Infertility

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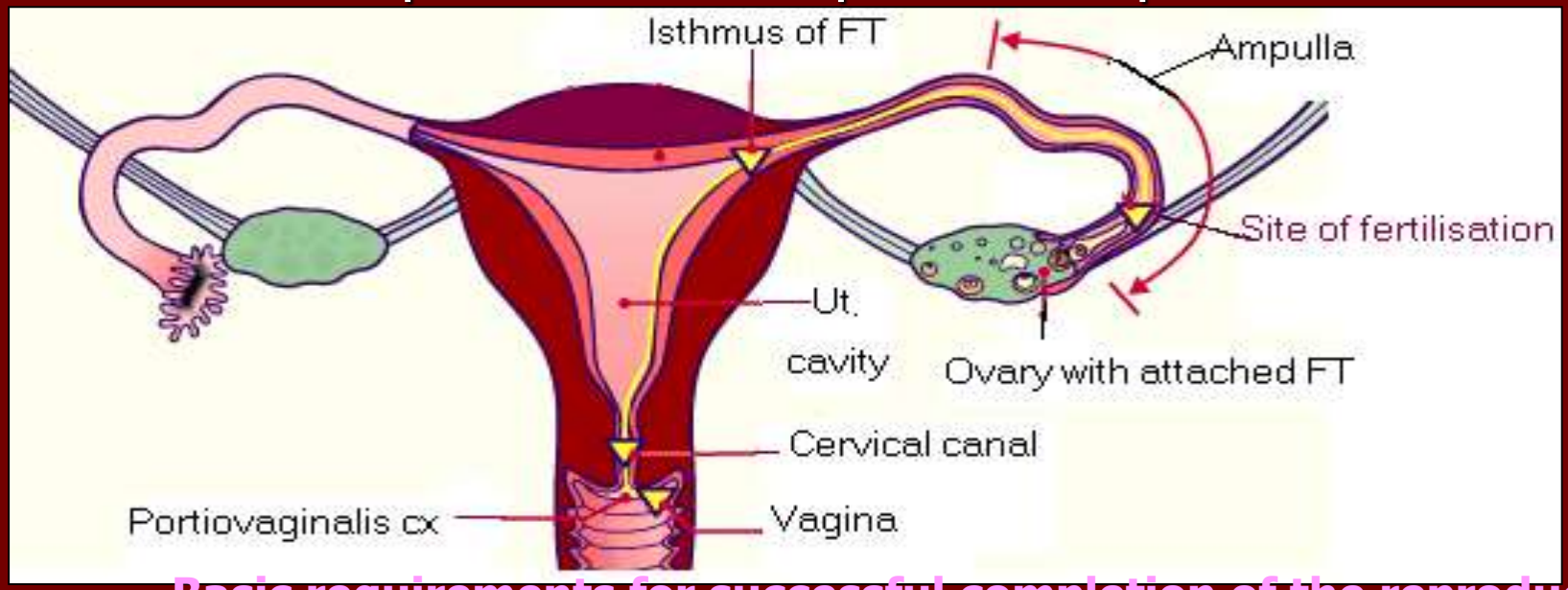
Definitions:

Fecundity	is the ability of a man and a woman to reproduce
Fertility	is the ability to conceive
Infertility	is failure to conceive after one year of unprotected regular sexual intercourse with average frequency (2-3 times / week)
Primary infertility	refers to patients in whom pregnancy had never occurred before
Secondary infertility	indicates that there has been a previous pregnancy, regardless of the outcome , whether the pregnancy had ended in abortion , delivery or even ectopic pregnancy, secondary infertility is considered after 1 year following labour provided that the mother not nursing her baby or 3 years for mothers nursing her baby.
Sterility	is an absolute inability to conceive

Incidence: 10 - 15% of all married couples worldwide

The fertility index (the sum of fertility of both partners). If the fertility index = 100 (10 for male &10 for female), the couple gets a pregnancy in the 1st or second month of marriage. If the fertility index is less than 60, no pregnancy will occur except after investigation & treatment.

Physiology of conception: The basic requirements for successful completion of the reproductive process are:



Basic requirements for successful completion of the reproductive process

Physiology of conception (cont.)

1. Deposition of spermatozoa in the female reproductive tract near the external cervical os.
2. Production of an ejaculate containing an ample number of good quality motile spermatozoa.
3. Migration of the spermatozoa through the female reproductive tract to the fallopian tubes
4. Release of ova from the ovaries (ovulation) on a regular cyclic basis.
5. Ovum pick-up by the fimbrial end of the fallopian tube.
6. Condition appropriate for fusion of gametes within the fallopian tube.
7. Patent and physiologically functioning fallopian tube.
8. Normal uterine environment to enable active movement of spermatozoa capable of fertilizing an ovum and nidation of the fertilized ovum.

Factors involved in fertility:

1- Spermatogenesis **(male factor)**.

2- Ovulation **(ovulation factor)**.

3- Mucus and sperm interaction **(cervical factor)**.

4- Endometrial integrity and cavity size and shape **(uterine factor)**.

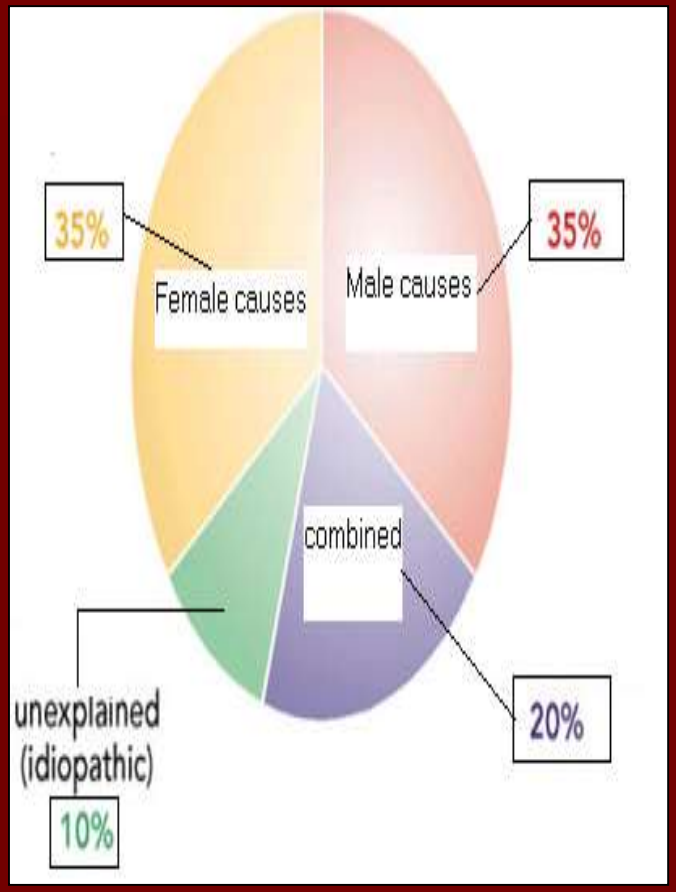
5- Oviductal patency and anatomic relation to the ovary **(tubal factor)**.

6- Insemination **(coital factor)**.

Causes of infertility:

Infertility can result from one or more causes in the male and/or the female

- Primary male factors 30 - 40%.
- Primary female factors 30 - 40 %.
- Combined male and female factors 20%.
- Cause remain unknown (unexplained infertility) in about 10%.



