

Infertility

Infertility is defined as the inability of a couple to conceive after 1 year of frequent unprotected intercourse without contraception

Subfertility : diminished capacity to conceive

Fecundability is defined as the probability of achieving a pregnancy within one menstrual cycle, (in normal couples the chance of conception after 1 month is approximately 25%).

- **Sterility:** Inability to conceive or produce offspring.
- **Huhner test:** postcoital examination to evaluate sperm and cervical mucous.
- **Artificial insemination:** introduction of viable semen into the vagina by artificial means for the purpose of impregnation.

INFERTILITY

The inability to conceive following
unprotected sexual intercourse
1 year (age < 35) or 6 months (age
>35)

Affects 15% of reproductive couples
6.1 million couples

Both Men and women affected

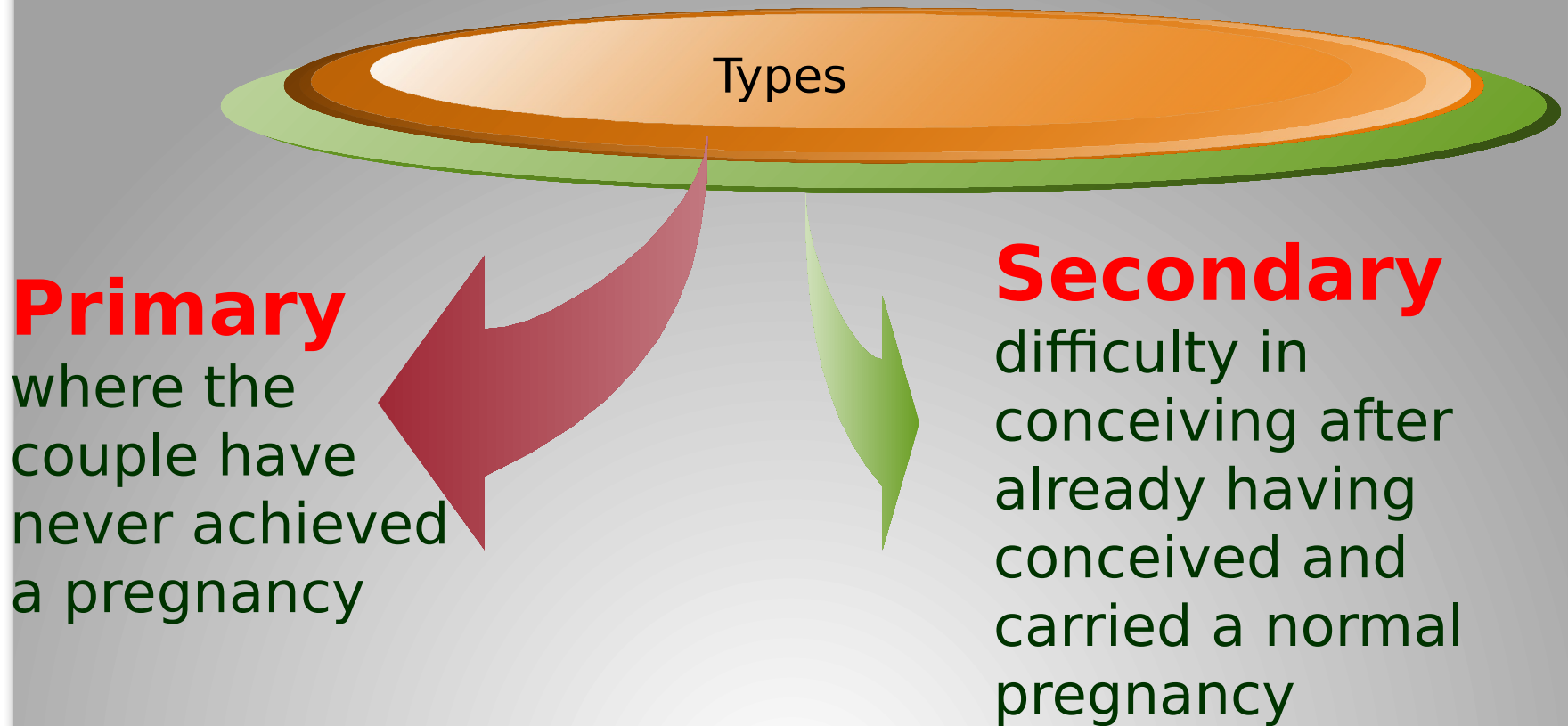
- Production of healthy egg and sperm
- Unblocked tubes that allow sperm to reach the egg
- The sperms ability to penetrate and fertilize the egg
- Implantation of the embryo into the uterus
- Finally a healthy pregnancy

