

Table of Contents

1. Introduction
2. Reproductive Health Problems and Strategies
3. Amniocentesis
4. Population Stabilisation and Birth Control
5. Birth Control or Contraception
6. Temporary Methods of Birth Control
7. Permanent Methods of Birth Control
8. Images
9. Medical Termination of Pregnancy (MTP)
10. Sexually Transmitted Infections (STIs)
11. Infertility
12. Assisted Reproductive Technologies
13. Test Tube Baby Programme
14. Gamete Intra Fallopian Transfer
15. Intra Cytoplasmic Sperm Injection
16. Artificial Insemination
17. Detection of Fetal Disorders

Introduction

Concepts of Reproductive Health

- Reproductive health means healthy reproductive organs with normal functions.
- Includes physical, emotional, behavioural, and social well-being related to reproduction.
- WHO defines it as total well-being in all reproductive aspects.
- Healthy individuals have normal reproductive organs and positive emotional and behavioural interactions in sexual matters.

Memory Aids

- Reproductive health = Physical + Emotional + Social well-being.
- WHO = Total reproductive well-being.

Quick Checkpoints

- What does reproductive health encompass?
- How does WHO define reproductive health?
- What are the components of reproductive well-being?

Reproductive Health Problems and Strategies

Problems and Government Initiatives

- India initiated national programmes for reproductive health, called Reproductive and Child Health care (RCH) programmes.
- RCH aims to raise awareness on reproductive organs, adolescence, STDs, and secondary sexual characters.
- Key programmes: Maternal and child health services, family planning.
- Major problems: Overpopulation, early marriage, maternal health issues.

Strategies for Improvement

- Family planning programme started in 1951.
- Sex education in schools to correct myths and misconceptions.
- Awareness of birth control devices, prenatal and postnatal care, and equal child importance.
- Prevention of sex abuse and sex-related crimes through awareness.
- Medical support for menstrual issues, infertility, pregnancy, contraception, abortions, and STDs.
- Use of advanced techniques and strategies for better reproductive health care.

Memory Aids

- $RCH = \text{Awareness} + \text{Health services} + \text{Family planning}$.
- $\text{Strategies} = \text{Family planning} + \text{Sex education} + \text{Medical care} + \text{Crime prevention}$.

Quick Checkpoints

- What are the main goals of RCH programmes?
- List major reproductive health problems in India.
- What strategies help achieve reproductive health?

Amniocentesis

Test and Uses

- Fetal test based on chromosomal analysis of amniotic fluid.
- Detects genetic disorders: Down syndrome, haemophilia, sickle cell anaemia.
- Assesses fetus survivability.
- Misused for fetal sex determination leading to female feticide.
- Legally banned for sex determination to prevent female feticide.

Memory Aids

- Amniocentesis = Genetic test + Fetal health check.
- Sex determination misuse banned.

Quick Checkpoints

- What disorders can amniocentesis detect?
- Why is sex determination by amniocentesis banned?
- What is the basis of amniocentesis testing?

Population Stabilisation and Birth Control

Population Growth and Control

- Population explosion: rapid increase in population over a short period.
- World population rose from 2 billion (1900) to 7.2 billion (2011).
- India's population grew from 350 million (independence) to 1.2 billion (2011).
- Population: total individuals of a species in an area at a time.
- Demography: scientific study of human population.
- Population increase due to decline in death rate, MMR, IMR, and more people in reproductive age.
- 2011 census: growth rate $< 2\%$ (20/1000/year), risking scarcity of essentials.
- Government measures: promote smaller families, raise marriage age (female 18, male 21), incentives for small families.
- Slogan: *Hum Do Hamare Do* (We two, our two) encourages two-child norm.

Memory Aids

- Population = Species count in area.
- Demography = Study of population.
- Hum Do Hamare Do = Two-child norm slogan.

Quick Checkpoints

- What factors caused population explosion?
- Define demography.
- What government steps control population growth?