Causes of infertility

Male causes: (30- 40%)

A)Poor quality of semen:

1- Defective spermatogenesis : due to

- Hypothalamic disturbance.
- Pituitary diseases.
- Testicular defects.

2- Defective quality of spermatozoa : as

- ↑ Abnormal form of sperms(teratospermia) (>30%)
- ↓ Motility (Athenospermia)
- Necrospermia.(dead sperm)
- ↑ Viscosity of the seminal fluid.

Due to:

- Undescended testicles.
- Varicocele.
- Addiction
- Infection.
- Chronic debilitating diseases & chronic poisoning(lead).

Male causes (cont.)

3- **Obstructive lesions:** → azospermia (complete absence of sperm) due to
- Epididymitis, vasectomy, absence or ligation of vas deferens.
- Ejaculatory duct infection.

4- **Infection :**
- Prostatitis, vesiculitis due to gonorrhea, mycoplasma or chlamydia.
- Bacteria or pus in seminal plasma affect the motility of spermatozoa as well as their ability to fertilize the oocytes.

5- **Drugs:** e.g. Opiates, marjuana, cimetidine, nitrofurantoin, anti-inflammatory drugs and anabolics.

B (Defective cervical insemination :

- Impotence or premature ejaculation.
- Advanced hypospadius.
- Severe obesity

Female causes: (30- 40%)

A (Causes detected by history& examination:

*General causes :

- **Age:** Fertility declines with advancing female age. The prevalence of infertility reaches 25% in women in their late thirties with rapid decline of fertility after the age of forty.
- **Weight:** Fertility will be reduced by overweight . It is unclear whether it is the weight that is an independent factor or whether other factors such as polycystic ovary syndrome (PCOS) result in both the infertility and excess weight. At the other extreme, if the patient is under the ideal weight , she is more likely to have anovulation problems.

- **Debilitating disease.**
- **Frigidity.**
- **Psychological (anxiety & tension).**
- **Smoking Cigarette:** has an adverse effect on female and male fertility
- **Excessive exercise:** (ovarian dysfunction in competition female athletes).

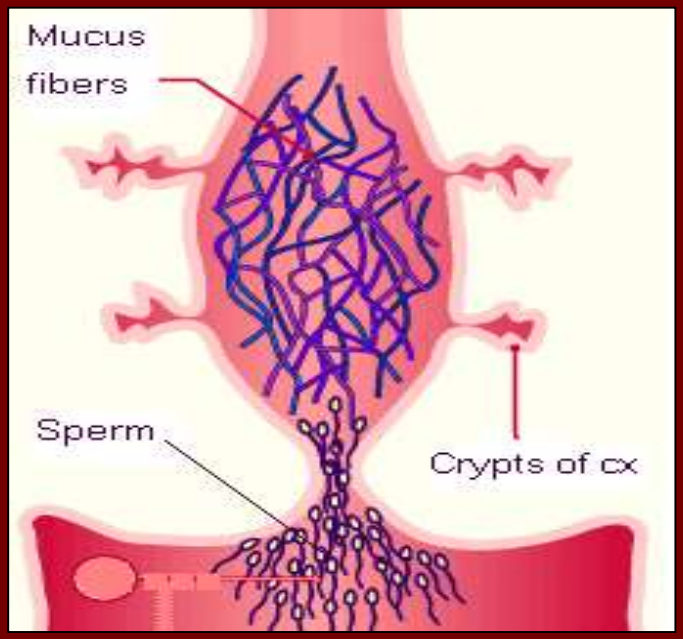
*__Gross pelvic lesions:__

- **Congenital:** (rigid hymen, stenosed cervix, uterine aplasia or hypoplasia).
- **Acquired:** Vaginitis, cervicitis, PID, endometriosis and fibroids (large & block the tubes).

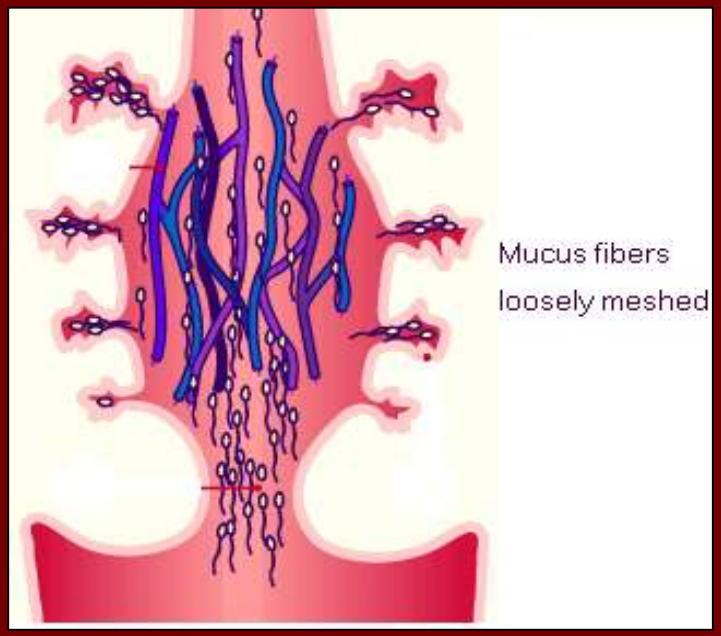
N.B. RVF uterus and fertility: about one woman in five has a uterus that tilts backwards. It was believed that a retroverted uterus was associated with infertility. It is now recognized that women with retroverted uterus are not less fertile than those with an anteverted uterus.

B (Causes detected by investigations:

1- Cervical factor of infertility: (5 - 10%)



Cervical mucus before ovulation



Cervical mucus at the time of ovulation

- ## Role of the cervix in human reproduction:

  The cervix uteri produces the cervical mucus which is thin, clear, copious and watery at the time of ovulation. It has the following functions:

  a- Neutralization of vaginal acidity which gives protection for the sperms.

  b- Nutrition of the sperms (rich in glucose, fructose and amino acids).

  c- Filter for the sperms.

  d- Reservoir for the sperms.

- ## Cervical causes of infertility include:

  a- Hostile cervical secretion e.g cervicitis→ kill the sperm.

  b- Dry cervix as following cauterization & amputation.

  c- Obstruction of the cervical canal by small fibroids.

  d- Immunological infertility → agglutination of the sperms due to antisperm antibodies

2- Tubal factor of infertility: (50 - 60%)

- This is the commonest cause of female infertility.
- The tubes should be patent and biologically functioning with normal cilia & peristalsis.
- Obstruction, narrowing or kinking of the tubes or more commonly peritubal adhesions that alter the tubo - ovarian relationship can be caused by:
  - a- P.I.D & S.T.D especially gonococcal & chlamydial infections (usually distal obstruction).
  - b- Pelvic endometriosis(usually proximal obstruction).
  - c- Previous pelvic surgery.
  - d- Pelvic T.B.
  - e- Previous ectopic pregnancy

3- Endocrine factors (Anovulation): (30 - 40%)

Four groups according to WHO:

a- Hypothalmic-pituitary dysfunction as PCOD → less favorable prognosis

b- Hypothalmic-pituitary failure → good prognosis

c- Ovarian failure → very poor prognosis.

d- Hyperprolactinemia due to ↑ PRL (without or with a space occupying lesions, good prognosis).