REQUIREMENTS FOR CONCEPTION

INFERTILITY

- Reproductive age for women
 - Generally 15-44 years of age
 - Fertility is approximately halved between 37th and 45th year due to alterations in ovulation
 - 20% of women have their first child after age 30
 - 1/3 of couples over 35 have fertility problems
 - Ovulation decreases
 - Health of the egg declines
- With the proper treatment 85% of infertile couples can expect to have a child

TYPES



INFERTILITY: ATTRIBUTING CAUSES IN

- **Female** **58%**
- **Male** **25**
- **Unknown** **17%**

AETIOLOGY OF INFERTILITY

- Male factor
 - Systemic factor: age above 45 yr, smoking, alcoholism
 - Endocrinopathy: hypothalamic pituitary dysfunction, hypothyroidism
 - Primary testicular d/o
 - Coital difficulty
 - Sexual dysfunction ,
 - Low-frequency coitus-wrong time.
 - Impotence, hypospadias, decreased libido.
 - Premature ejaculation.
- Psychological: psychiatric illness

- Immunological:
 - sperm autoagglutination,
 - Sperm acrosome defect.
 - Zona pellucida binding defect.
 - Zona penetration defect.
 - Oocyte fusion defect
- Genital: defective spermatogenesis, undescended testis, mumps, hydrocele
- Genital duct obstruction and infection

Male factor

- Inadequate sperm production
- Failure of ovulation
- Abnormility in female genital tract

COMBINED MALE AND FEMALE FACTOR

Investigation on male

- **History.** History includes age of the man, previous children, duration of infertility and for how long.
 - The coital frequency and timing.
 - The occupation-
 - Habit of smoking, alcohol, tobacco, drugs.
 - Fever of any cause can suppress spermatogenesis for as long as 6 months.
 - Operation on the hernia or scrotum.
 - Any coital problem like premature and failure to ejaculate.

- Abnormalities of Spermatogenesis

- 40% of the cause for infertility
- Sperm is constantly produced by the germinal epithelium of the testicle
 - Sperm generation time 73 days
 - Sperm production is thermoregulated
 - ▮ 1° F less than body temperature
- Both men and women can produce anti-sperm antibodies which interfere with the penetration of the cervical mucus

MALE FACTOR

- Obtained by masturbation
- Provides immediate information
 - Quantity
 - Quality
 - Density of the sperm
- Abstain from coitus 2 to 3 days
- Collect all the ejaculate
- Analyze within 1 hour
- A normal semen analysis excludes male factor 90% of the time

Semen Analysis (SA)

- Volume: 1.5-5.0 ml
- pH: >7.2
- Viscosity: <3 (scale 0-4)
- Sperm concentration: >20 million/ml
- Total sperm number: >40 million/ejaculate
- Percent motility: >50%
- Forward progression:

Normal Values for SA

- Repeat semen analysis in 30 days
- Physical examination
 - Testicular size
- Laboratory tests
 - Testosterone level
 - FSH (spermatogenesis- Sertoli cells)
 - LH (testosterone- Leydig cells)

Evaluation of Abnormal SA

Management

- 1** Education. This involves: (i) sexual counselling-coital frequency and timing, (ii) coital position
- 2.** Substance abuse. Advice on avoidance
- 4.** Correct endocrinopathies. Prompt attention to diabetes and thyroid disorders.
- 5.** Surgical
- 6** antibiotics

- 7 Hormones. Testosterone, pituitary hormones and GnRH improve spermatogenesis with variable results. Bromocriptine is useful in hyperprolactinaemia
- 8 Artificial insemination

- Severe endometriosis
- Pelvic Inflammatory Disease (PID)
- Ovulation disorders
- Elevated prolactin
- Polycystic ovary syndrome (PCOS)
- Cervical factor
- Benign uterine fibroids
- Pelvic adhesions
- Any physical obstruction

FEMALE FACTOR

Other causes

- Medications
- Thyroid problems
- Cancer and treatment
- Other medical conditions

Fertilization problems

- Anti-sperm antibodies (ASA)
- Oocyte membrane proteins

Immune Infertility

- The developing embryo may be miscarried due to the mother's immune system recognizing it as a "foreign body" and attacking it.
- Also, the woman may produce anti-sperm antibodies (ASA) to her partner's sperm.
- ASA neutralize sperm by clumping them together and destroying their membranes.
- They also coat over receptors involved in sperm-egg binding and fertilization.
- An estimated 12 to 15 percent of unexplained infertility in women is linked to ASA.