Birth Control or Contraception

Definition and Principles

- Birth control/contraception: regulation of conception to limit offspring.
- Prevents fertilisation by blocking sperm transport, ovulation, or embryo implantation.
- Ideal contraceptive: user-friendly, effective, reversible, minimal side effects, no sexual interference.
- Methods: temporary and permanent.

Memory Aids

- Birth control = Prevent fertilisation.
- Ideal contraceptive = Easy, safe, reversible.

Quick Checkpoints

- What are the targets of birth control?
- Characteristics of an ideal contraceptive?
- Types of contraceptive methods?

Temporary Methods of Birth Control

Types and Details

- Used to postpone or space births; require regular use.

- Includes natural, barrier, chemical, IUCDs, oral pills, hormone injections, and implants.
- **Natural methods:** avoid sperm-ovum meeting.
 - Periodic abstinence (Rhythm): avoid intercourse days 10-17 (fertile period).
 - Coitus interruptus (Withdrawal): male withdraws before ejaculation.
 - Lactational amenorrhea: no ovulation during intense breastfeeding (up to 6 months).

Low side effects but higher failure risk.

- **Barrier methods:** physical barriers prevent sperm entry.
 - Condoms: male (Nirodh) and female (femidoms).
 - Diaphragms, cervical caps, vaults: rubber barriers covering cervix, reusable.
 - Condoms also protect against STIs and AIDS.
- **Chemical methods:** spermicidal creams, jellies, foams used with barriers.
 - Contain lactic acid, citric acid, boric acid, zinc sulphate, potassium permanganate.
 - Sponge ('Today') and cream (Delfin) are spermicidal products, less reliable.
- **Intrauterine Contraceptive Devices (IUCDs):** plastic/metal devices inserted in uterus.
 - Non-medicated (e.g., Lippes loop): S-shaped plastic wire increasing sperm phagocytosis.
 - Hormone releasing (e.g., LNG-20, progestasert): make uterus hostile to implantation and sperm.
 - Copper releasing (e.g., CuT, Cu7, Multiload 375): Cu ions reduce sperm motility and fertilisation.
 - Disadvantages: expulsion risk (10-15%), uterine perforation, infection, excessive bleeding, pain.
- **Oral contraceptive pills:** tablets with progestogens or progestogen-estrogen.
 - Combined pills (e.g., Mala D, Mala N): synthetic progesterone + estrogen, inhibit ovulation.
 - Mini pills (e.g., Saheli): progestin only, non-steroidal, inhibit implantation.
 - Saheli: weekly dose, safe long-term, minor side effect delayed menstruation (8%).
 - Side effects: risk of intravascular clotting, acne, weight gain, depression, hypertension, nausea.
- **Hormone injections and subcutaneous implants:**
 - Progestogens alone or with estrogen block ovulation, thicken cervical mucus.
 - Emergency contraceptives: effective within 72 hours post-coitus.
 - Hormone injections: convenient, effective, occasional heavy bleeding.
 - Subcutaneous implants: matchstick-sized capsules under arm skin, release progesterone for 5 years.
 - Examples: Depot medroxyprogesterone acetate (DMPA), Norethisterone enanthate (NET-EN).

Memory Aids

- Natural = Avoid sperm-ovum meeting.
- Barrier = Physical sperm block.
- Chemical = Spermicides enhance barriers.
- IUCD = Uterus device, multiple types.
- Oral pills = Hormonal, daily intake.
- Hormone injections/implants = Long-term hormonal control.

Quick Checkpoints

- List natural methods of contraception.
- What are barrier methods and examples?
- Types and function of IUCDs?
- Difference between combined and mini oral pills?
- How do hormone implants work?

Permanent Methods of Birth Control

Surgical Sterilisation

- Also called sterilisation methods; advised as terminal contraception.
- Blocks gamete transport to prevent conception.
- Male sterilisation: vasectomy - removal or tying of vas deferens via scrotal incision.

