOK** needles	Not disclosed	Mr. Gopal	+91 9212798185	projects@inter-medics.in

References

1. Lapata A. Johnston IMH, Leeton JF et al. Collection of human oocytes at laparoscopy and laparotomy. *Fertil Steril.*1974; 25: 1030-34.
2. Steptoe PC, Edwards RG. Laparoscopic recovery of preovulatory human oocyte after priming of ovaries with gonadotrophins. *Lancet.*1970; 2959(7649): 683-9.
3. Steptoe PC, Edwards RG. Birth after the reimplantation of a human embryo. Lancet. 1978; 2:366.
4. Lenz S, Lauritsen JG, Kjellow M: Collection of human oocytes for in-vitro fertilization by ultrasonically guided follicular puncture. *Lancet.* 1981; 1(8230) 1163-64.
5. Daya S: Follicular fluid pH changes following intraperitoneal exposure of Graafian follicles carbon Dioxide : A comparative study with follicles exposed to ultrasound. *Hum Reprod.* 1988; 3(6) :727- 30.
6. Daniel F. Pettway DE, Maxson WF: The role of laparoscopic adhesiolysis in an in-vitro fertilization program. Fertilization program. *Fertil Steril.* 1983; 40:49-52.
7. Lenz S. Lauritzen JG. Ultrasonically guided percutaneous aspiration of human follicles under local anesthesia: A new method of collecting oocytes for in vitro fertilization. *Fertil Steril.* 1982; 38 (6):673-77.
8. Parsons JH,Booker M, Sharma V et al: Oocyte retrieval for in vitro fertilization by ultrasonically guided needle aspiration via the urethra. *Lancet.*1985; 1(8437) :1076-7.
9. Wikland M. Hamberger L,Enk L et al: Technical and clinical aspects of ultrasound guided oocyte recovery. *Hum Reprod.* 1089; 4 (8 Suppl): 79-82.
10. Bjercke S, Tanbo T, Dale PO et al: Comparison between two hCG to-oocyte aspiration intervals on the outcome of in vitro fertilization, J Assist *Reprod Genet.* 2000; 17 (6): 319-22.
11. Van Os HC, Roozenderg BJ, Janseen Caspers HAB et al Vaginal disinfection with povidone iodine and the outcome of in-vitro fertilization. *Hum Reprod.* 1992; 7(3); 349-50.
12. Funabiki M, Taguchi S, Hayashi T, Tada Y et.al. Vaginal preparation with povidone iodine disinfection and saline douching as a safe and effective method in prevention of oocyte pickup associated pelvic inflammation without spoiling the reproductive outcome: Evidence from a large cohort study. *Clin Exp Obstet Gynecol.* 2014; 41: 689-90
13. Coetsier T, Dhont M, De Sutter P, et al. Propofol anaesthesia for ultrasound-guided oocyte retrieval: accumulation of the anaesthetic agent in follicular fluid. *Hum Reprod.* 1992; 7: 1422–4.
14. Choen J, Avery S, Campbell S. Follicular aspiration using a syringe suction system may damage zona pellucid. *J In Vitro Fertil Embryo Transf.* 1986; 4: 224.
15. Mikkelsen AL, Smith S, Lindenberg S. Possible factors affecting the development of oocytes in in vitro maturation. *Hum Reprod.* 2000; 15(suppl 5):11.
16. Papanikolaou EG, Platteau P, Albano C, et al. Immature oocyte in-vitro maturation: clinical aspects. *Reprod Biomed* Online. 2005;10: 587.
17. Awonuga A, Waterstone J, Ovesanya O, et al. A prospective randomized study comparing needles of different diameters for transvaginal ultrasound-directed follicle aspiration. *Fertil Steril.* 1996; 65:109-113
18. Kingsland CR, Taylor CT, Aziz N, Bickerton N. Is follicular flushing necessary for oocyte retrieval? A randomized trial. *Hum Reprod.* 1991; 6: 382.
19. El-Shawarby S, Margara R, Trew G. A review of complications following trans-vaginal oocyte retrieval for in vitro fertilization. *Hum Fertil (Camb).* 2004; 7: 127.
20. Tureck RW, Garcia CR, Blasco L, Perioperative complications arising aftertransvaginal oocyte retrieval. *Obstet Gynecol.* 1993; 81: 590.
21. Azem F, Wolfey Y, Botchan A, Massive retroperitoneal bleeding: a complication of transvaginal ultrasonography-guided oocyte retrieval for in vitro fertilization-embryo transfer. *Fertil Steril.* 2000; 74: 405.
22. B. Wirleitner, J. Okhowat, L. Vištejnová, M. Králíčková, M. Karlíková et al. Relationship between follicular volume and oocyte competence, blastocyst development and live-birth rate: optimal follicle size for oocyte retrieval. *Ultrasound Obstet Gynecol.* 2018; 51: 118–125
23. Vitaly A Kushnir, 1 Ann Kim,1 Norbert Gleicher,1,2 and David H Barad. A pilot trial of large versus small diameter needles for oocyte retrieval. *Reprod Biol Endocrinol.* 2013; 11: 22
24. B Ozmen, K Diedrich, S Al-Hasan. Hydrosalpinx and IVF: assessment of treatments implemented prior to IVF. Reproductive *BioMedicine Online.* 2007; 14(2): 235-241
25. Johnson NP, Mak W, Sowter MC. Surgical treatment for tubal disease in women due to undergo in vitro fertilization. *Cochrane Database Syst Rev.* 2004; 1: CD002125