4- Uterine factor : (15 - 25 %)

A) Congenital:

- Mullerian agenesis " Rokytanisky syndrome ".
- Severe degree of hypoplasia.
- Congenital fusion defects as unicornuate, bicornuate, septate & subseptate uteri. Fusion defects usually cause repeated pregnancy wastage & not primary infertility.

B) Acquired:

- Trauma as Asherman's syndrome.
- Inflammatory as T.B endometritis.
- Neoplastic → fibroid. Fibroids that are not affecting the cavity of the uterus, probably have no effect on fertility. Uterine fibroids distorting the uterine cavity, however, may perhaps reduce the chance of pregnancy. Also, fibroid may cause compression on the fallopian tubes resulting in a blockage of the passage of sperm or eggs With fibroid, all other causes of infertility should be excluded as the associated tubo-ovarian lesions which are more important than fibroids perse.

Management of the infertile couple :

* When to start infertility investigation?

Infertility investigations are usually started if pregnancy has not occurred after one year. However, if the patient is > 35 years or having an abnormal menstrual cycle history suggesting possible tubal disease, coital difficulties or if she has had infertility problems before , investigations and treatment are started earlier.

*How to proceed: sequential steps

1. History & examination of the wife.
2. History & examination of the husband.
3. Counseling and treatment of gross pelvic lesion
4. Investigation of the husband. (easy,non-invasive,*****)
5. Investigation of the wife.
6. Treatment(only after completion of investigations and diagnosing the cause of infertility)

1) **History and examination of the wife:**

- **Detailed history:**
  - Age: female fertility reaches maximum about the age of 25 and decline sharply after 40
  - Previous pregnancies
  - Length of time without pregnancy
  - Sexual history
    - Frequency and timing of intercourse
    - Use of lubricants, immediate postcoital vaginal douches
    - Impotence, anorgasmia, dyspareunia and vaginismus
    - Contraceptive history
  - Previous female pelvic surgery
  - PID
  - Appendicitis
  - IUD use
  - Ectopic pregnancy history
  - Endometriosis symptoms
  - Irregular menses, amenorrhea, detailed menstrual history
  - Vasomotor symptoms
  - Stress
  - Weight changes
  - Exercise
  - Cervical and uterine surgery

- **Thorough clinical examination:**

  General:: to detect evidence of endocrinopathies such as extreme obesity , hirsutism or poor breast development and thyroid swellings. Breast is examined for galactorrhea, chest, examination.

  Abdominal examination: look for distribution of pubic hair, presence of scars, tenderness or masses

  Pelvic examination: aiming at discovery of local pelvic lesions.

  - Pelvic masses
  - Uterosacral nodularity
  - Abdomeno-pelvic tenderness
  - Abdomeno-pelvic tenderness
  - Uterine enlargement
  - Uterine mobility
  - Cervical abnormalities
  - Abnormal vaginal discharge

2) History and examination of the husband:

- **Detailed history:**
  - Previous marriage & children
  - History of genital infection (orchitis or epididymo–orchitis(
  - History of radiation, toxic exposures (including drugs)
  - History of postpubertal mumps
  - History of testicular surgery/injury
  - History of inguinal herniorrhaphy in childhood
  - Excessive heat exposure (spermicidal)
  - Frequency and normality of sexual act
- **Thorough clinical examination:**

General:

- Observation of general body habitus and limb length to exclude genetic conditions such as klienfelter's syndrome
- Observation of signs of possible inadequate virilization as decreased body hair, gynaecomastia, and eunuchoid proportions.

Local:

- Size of testicles
- Testicular descent
- Varicocoele
- Outflow abnormalities (hypospadias, etc)

3) Counseling and treatment of gross pelvic lesion:

Now, treat any relevant gross pelvic lesion (if detected) or assure the couple if no abnormality is detected.

4) Investigation of the husband: The following tests are used to evaluate the male factor

1- Conventional semen analysis

Semen is collected in sterile container by masturbation or coitus interptus after 2-3 days of abstinence, semen must not exposed to direct sun or extreme cold. Evaluated within one hour of ejaculation, If abnormal parameters, repeat twice, 2 weeks apart

2- Postcoital test.

3- Sperm antibodies (man and woman) impair sperm penetration of cervical mucus.

4- Testosterone level.

5- Serum T, FSH, PRL levels

6- Karyotypic abnormalities.

7- Testicular biopsy: in cases of azospermia to differentiate between testicular lesions and obstructive lesions of vas deference or epididymis. Normal FSH value in an azospermic man with normal testis suggests obstruction

- Sperm count (number of sperm per cc)
- Motility (percentage of sperm moving)
- Sperm morphology

Criteria of normal seminogram:

WHO criteria

Volume	> 1cc
Reaction	Alkaline
Liquefaction	within 30 min
Sperm count	> 20 million/ml
Initial forward motility	> 50% motile after 2hrs
Abnormal forms	less than 50%.
Leukocytes	should be less than 1 million per ml

5) Investigation of the wife:

* Should not be attempted before investigation of the male (semen analysis).
* A minimum of three basic investigations should be done.
  1- Tubal patency tests.
  2- Ovulation detection tests.
  3- Postcoital test.

1- Tubal patency tests:

a- Utero- tubal insufflation (CO_2 pertubation): unreliable and obsolete

I -**Rubin's test:** injection of CO_2 through cervix → uterus → tubes, where patency of one tube at least can be diagnosed if the gas pass into peritoneal cavity when passage of gas through the fimbrial end is heared upon auscultation of the abdomen

ii- **Kymography:** utero tubal insufflation in which kymograph is used to deliver CO_2 at a controlled rate with pressure. Pressure changes (indicating tubal patency) & oscillations (due to tubal peristalsis) are recorded on a revolving drum.

b- Hysterosalpingography (H.S.G):

- Enables visualization of the lumen and patency of fallopian tubes using a radioopaque contrast medium (urografin or lipidol).
- Time and procedure : post menstrual (3–6 days).

– Patient lie on an X-ray table.

– Inject the radioopaque contrast medium into the uterus through a cannula inserted and fixed in the cervical canal. (olive or oil-screw): inject 2ml first to visualize the uterine cavity. Take the 1st film (Hysterography), then inject 8 ml (rest of 10 ml) to distend the uterus. The second film is taken to show the uterus and tubes (fractional HSG. The third film is taken 24 hours later with lipidol (oil based (or 1/2 hour with urographin (watery). If the tubes are patent, the peritoneal spill can be demonstrated

Hysterosalpingography

Hysterosalpingography (H.S.G) (con.):

Contrast media used:

- Urografin, it is water soluble, most widely used but allergy may occur,
- Lipidol, it is 20 - 40% iodine in poppy seed oil, but may produce granuloma.

Advantages:

* Demonstrate the site of lesions.
* Permanent record.
* Diagnose peritubal adhesions, kinking and distortion.

Disadvantages:

- Pain.
- Infection
- Local allergic reaction
- Pelvic peritonitis.
- Foreign body granuloma after injection of oily media.

Hysterosalpingography (H.S.G) (con.):

Contraindications:

- Pregnancy
- Uterine Bleeding
- Lower genital tract infection
- PID
- Allergy to contrast dye

HSG Limitations

- Often does not indicate the exact nature of intrauterine lesions
- False-positive results with regard to cornual occlusion
- Low positive predictive value in the diagnosis of periadnexal adhesions and endometriosis.
- HSG and laparoscopy are complementary.