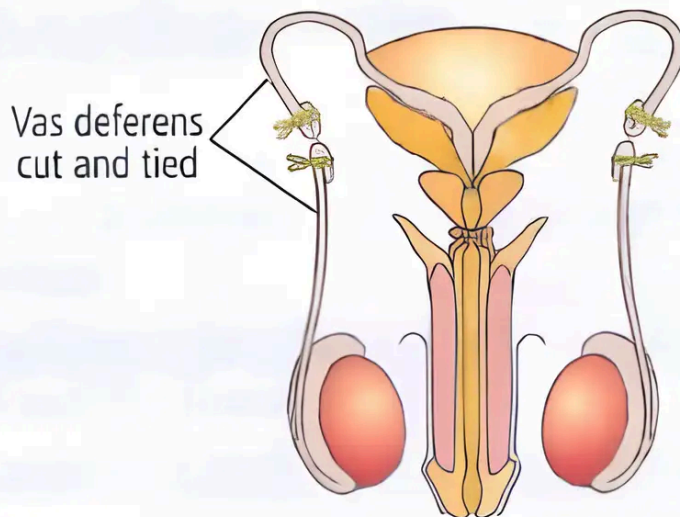


Fig.: (a) Vasectomy

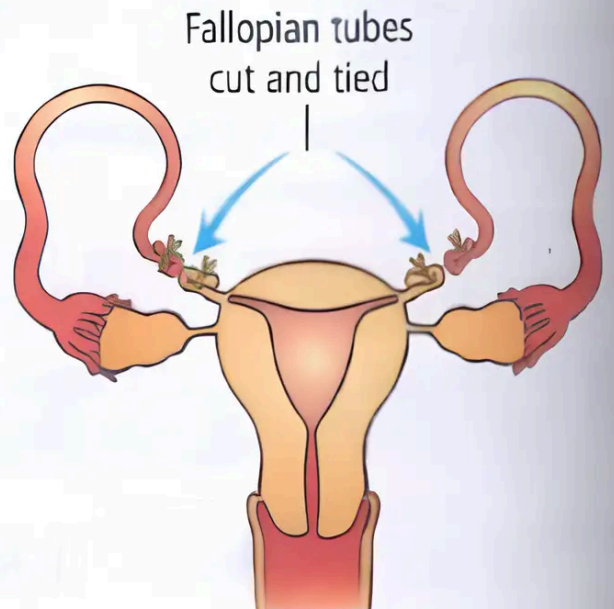


Fig.: (b) Tubectomy

- Female sterilisation: tubectomy - removal or tying of fallopian tubes via abdominal or vaginal incision.
- Highly effective but poor reversibility.
- Does not affect hormone production or sexual function.
- Consult medical professionals before choosing method; consider side effects like nausea, pain, irregular bleeding.

Memory Aids

- Vasectomy = Male sterilisation, vas deferens cut.
- Tubectomy = Female sterilisation, fallopian tubes cut.
- Permanent = Blocks gamete transport.

Quick Checkpoints

- What is vasectomy and its purpose?
- Describe tubectomy procedure.
- Why is sterilisation considered permanent?