- Evaluation of Ovulation

- Ovulation occurs 13-14 times per year
- Menstrual cycles on average are Q 28 days with ovulation around day 14
- Luteal phase
 - dominated by the secretion of progesterone
 - released by the corpus luteum
- Progesterone causes
 - Thickening of the endocervical mucus
 - Increases the basal body temperature (0.6° F)
- Involution of the corpus luteum causes a fall in progesterone and the onset of menses

Menstruation

- A history of regular menstruation suggests regular ovulation
- The majority of ovulatory women experience
 - fullness of the breasts
 - abdominal bloating

Ovulation

- Serum progesterone
 - After ovulation rises
 - Can be measured
- Urinary ovulation-detection kits
 - Measures changes in urinary LH
- Basal body temperature
 - Inexpensive
 - Predicts ovulation but does not confirm it

Diagnostic studies to confirm Ovulation

- Excellent screening tool for ovulation
- Temperature
 - drops at the time of menses
 - rises two days after the luteinizing hormone (LH) surge
- Ovum released one day prior to the first rise

Basal Body Temperature

- Anovulation

- Irregular menstrual cycles
- Amenorrhea
- Acne

Symptoms

- Follicle stimulating hormone
- Lutenizing hormone
- Thyroid stimulating hormone
- Prolactin
- Total testosterone

Evaluation*

- The female genital tract is not just only a conduit
 - facilitates sperm transport
 - cervical mucus traps the coagulated ejaculate
 - the fallopian tube picks up the egg
- Fertilization must occur in the proximal portion of the tube
 - the fertilized oocyte cleaves and forms a zygote

enters the endometrial cavity at 3 to 5

Sperm transport, Fertilization, & Implantation

- Acute salpingitis
 - Alters the functional integrity of the fallopian tube
 - ▮ *N. gonorrhea* and *C. trachomatis*
- Intrauterine scarring
 - Can be caused by curettage
- Endometriosis, scarring from surgery, tumors of the uterus and ovary
 - Fibroids, endometriomas

Acquired Disorders

- ❑ Both partners should be present
- ❑ Most important part of infertility evaluation
- ❑ A thorough history is taken on both partners