Uterine polyp with SIS

c- Saline Infusion Sonography (SIS):

- SIS involves transvaginal ultrasonography after the introduction of sterile saline.
- Can be used to evaluate tubal patency by detecting the fluid in Douglas
- Provides accurate information regarding the size and shape of the uterine cavity as well as any polyps, submucosal myomas, synechiae and hydrosalpinges. **Uterine polyp with SIS**

d- Laparoscopy after pertubation with a coloured material:

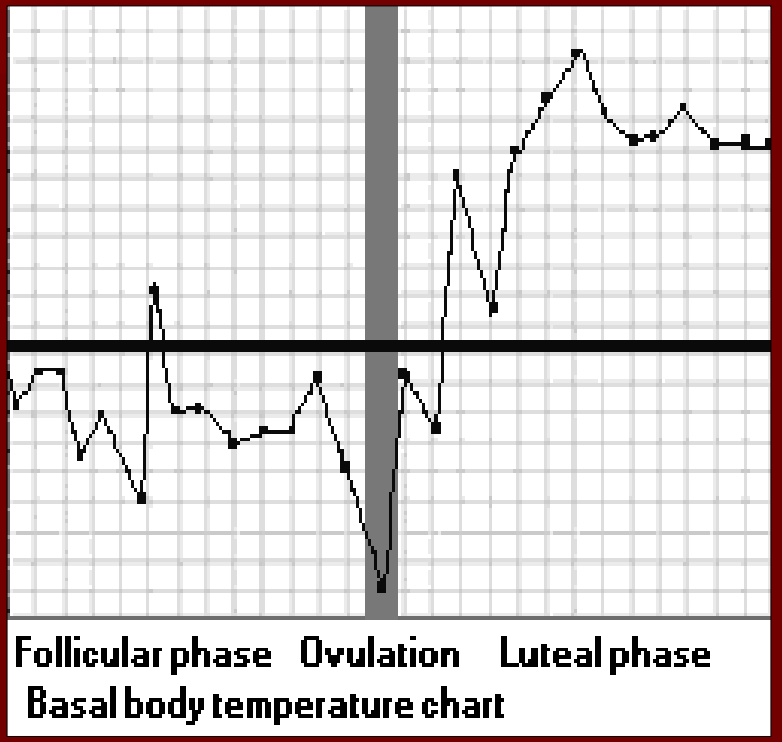
- Usually resorted to after doubtful salpingograms or in cases of unexplained infertility.
- Have additional benefit of visualizing the pelvis to detect adhesions, tubal occlusions and endometriosis. Adhesions can be treated by laparoscopic diathermy, endocoagulation or laser.

2- Ovulation detection tests:

Ovulation may be confirmed in several ways:

* **Basal body temperature chart:** to show the thermogenic effect of progesterone if ovulation occur. A basal temperature chart provides a simple and inexpensive early indication of ovulation.

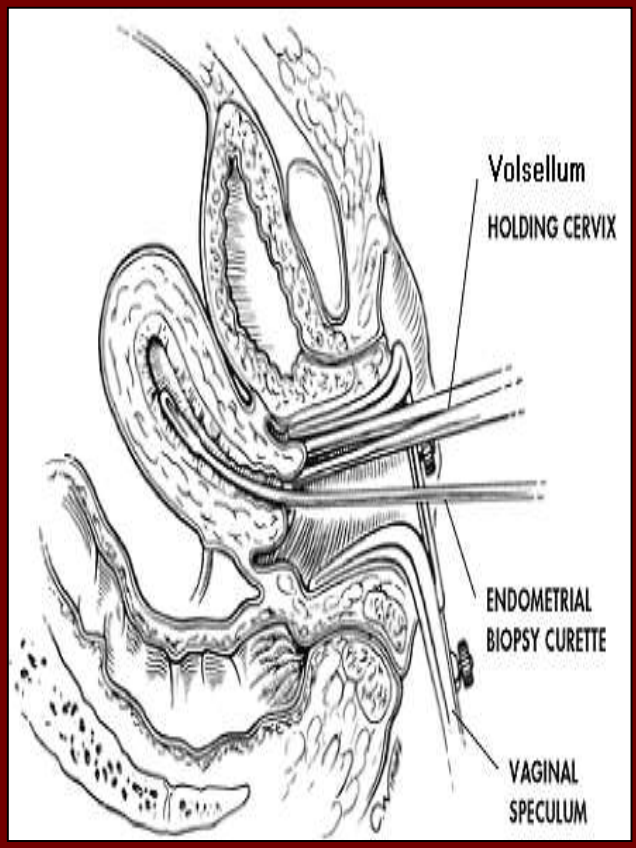
The temperature can be taken daily while women in basal condition (immediately after waking up while in bed) through the whole cycle by mouth with a regular thermometer that should be easy to read. The temperature should be taken before the day's activity begins. Typically, the temperature falls and then rises by 0.5 degrees centigrade around the time of ovulation (biphasic chart. However, biphasic profiles can also be seen with LUF syndrome