Images

Hormone Implants

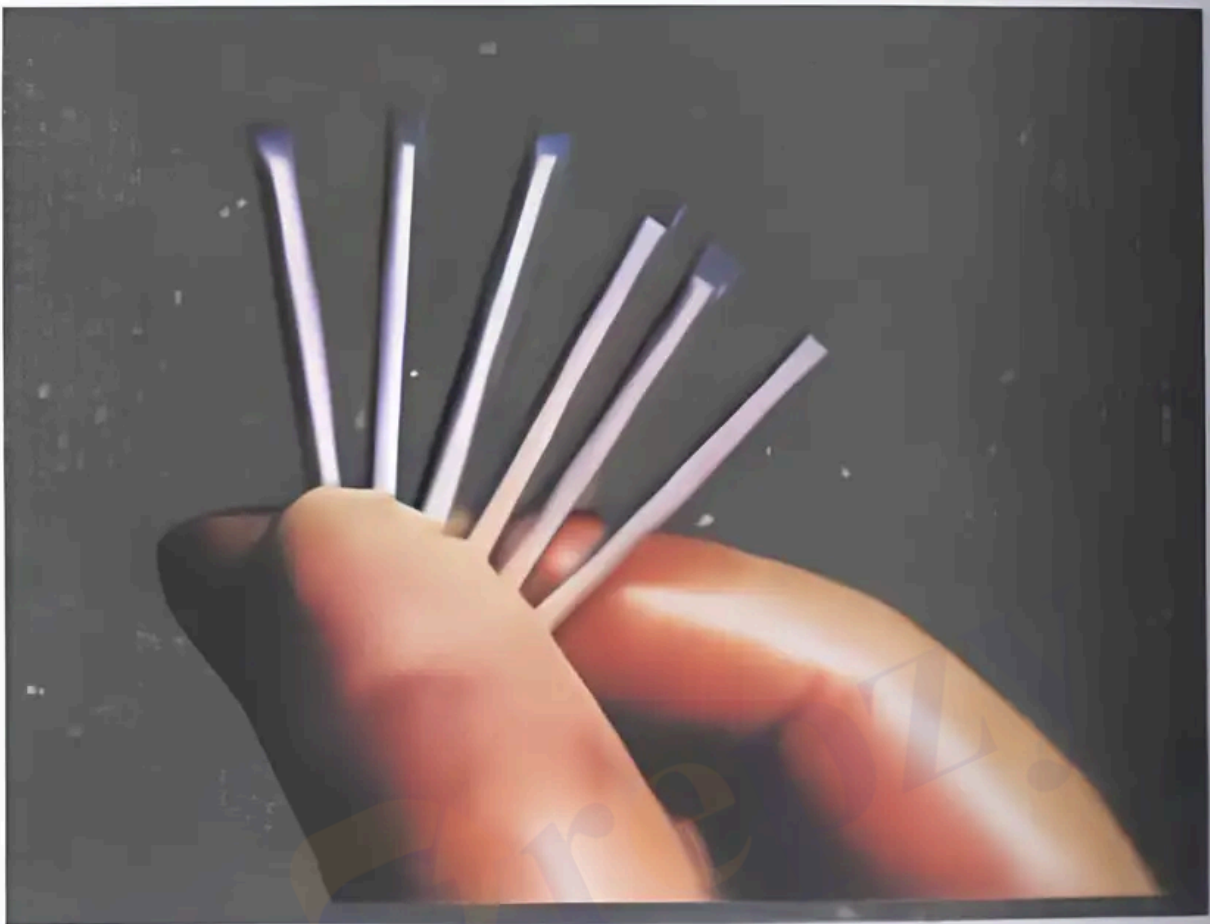


Fig. : Implants

Implants are small devices inserted under the skin to release hormones slowly for contraception.