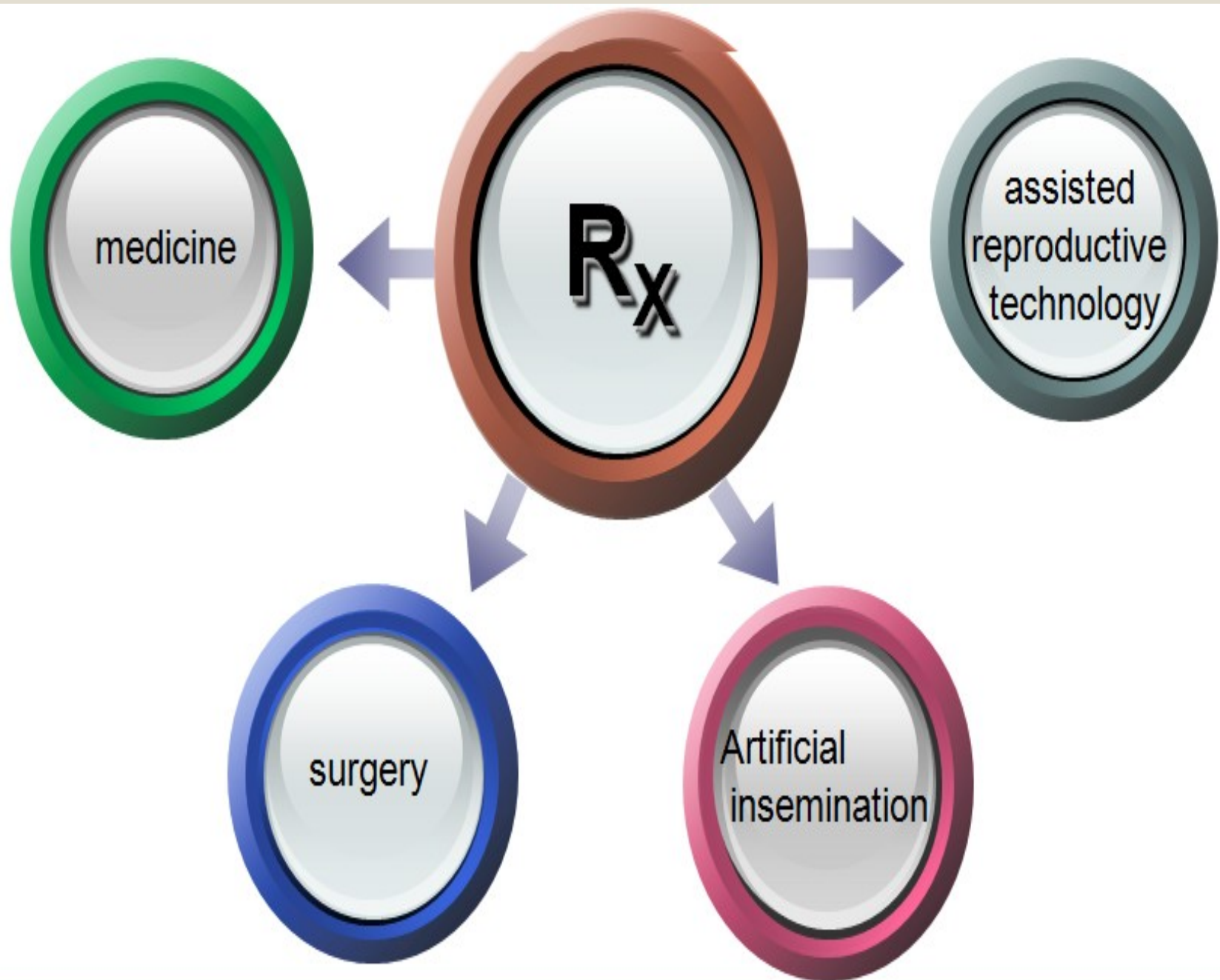
Assessment of Female history

- ❑ Fertility history: duration of infertility
- ❑ Obstetric history: number and outcome of previous pregnancies, postpartum or miscarriage complications
- ❑ Menstrual history: age at menarche, regularity, duration and amount of bleeding, abnormal bleeding.

Assessment History taking

- ❑ Contraceptive history.
- ❑ History of medical illnesses.
- ❑ Personal history: smoking, alcohol, drug abuse.
- ❑ Sexual history: knowledge, frequency, dyspareunia,
- ❑ Gynaecological history: PID, STI.
- ❑ History suggestive of ovulatory disorders: exercise, cyclical pelvic pains, hot flushes, hirsutism, stress, eating disorders.

History taking



Medical treatment

- **Clomiphene citrate (*Clomid*):**
causes ovulation by acting on the pituitary gland. It is often used in women who have problems with ovulation.
- **progesterone:**
IF infertility due to inadequate luteal phase.
- **Follicle-stimulating hormone (FSH):**
causes the ovaries to begin the process of ovulation.
 - FSH works by stimulating maturation of egg follicles the ovaries

Medical treatment

- **Gonadotropin-releasing hormone (GnRH) analog:**

used for whom don't ovulate regularly or ovulate before the egg is ready. stimulates the follicle to release its egg (ovulate).

- **Bromocriptine:** for ovulation problems due to high levels of prolactin.

- **Metformin (Glucophage).** This oral drug is taken to boost ovulation. It's used when insulin resistance is a known or suspected cause of infertility.

- Restore ovulation
 - Administer ovulation inducing agents
- Clomiphene citrate
 - Antiestrogen
 - Combines and blocks estrogen receptors at the hypothalamus and pituitary causing a negative feedback
 - Increases FSH production
 - ▮ stimulates the ovary to make follicles

Anovulation

- Given for 5 days in the early part of the cycle
- Maximum dose is usually 150mg
 - ▮ 50mg dose - 50% ovulate
 - ▮ 100mg -25% more ovulate

No changes in birth defects If no pregnancy in 6 months refer for advanced therapies

- ▮ 7% risk of twins 0.3% triplets

Clomid

Superovulatory Medications

- If no response with clomid then gonadotropins- FSH (e.g. pergonal) can be administered intramuscularly
 - This is usually given under the guidance of someone who specializes in infertility
- This therapy is expensive and patients need to be followed closely
- Adverse effects
 - Hyperstimulation of the ovaries
 - Multiple gestation
 - Fetal wastage

- ***Gonadotropins*** are highly effective for ovulation induction in women with hypogonadotropic hypogonadism
- are used to induce multiple follicular recruitment in unexplained infertility and in older reproductive-aged women.
- FSH is the key component, the addition of some LH (or human chorionic gonadotropin) may improve results, particularly in hypogonadotropic patients.