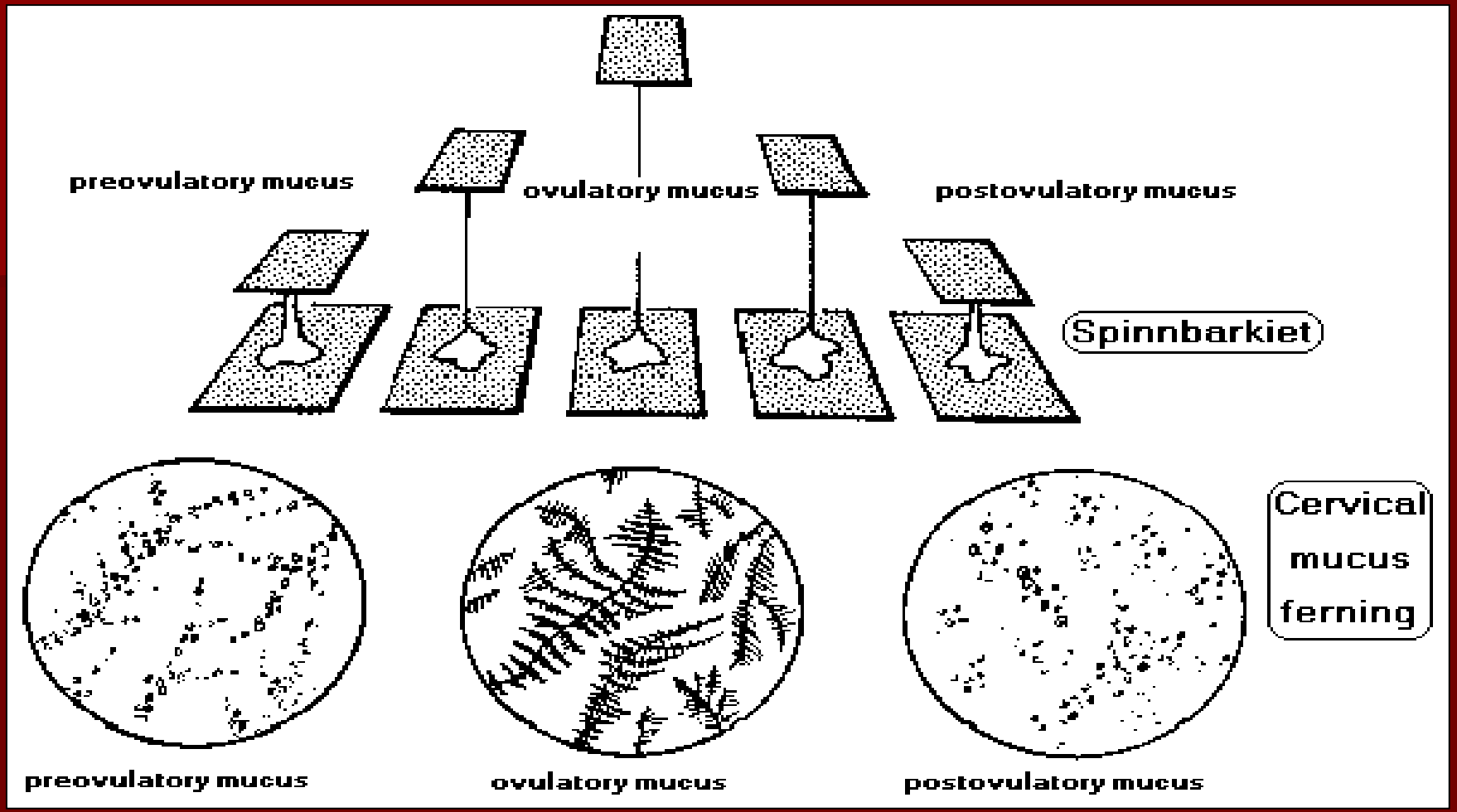


Biphasic chart

Ovulation detection tests (cont.)

* **Premenstrual endometrial biopsy (PEB):** to demonstrate secretory changes (effect of progesterone). Biopsy is taken one day before menstruation or within 6 hours from the onset of menstruation . It is invasive, but the only reliable way to diagnose luteal phase defect. (if lag between chronological and histological dating)
* **Inspection of cervical mucus:**
  - 1st half of the cycle: cervical mucus is copious, clear, watery, elastic, +ve ferning (palm-leaf appearance or dried cervical mucous under microscopy) and +ve Spinnbarkiet (ability to extend cervical mucous long threads up to 10 cm between thumb and index finger).
  - 2nd half: progestational mucus (scanty, viscid, turbid, -ve ferning & -ve Spinnbarkeit

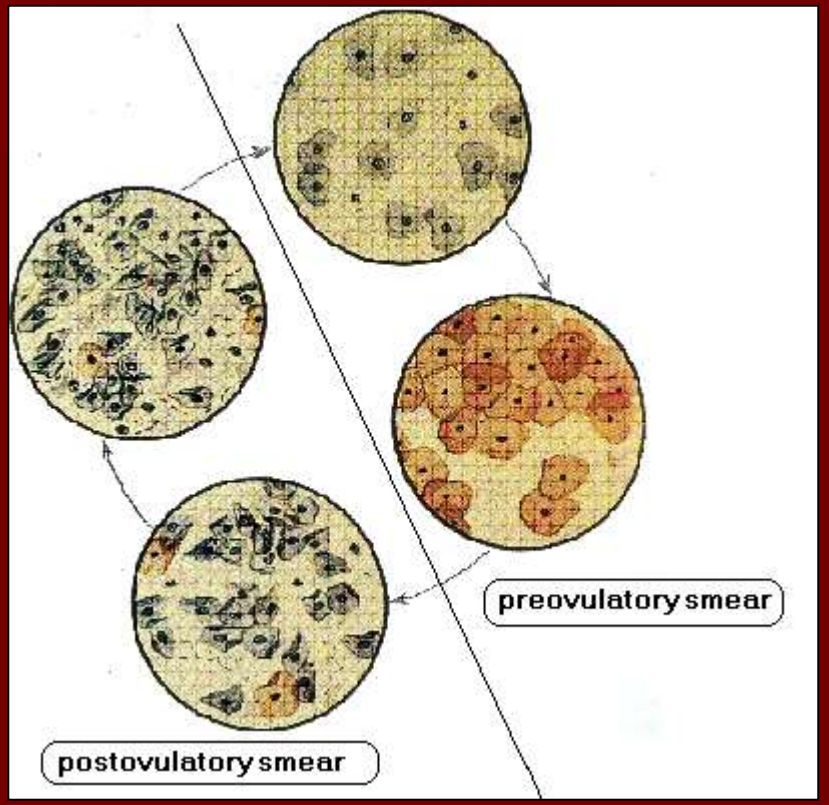




* **Serial vaginal smears :** are taken at 3 or 4 days interval beginning from day 8 and up to day 26 of the menstrual cycle and the cytological patterns of the smears showing an estrogenic pattern in the first half of the cycle (polyhedral cells, acidophilic cytoplasm , piknotic nuclus) and a progesterone pattern in the second half of the cycle is indicative of ovulation (↑number of folded intermediate basophilic cells with vesicular nuclei that tend to aggregates in clumps on a dirty background).

Ovulation detection tests (cont.)

* **Plasma progesterone:** a blood test for progesterone level is a useful guide to ovulation. However, single level may not be useful due to pulsatile release. A result in excess of 5 ng/ml at day 21 or 22 of a 28 day cycle is generally accepted as evidence of ovulation.
* **Ultrasound folliculometry:** ovulation is diagnosed when the dominant follicle (18-25 mm diameter) collapses and may be with appearance of fluid in Douglas pouch.
* **Laparoscopy** →stoma of ovulation with or without corpus luteum.



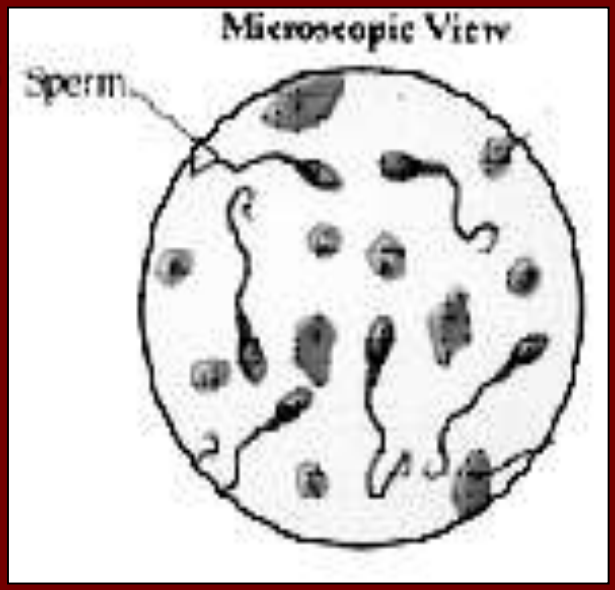
Vaginal cytology

3-Investigation of cervical factor:

* **Postcoital test (PCT):** (Sim's Huhner test)
  - Scheduled around 1-2d before ovulation (increased estrogen effect)
  - 48 hour of male abstinence before test
  - No lubricants
  - Evaluate up to 8-12h after coitus
  - Remove mucus from cervix (forceps, syringe) which is placed on a glass slide and then examined under a microscope

A positive test will show reasonable numbers of actively motile sperm. Indicating good cervical insemination i.e male can probably deposit the semen and the cervical mucous is quite suitable

For surving sperm



PCT (M/E)