Notes

Notes



Innovation is at the heart of what we do. That is why we have developed state-of-the-art products, for every stage of the IVF process, that are coupled with bespoke hands-on training, workshops and servicing packages.

From equipment to electronic witnessing, culture media to cryopreservation, our products and services help optimize quality management and the work within your clinic, so you get exceptional results.

NEXT GENERATION ART

Products and services for every step of the ART cycle

ORIGIO India Private Limited
C - 401, Delphi, Hiranandani Business Park, Powai,
Mumbai - 400 076, Maharashtra, India
Board Line No. : +91 22-49280000 I Fax No. +91 22-49280010

CooperSurgical Companies Product Portfolio

Pre ART

- CarrierMap
- Genetic Counseling
- Endosee (hysteroscopy)
- ERGrade Endometrial Receptivity Analysis
- POC Testing

Oocyte Retrieval

Oocyte Retrieval Needles
- Wallace Single Lumen Oocyte Recovery Needle*
- Wallace Single Lumen Oocyte Recovery Sets
- Wallace Dual Lumen Oocyte Recovery Sets*
- ORIGIO Stiff Oocyte Retrieval Needles*
- ORIGIO Regular Wall Oocyte Retrieval Needles*
- ORIGIO Thin Wall Oocyte Retrieval Needles*
- ORIGIO Double Lumen Oocyte Retrieval Needles*

Suction Pump
- ORIGIO Suction Pump*

Handling Devices
- The Stripper (Standard / BP / CC / PGD)
- RI EZ-Range (RI EZ-Grip, RI EZ-Strip, RI EZ-Squeeze, RI EZ-Tip)
- IVF Pasteur Pipets
- The Stripper Tips (Individual or Multi Pack)

Media
- Quinn's Advantage Medium with HEPES
- Flushing Media
- SynVitro Flush

Heated Trolley
- K-Systems Trolley with Warmed Table Top*
- K-Systems Warming Plates T45/T47*

Incubators
- K-Systems G210 InviCell*
- K-Systems G185*
- ORIGIO / PLANER Benchtop Incubator BT37

Security & Management
- RI Witness

Andrology

Analysis
- HBA Assay

Preparation by Swim Up
- ORIGIO Sperm Preparation Media
- Quinn's Sperm Washing Medium