- Tuboplasty
- Myomoectomy
- Adeholysis
- If fallopian tube is beyond repair one must consider IVF

Surgical tx

- **Assisted reproductive techniques are usually used after other techniques to treat infertility have failed.**
 - **In-vitro fertilization**
 - **GIFT (gamete intrafallopian transfer)**
 - **ZIFT (zygote intrafallopian tube transfer)**
- ART**

- ART refers to all techniques involving direct retrieval of oocytes from the ovary
- ART procedures include IVF, GIFT, ZIFT, and ICSI.
- The simplest ART procedure, IVF has been around for over 20 years and is perhaps the most commonly recognized ART of all procedures.

- Women with tubal diseases
- Unexplained infertility
- Endometriosis
- Immunologic causes for infertility
- Women with premature ovarian failure
- Individuals with male factor infertility (e.g., abnormalities in sperm production, function or transport or prior vasectomy)

Who is eligible for ART

- ZIFT
- GIFT
- TEST
- POST
- ICSI
- TESE

techniques

ZIFT

- Zygote Intrafallopian Transfer. ZIFT may be recommended if the husband has severe male fertility factor or if there has been difficulty confirming fertilization with past procedures. ZIFT has the advantages of allowing fertilization to be confirmed and it has demonstrated higher success rates than IVF
- One disadvantage with ZIFT is that the transfer of the zygote must be performed through a laparoscope.

IVF

- **In-vitro fertilization**
- drug to induce the simultaneous release of many eggs which are retrieved surgically.
- several semen samples are obtained from the male
- The ova and sperm are then combined in a laboratory, where several of the ova may be fertilized.
- Cell division is allowed to take place up to the embryo stage.
- During this, the female may be given drugs to prepare her uterus
- Three or four of the embryos are transferred to the female's uterus.

ivf

- IVF may be used to overcome female infertility in the woman due to problems of the fallopian tube, making fertilization *in vivo* difficult. It may also assist in male infertility, where there is defect sperm quality, and in such cases intracytoplasmic sperm injection (ICSI) may be used, where a sperm cell is injected directly into the egg cell. This is used when sperm have difficulty penetrating the egg, and in these cases the partner's or a donor's sperm may be used. ICSI is also used when sperm numbers are very low.

- to be successful it typically requires healthy ova, sperm that can fertilise, and a uterus that can maintain a pregnancy. Due to the costs of the procedure, IVF is generally attempted only after less expensive options have failed.

IVF

- IVF can also be used with egg donation or surrogacy where the woman providing the egg isn't the same who will carry the pregnancy to term. This means that IVF can be used for females who have already gone through menopause. If the fertilisation is successful, the embryo will be transferred into the uterus, within which it may implant.

ivf

- Ovarian hyper stimulation
- transvaginal oocyte retrieval
- Egg and sperm preparation
- Fertilisation
- Embryo transfer

method

● GIFT

- Gamete intrafallopian transfer was developing in 1984 as a variation of in vitro fertilization (IVF).
- Gift is recommended when
 - unexplained infertility
 - infertility due to immunological factors
 - selected cases of male infertility
 - Tubal infertility
- A requirement for the procedure is that the female partner having at least one open (patent) fallopian tube.

GIFT

- GIFT is an assisted reproductive procedure that involves the following steps:
- A woman's ovaries are stimulated with medications to increase the probability of producing multiple eggs.
- Eggs are collected through an aspiration procedure.
- Three to four eggs are immediately mixed with about 200,000 mobile sperm and placed in a special catheter.

- The mixture of eggs and sperm are transferred through a laparoscopic procedure. The catheter is placed in the fallopian tube and the egg/sperm mixture is injected.
- The last step is to watch for early pregnancy symptoms. fertility specialist will probably use a blood test to determine if pregnancy has occurred.

- GIFT is an assisted reproductive procedure which may be the selected form of treatment for any infertility problems except the following:
- Tubal blockage
- Significant tubal damage
- An anatomic problem with the uterus, such as severe intrauterine adhesions.

Who should be treated with GIFT?

● TEST

- Tubal Embryo Transfer; the placing of cleaving embryos into the fallopian tube.

ICSI

Intracytoplasmic sperm injection, or ICSI, was developed to treat couples who previously had a very poor probability of achieving fertilization due to the male partner's extremely low numbers of viable sperm. This treatment, when combined with in vitro fertilization, allows these couples a more favorable probability of achieving conception.

MESA

Microsurgical Epididymal
Sperm Aspiration

TESE

Testicular Sperm
Extraction

Thank

you.....