Permanent Birth Control Surgeries

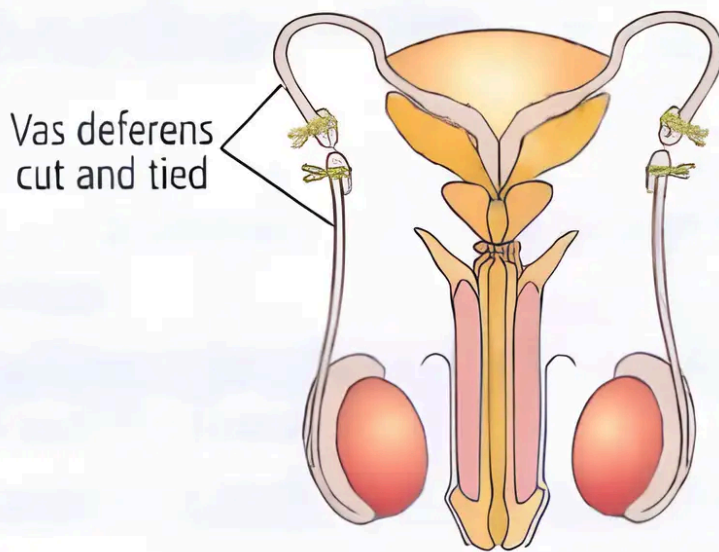


Fig.: (a) Vasectomy

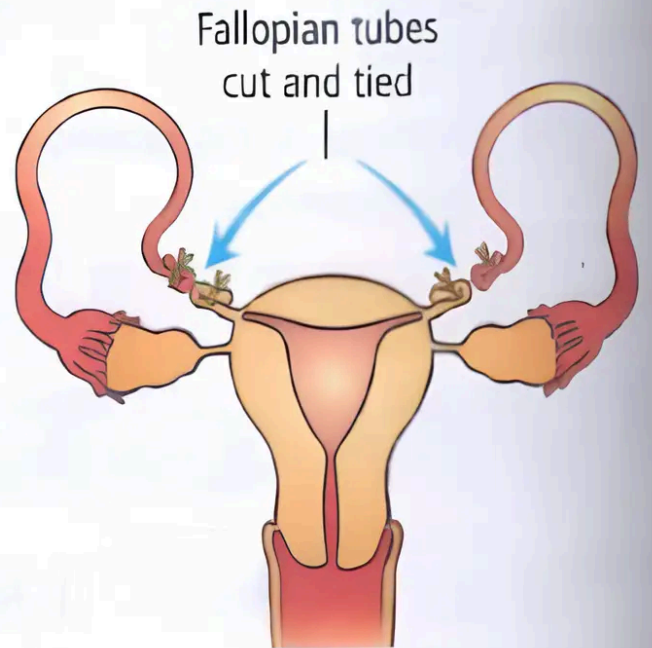


Fig.: (b) Tubectomy

Vasectomy and tubectomy surgeries block sperm and egg transport respectively to prevent pregnancy permanently.

Medical Termination of Pregnancy (MTP)

Overview

- Intentional termination of pregnancy before full term is called Medical Termination of Pregnancy (MTP) or induced abortion.
- Approximately 45 to 50 million MTPs occur worldwide annually, about 1/5th of all conceived pregnancies.
- Legalised in India in 1971 with strict conditions to prevent misuse and illegal female feticide.
- MTP is used to end unwanted pregnancies due to unprotected intercourse, contraceptive failure, or rape.
- Also performed when pregnancy continuation risks the health of mother, fetus, or both.
- Safe mostly during the first trimester (up to 12 weeks); second trimester abortions carry higher risks.
- Many MTPs are done illegally by unqualified persons, posing serious health risks.

- Misuse of amniocentesis for sex determination followed by MTP is dangerous and discouraged.
- Effective counselling is essential to prevent unprotected sex and illegal abortions.

Memory Aids

- **MTP:** Medical Termination of Pregnancy = Induced abortion before full term.
- **Safe period:** First trimester (up to 12 weeks).
- **Legalised India:** 1971 with strict conditions.
- **Risks:** Illegal MTPs and sex-selective abortions are harmful.

Quick Checkpoints

- What is the definition of MTP?
- When was MTP legalised in India?
- Why are MTPs performed?
- What is the safest period for MTP?
- What are the risks of illegal MTPs?
- Why is misuse of amniocentesis dangerous?
- How can illegal abortions be prevented?

Sexually Transmitted Infections (STIs)

Overview

- STIs are infections transmitted mainly through sexual intercourse.
- Also called venereal diseases (VDs) or reproductive tract infections (RTIs).
- Transmission modes: sexual contact, sharing needles, surgical instruments, blood transfusion, mother to fetus.
- Except HIV, hepatitis B, and genital herpes, most STIs are curable if treated early.
- Early symptoms: itching, swelling, fluid discharge, mild pain.
- Untreated STIs can cause abortions, stillbirths, ectopic pregnancy, infertility, reproductive tract cancer, pelvic inflammatory disease.
- High incidence in 15-24 years age group.