Postcoital test

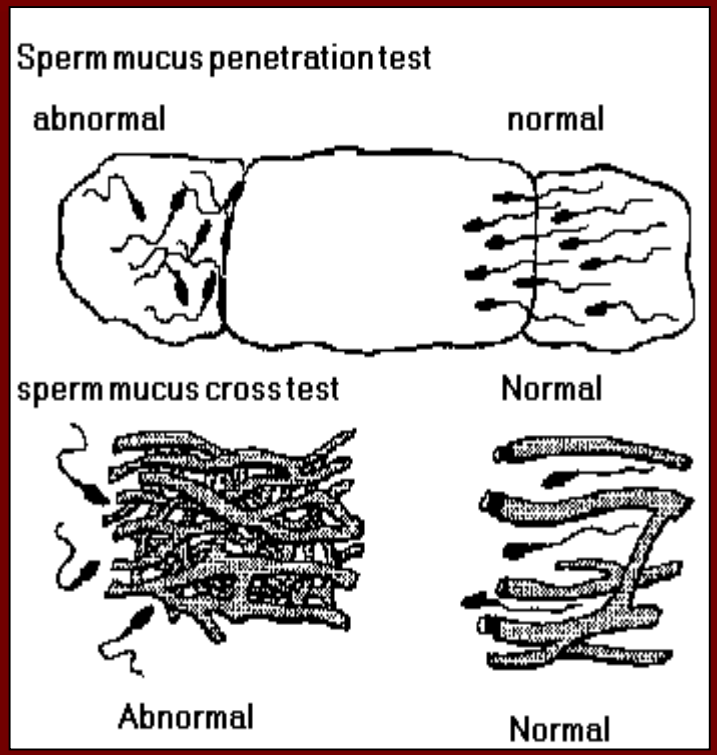
Satisfactory PCT :more than 10 actively motile sperms are seen/ HPF

Unsatisfactory results:

- No spermatozoa.
- Immotile spermatozoa.
- Very few spermatozoa.
- Hostile cervical mucus is present eg ↑ pus cells.

However, there is now debate about the value of postcoital test.

* **In vitro cross testing:** utilizing donor mucus and sperm can indicate the origin of an abnormal PCT. A drop of the partner's sperm and donor sperm are placed on a glass slide in contact with the woman's cervical mucus and also with donor mucus from another woman. Penetration of the mucus is evaluated microscopically.



4- Other investigations: may be done after performing the previous basic investigations to further establish the cause of infertility.

* ***Ultrasonography :** specially TVS can help to diagnose PCO or small myoma

* ***Laparoscopy:**

- Can offer diagnosis and treatment in one sitting
- Usually is considered to be done only in cases of abnormal HSG or in cases of unexplained infertility
- Therapeutic value:
  - Lysis of adhesions
  - excision of endometriosis
  - Myomectomy
  - Tubal reconstructive surgery

Other investigations (cont.)

* **Hysteroscopy:**
  - Definitive method to evaluate the uterine cavity.
  - It can diagnose intrauterine pathology as polyp, submuus myoma and intrauterine adhesions
  - If patients have clear indications for laparoscopy, the addition of hysteroscopy is valid in same sitting

** **Falloposcopy (Salpingoscopy) :** is a visual exam of the inside of the fallopian tubes
  - Hysteroscopic procedure with cannulation of the fallopian tubes
  - Can be useful for diagnosis of intraluminal pathology
  - Promising technique but not yet widespread

* Hormonal assays (day 3):FSH, LH, Prolactin, T3, T4 which may explain ovulatory dysfunction

Unexplained infertility

- 5 -10% of couples
- Consider PRL, laparoscopy, other hormonal tests, cultures, antisperm antibody testing, sperm penetration assay if not done
- Review previous tests for validity
- Empiric treatment:
  - Ovulation induction
  - Intrauterine insemination (IUI)
  - Consider IVF and its variants

Prevention of infertility: some but not all of infertility causes are preventable as:

I- **general advices** female marriage and child bearing should be planned earlier rather than in the latter fertile years. An advice to complete family before 35 years female age.

II- **Prevention and control of genital infection:**

1- Sexually transmitted diseases especially gonorrhea, chlamydia and mycoplasma.

2- Control of non venereal disease as T.B.

3- Immunization of children against Mumps.

4- Prevention & treatment of puerperal & postabortive infections

5- Treatment of appendicitis which lead to pelvic adhesions.

Avoidance of unnecessary pelvic operations: as

- Repeated cervical cauterization.
- Repeated D & C.
- Laparatomy for PCOD (Adhesions).

Follow the precautions that minimize adhesions during pelvic and abdominal operations .

IV- **Early treatment of diseases that may affect fertility:** as:

1- Thyroid disorders.

2- Treatment of severe nutritional disorders & obesity.

V- **Prevention of Male infertility:** avoid

- The use of alcohol, Marijuana & heavy metals.
- Radiation to the genital organs which can cause genetic mutations.
- Heat which ↓ spermatogenesis.

Treatment of infertility:

Goals& principles of Infertility Management:

1. Investigate and correct causes of infertility
2. No treatment except after completed basic investigations & provide diagnosis
3. Remember that 30% of women get pregnant after history taking, examination and investigations. Do not rush for treatment.
4. Provide accurate information and dispel myths
5. Provide emotional support
6- Counsel couples on when to stop

I- Treatment of the husband:

Medical:

- Good diet , vitamins and attention to causative habits as smoking, alcohol and drug addiction
- General tonic.
- Treatment of diabetes.
- Treatment of specific & non specific infection.
- Hormonal agents as testosterone ,C.C, Bromocryptin, Gn RH, HMG, HCG to improve spermatogenesis.
- Cortisone in cases with circulating antisperm antibodies.
- Retrograde ejaculation: ephedrine, imipramine or AIH with recovered sperm

Surgical :

- Varicocelectomy (by ligation of the testicular veins)
- Vasovasotomy.
- Epididymovasotomy.

Assisted conception: by AIH, GIFT, IVF, SUZI, ICSI.

II-Treatment of female causes:

1- Treatment of gross pelvic lesions: Usually overestimated than missed

- Cervicitis: antibiotics
- Asherman syndrome:
  - Hysteroscopic lysis of adhesions (scissor)
  - Postoperative antibiotics, E2
- Fibroids: (rarely need treatment)
  - Myomectomy (hysteroscopic, laparoscopic, open). Developments in minimally invasive surgery and in particular transcervical hysteroscopy allow resection of submucous fibroids
  - ??UAE
- Uterine anomalies: e.g. Double uterus (rarely need treatment): metroplasty
- Cervical stenosis: dilatation and curettage.

2- Treatment of cervical factors:

* High vaginal acidity: precoital alkaline douche.
* Pin hole OS: dilatation.
* Thick cervical mucus: small dose of estrogen in 1st half of cycle.
* Immunological factor:
  - Condom for 1 year.
  - Others: Immuno-suppresion therapy , AIH and IVF

3- Treatment of tubal factor:

a) Non surgical (conservative): traditional therapies that was performed at one time

- Hydrotubation.
- Ultrashort waves.
- Iodine therapy.
- Lysing enzyme.

b) Tubal Surgery:

- The result of tubal surgery are disappointing because even when tubal patency can be restored, the ciliary action of the tube has been damaged.
- Success rate less than 20% (depend on many factors).
- Complications : trauma, failure, ectopic pregnancy 12

Types of tubal surgery:

* **Salpingolysis:** Dissection of adhesions to free the tube and facilitate ovum pickup by laparoscopy or Laparotomy by diathermy or laser beam.
* **Reconstructive tubal surgery:** rarely performed now because the results are very poor
  - Salpingostomy (fimbrial block).
  - Reimplantation (cornual block).
  - End to end anastomosis (mid tubal block).