Preparation by Gradient
- PureCeption
- Quinn's Sperm Washing Medium
- SupraSperm
- ORIGIO Sperm Preparation Media

Centrifuges
- Midi/Maxi

Sperm Selection
- SpermSlow
- PICSI Dish
- PVP (PVP Medium, PVP Clinical Grade, PVP 7% Solution)
- ORIGIO, TPC and RI Micropipettes

Cryopreservation
- CryoSperm
- Sperm Freezing Medium
- Quinn's Advantage Sperm Freezing Medium

Micromanipulator
- Integra 3 Micromanipulator

Laser
- Saturn 5 Laser System

Workstations – Class I
- K-Systems 100 Series (L124 / L124 ICSI/ L126 MP)*
- ORIGIO Fortuna
- ORIGIO Titan

Workstations – Class II
- K-Systems L234 CellTouch*
- K-Systems G603 Work Chamber*
- ORIGIO Mars

Supporting Products
- Warming Blocks
- Glass Hoods
- Gas Line Filters

Security & Management
- RI Witness

IUI

Handling Devices
- Wallace Intrauterine Insemination Catheter
- ORIGIO IUI Catheter*
- IVF Pasteur Pipets

Security & Management
- RI Witness

Fertilization

Handling and Denudation Devices
- The Stripper (Standard / BP / CC / PGD)
- RI EZ-Range (RI EZ-Grip, RI EZ-Strip, RI EZ-Squeeze, RI EZ-Tip)
- IVF Pasteur Pipets
- The Stripper Tips (Individual or Multi Pack)

Media
- ORIGIO ICSI Cumulase
- SAGE Hyaluronidase
- ORIGIO SynVitro Hyadase
- Quinn's Advantage Fertilization (HTF) Medium
- Quinn's Advantage Protein Plus Fertilization (HTF) Medium
- ORIGIO Sequential Fert

Oil
- ORIGIO Liquid Paraffin
- SAGE Oil for Tissue Culture

Incubators
- K-Systems G210 InviCell*
- K-Systems G185*
- ORIGIO / PLANER Benchtop Incubator BT37

Workstations – Class I
- K-Systems 100 Series (L124 / L124 ICSI / L126 MP)*
- ORIGIO Fortuna
- ORIGIO Titan

Workstations – Class II
- K-Systems L234 CellTouch*
- K-Systems G603 Work Chamber*
- ORIGIO Mars

Micropipettes
- ORIGIO Holding and Injection Pipettes
- TPC Holding and Injection Pipettes
- RI Holding and Injection Pipettes
- Wallace Holding and Injection Pipettes

Micromanipulator
- Integra 3 Micromanipulator

Laser
- Saturn 5 Laser System

Security & Management
- RI Witness

*Not available in the USA

Culture

Media
- Quinn's Advantage Cleavage Medium
- Quinn's Advantage Blastocyst Medium
- Quinn's Advantage Protein Plus Cleavage Medium
- Quinn's Advantage Protein Plus Blastocyst Medium
- ORIGIO Sequential Cleav
- ORIGIO Sequential Blast
- EmbryoGen & BlastGen
- SAGE 1-Step

Oil
- ORIGIO Liquid Paraffin
- SAGE Oil for Tissue Culture

Handling Devices
- The Stripper (Standard / BP / CC / PGD)
- RI EZ-Range (RI EZ-Grip, RI EZ-Strip, RI EZ-Squeeze, RI EZ-Tip)
- IVF Pasteur Pipets
- The Stripper Tips (Individual or Multi Pack)

Incubators
- K-Systems G210 InviCell*
- K-Systems G185*
- ORIGIO / PLANER Benchtop Incubator BT37

Workstations – Class I
- K-Systems 100 Series (L124 / L124 ICSI/ L126 MP)*
- ORIGIO Fortuna
- ORIGIO Titan

Workstations – Class II
- K-Systems L234 CellTouch*
- K-Systems G603 Work Chamber*
- ORIGIO Mars