Pregnancy rate :20 - 75 % . It varies depending upon

- Extent of pelvic adhesions.
- Location of obstruction: Proximal: better. Distal: worst.

c) **In vitro fertilization (IVF) andintracytoplasmic sperm injection (ICSI):** is resorted to if tubal factor with a previous failed tubal surgery.

N.B. IVF provides an alternative to tubal surgery. For mild tubal disease and previous sterilization, tubal surgery is probably the treatment of first choice. With severe tubal disease, IVF carries the better success rate.

4- Treatment of anovulation (see induction of ovulation)

5- Treatment of unexplained infertility: no standardized treatment

The following options are tried:

A) Some advocate no treatment

B) Others treat with ovulation induction therapy such as (Clomiphene, Bromocriptine, gonadotropins) on empirical basis

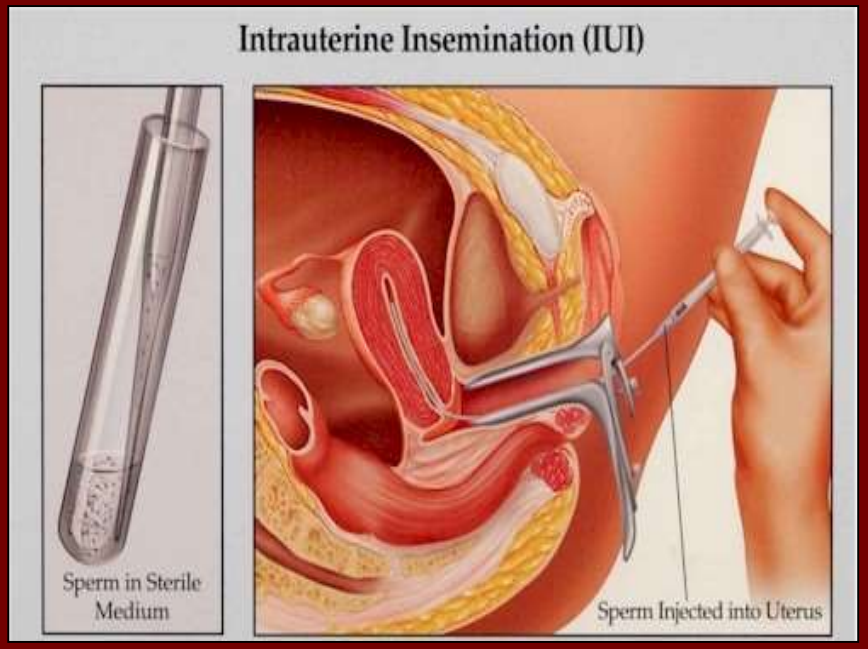
C) Still others try AIH

D) ART may be performed as I.V.F & E.T, GIFT, ZIFT

Assisted reproductive technologies (ART)

Clinical and laboratory techniques that are used to enhance fertility. These revolutionized the field of infertility. They are costly and the success rates per treatment ranges between 20-30%. The most widely used technique nowadays are:

- IUI (intrauterine insemination)
- IVF (in vitro fertilization)
- ICSI (intracytoplasmic sperm injection)



1- Artificial insemination husband (AIH):

- **Indications:**
  - Cervical factor infertility:poor nucus, hostile secretions or mmunological.
  - Olig- asthenospermia.
  - Unexplained infertility.
- **Technique:**

1- Stimulated cycles by monitoring.

2- At the time of ovulation → sperm processing by swim up technique or other and then injection of 0.3 - 0.5c.c of processed semen by special catheter inside the uterus.

2- In vitro fertilization & Embryo transfer (IVF & ET):

- **Indications:**

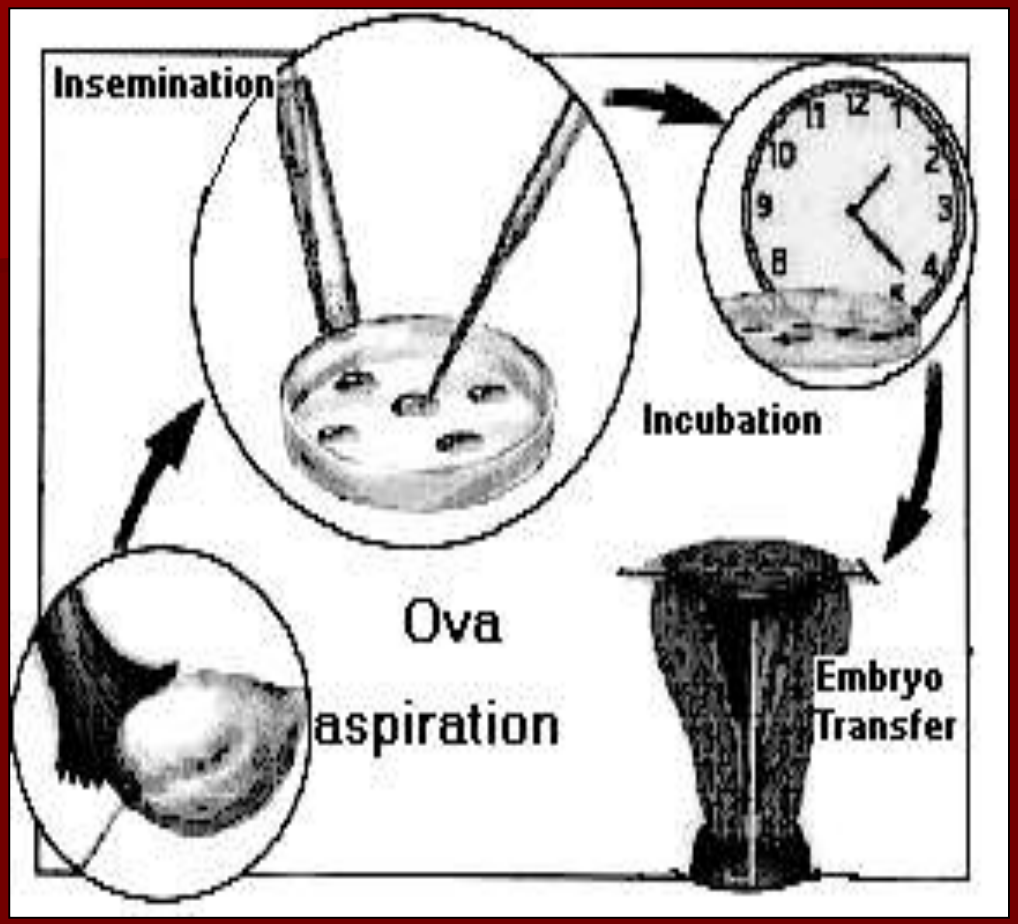
1- Tubal factor. 2- Frozen pelvis.

3- Endometriosis (failed medical & surgical treatment).

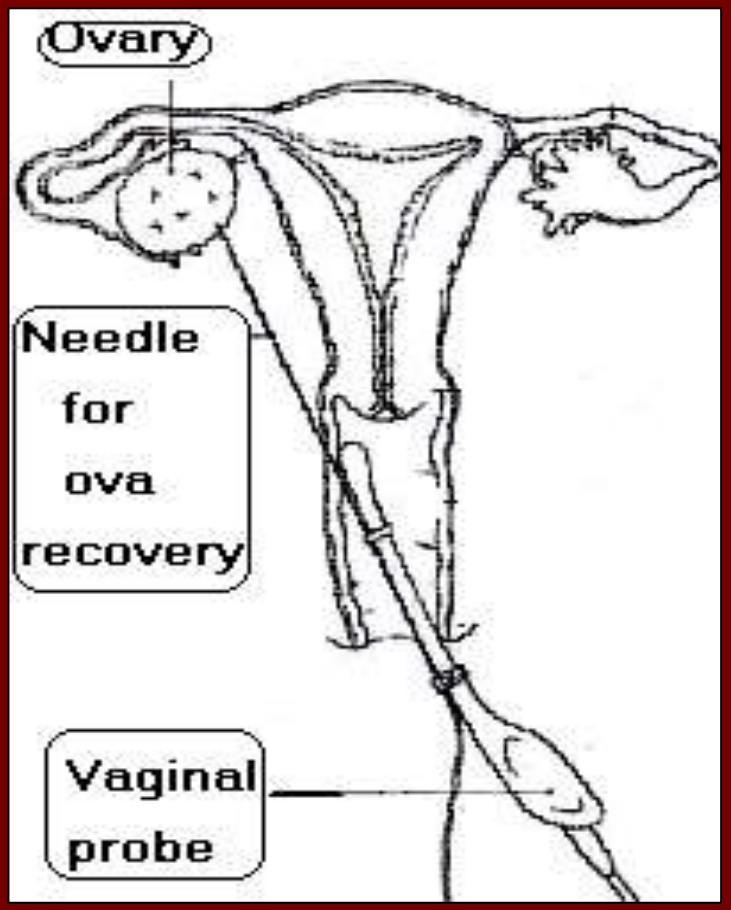
4- Oligo-astheno-spermia after failed AIH.

5- Immunological infertility.

6- Unexplained infertility.



IVF procedure



GIFT procedure

- **Stages of IVF & ET:**

1-Pretreatment screening and proper counseling of the couple about results.

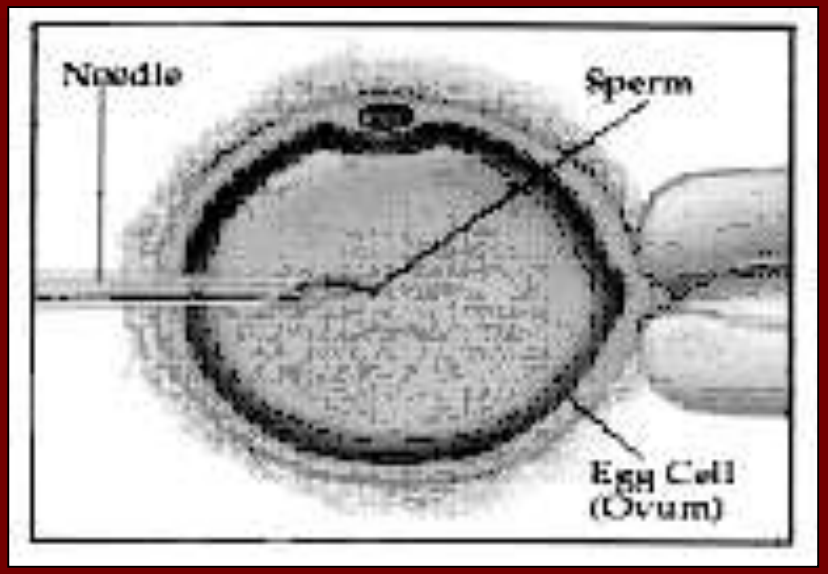
2- Induction of ovulation & ovum monitoring.

3- Recovery of oocytes " oocyte Retrieval " by laparoscopy or sonographic guidance then incubation at 37c° for 4-6 hours. 4- IVF processed semen is added to oocytes till fertilization occurs → left for 36 - 48 hours

(2 - 4 cell stage).

5- Embryo transfer: 3-4 embryos at 2-4 cell stage (through embryo transfer catheter) near the fundus.

6-Monitoring of luteal phase.



Ovum retrieval under U/S guidance

3- Intra cytoplasmic sperm insemination (ICSI): only one sperm is injected inside the cytoplasm of the oocyte by micro-manipulations. Used in cases of valid for IVF and also in cases of severe male infertility eg: sever oligospermia or even azospermia. It gives double success rate rather than IVF

N.B.

Surrogate mothers: These are mothers renting their uteri to women with uterine factor infertility.

Selective embryo transfer: Selective embryo transfer is becoming an option for couples at risk of transmitting an inherited disorder. The embryos are produced by standard IVF techniques. One or two cells are removed (embryo biopsy) from the 6-10 cell embryo and evaluated for the disorder. Only embryos shown to be free of the disorder are transferred into the uterus. Although 25% of the early embryonic cells are removed, the remaining cells have been shown to survive and produce perfectly healthy babies.

The technological advances in IVF such as selective embryo transfer open up potentially serious ethical issues. It is technically possible, for example, to determine the sex of the embryos, which leads to sex selection. A couple may have several boys but no girls and some seek IVF with sex selection. Technically, IVF with embryo selection according to sex is possible although this is a difficult ethical issue that has already engendered debate in the medical literature.

Mismanagement of infertility

A) Mismanagement of investigations:

1- **The male:** We have to remember that the male is the cause of infertility in 30% of causes & shares in another 30%. However semen analysis should be repeated if poor semen pictures are found. Never start treatment for the male except after a poor postcoital test.

2- **Post coital testing:** A poor PCT after 6 hours has to be repeated after 3 hours & should be done at the proper time (preovulatory phase of the cycle).

3- **Anovulation:** don't consider the woman anovulatory except after 3 successive cycles of documented anovulation.

4- **HSG:** High incidence of false positive results especially from tubal spasm. So, never advice tuboplasty except after laparoscopy.

5- **Laparoscopy:** must be done for every case before any ART or tuboplasty is done.

B) Mismanagement of treatment: Never start treatment of a case of infertility without proper diagnosis of the cause of infertility.

1- **Hypoplasia uteri:** Is not a cause of infertility as long as the woman is normally menstruating.

2- **Bicornuate uterus:** Can cause abortion & preterm labor but not infertility. So, don't rush for surgical treatment.

3- **Narrow external os:** Sperms can pass through a very narrow os. No need for cervical dilatation.

4- **RVF:** Rarely if ever a cause of infertility, no need for surgical correction. Knee-chest position for intercourse if there is a poor post-coital test.

5- **Fibroids:** Not always a cause of infertility. So, don't rush for myomectomy which may result in postoperative adhesions → tubal factor infertility.

6- **Ovulation induction:** Don't give ovulatory drugs except when you are sure that, the woman is anovulating for 3 cycle & after exclusion of other cause of infertility.

7- **Luteal phase defects:** Exclude luteal phase defect by PEB or progesterone level.

8- **PCOD:** wedge resection is not resorted to and instead ovarian puncture by diathermy

9- **Tubo plasty:**

- Proper selection of patients.
- Laparoscopic surgery better than laparatomy.
- You have to explain the results to the patient before hand.