Security & Management
- RI Witness

Cryopreservation

Carrier
- VitriFit*
- CryoLeaf
- VitriGuard (US only)

Vitrification & Warming Kits
- SAGE Vitrification Kit with DMSO
- SAGE Vitrification Warming Kit
- MediCult Vitrification Cooling Kit DMSO free
- MediCult Vitrification Warming Kit

Slow Freeze & Warming Kits
- CSC Freezing Medium (Oocytes)
- CSC Thawing Medium (Oocytes)
- ORIGIO Oocyte Thaw
- ORIGIO Embryo Freezing Kit
- ORIGIO Embryo Thawing Kit
- ORIGIO BlastFreeze
- ORIGIO BlastThaw
- SAGE Embryo Freeze Kit
- SAGE Blastocyst Freeze Kit
- SAGE Thaw Kit

Handling Devices
- The Stripper (Standard / BP / CC / PGD)
- RI EZ-Range (RI EZ-Grip, RI EZ-Strip, RI EZ-Squeeze, RI EZ-Tip)
- IVF Pasteur Pipets
- The Stripper Tips (Individual or Multi Pack)

Workstations – Class I
- K-Systems 100 Series (L124 / L124 ICSI/ L126 MP)*
- ORIGIO Fortuna
- ORIGIO Titan

Workstations – Class II
- K-Systems L234 CellTouch*
- K-Systems G603 Work Chamber*
- ORIGIO Mars

Micromanipulator
- Integra 3 Micromanipulator

Laser
- Saturn 5 Laser System

Security & Management
- RI Witness

Embryo Biopsy

Handling Devices
- The Stripper (Standard / BP / CC / PGD)
- RI EZ-Range (RI EZ-Grip, RI EZ-Strip, RI EZ-Squeeze, RI EZ-Tip)
- IVF Pasteur Pipets
- The Stripper Tips (Individual or Multi Pack)

Micropipettes
- ORIGIO Biopsy and Holding Pipettes
- TPC Biopsy and Holding Pipettes

Media
- ORIGIO SynVitro Hyadase
- Biopsy Medium
- Quinn's Advantage medium with HEPES (without Ca/Mg)
- Acidified Tyrodes Solution

Oil
- ORIGIO Liquid Paraffin
- SAGE Oil

Micromanipulator
- Integra 3 Micromanipulator

Laser
- Saturn 5 Laser System

Workstations – Class I
- K-Systems 100 Series (L124 / L124 ICSI/ L126 MP)*
- ORIGIO Fortuna
- ORIGIO Titan

Workstations – Class II
- K-Systems L234 CellTouch*
- K-Systems G603 Work Chamber*
- ORIGIO Mars

Genetic Testing
- PGD
- PGS
- MitoGrade
- Genetic Counseling

Security & Management
- RI Witness

Transfer

Genetic Testing
- PGD / PGS Testing Results
- NIPT

Transfer Catheters
- Wallace Classic Catheter Range
- Wallace Sure View Range
- Wallace Sure-Pro Range
- Wallace Sure-Pro Ultra Range
- ORIGIO Transem Classic Catheter Range*
- ORIGIO EchoGen Ultrasound Range*
- ORIGIO Spherical Tip Catheter*
- ORIGIO Angled Catheter*
- ORIGIO Soft Catheter*
- ORIGIO Supported Catheter*

Security & Management
- RI Witness

Availability of a device for clinical use is dependent on the regulatory approval status within the country the device is intended to be sold into.

For queries and feedback

Information & Pictures are Copy Righted by Education Committee Indian Fertility Society, India
No Conflict of Interest and the Bulletin is being brought out by Education Grant by Origio India Pvt. Ltd.

Dr (Prof) Pankaj Talwar
Editor Nexus
Secretary General - Indian Fertility Society
E: pankaj_1310@yahoo.co.in, M: +91 9810790063