Common STIs and Detection

Table : Some Important STIs and Common Techniques for their Detection

S. No.	STI	Causal agent	Detection Techniques
1	Syphilis	<i>Treponema pallidum</i>	Antibody detection, e.g., VDRL, ELISA test.
2.	Gonorrhoea	<i>Neisseria gonorrhoeae</i>	Gram-staining of discharge, culture microscopic examination
3.	Enterobiasis	<i>Enterobius vermicularis</i>	Microscopic examination
4.	AIDS	Human Immunodeficiency Virus (HIV)	ELISA, PCR
5.	Hepatitis B	Hepatitis B Virus (HBV)	ELISA
6.	Genital herpes	Herpes simplex virus	Clinical, antigen test, PCR
7.	Genital warts	Human papilloma virus (HPV)	Clinical, antibody detection, culture. DNA hybridisation
8.	Chlamydiasis	<i>Chlamydia trachomatis</i>	Clinical, gram-staining of discharge, antigen detection, nucleic acid hybridisation.
9.	Trichomoniasis	<i>Trichomonas vaginalis</i>	Microscopic examination, culture

- Common STIs: Syphilis, Gonorrhoea, AIDS, Genital herpes, etc.
- Causal agents: specific bacteria or viruses causing each STI.
- Detection methods: antibody tests, microscopic examination, DNA-based tests.
- Accurate diagnosis aids effective treatment and control.

Prevention

- Avoid sex with unknown or multiple partners.
- Use condoms consistently during intercourse.
- Seek early medical advice and complete treatment if infected.

Memory Aids

- STIs = Sexually Transmitted Infections = VDIs = RTIs.
- Transmission: Sex, Needles, Surgery, Blood, Mother-to-fetus (SNSBM).
- High risk: Age 15-24 years.
- Prevention: Avoid unknown partners, Use condoms, Early treatment (AUE).

Quick Checkpoints

- What are the main transmission routes of STIs?

- Which STIs are incurable?
- List common early symptoms of STIs.
- Why is early detection important?
- What are key prevention methods?

Infertility

Causes and Diagnosis

- Inability to conceive despite unprotected sex.
- Caused by physical, congenital, immunological, or psychological disorders.
- Specialized clinics diagnose and treat some causes.
- Assisted reproductive technologies (ART) help infertile couples conceive.

Memory Aids

- Infertility = No conception despite unprotected sex.
- ART = Medical help for conception.

Quick Checkpoints

- What are the main causes of infertility?
- How do infertility clinics assist couples?
- What is the role of ART?

Assisted Reproductive Technologies

Key Techniques

- Test tube baby programme (IVF + embryo transfer).
- Gamete intra fallopian transfer (GIFT).
- Intra cytoplasmic sperm injection (ICSI).
- Artificial insemination (AI) including intrauterine insemination (IUI).

Memory Aids

- IVF = Fertilisation outside body + embryo transfer.
- GIFT = Sperm + ovum placed in fallopian tube.
- ICSI = Sperm injected into ovum cytoplasm.
- AI = Semen introduced artificially into female tract.

Quick Checkpoints

- What is IVF and how does it work?
- When is GIFT used?
- Describe ICSI technique.
- What conditions require AI?

Test Tube Baby Programme

Process

- Ova and sperm collected from wife/husband or donors.
- Fertilisation occurs outside body (in vitro fertilisation).
- Embryo transfer:
 - Up to 8 blastomeres: transferred to fallopian tube (ZIFT).
 - More than 8 blastomeres: transferred to uterus (IUT).
- Embryo can be implanted in another female (surrogate mother).

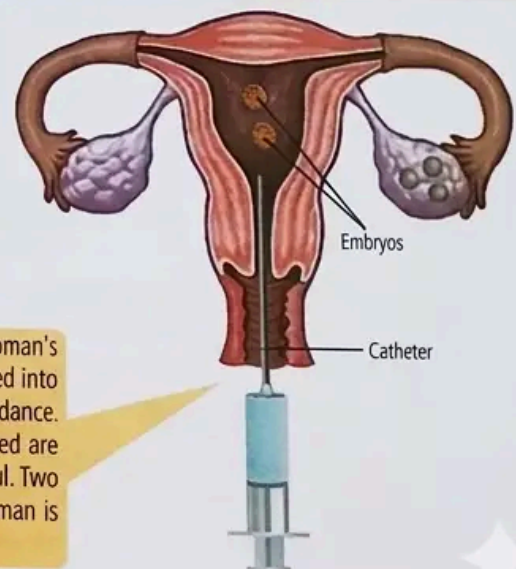
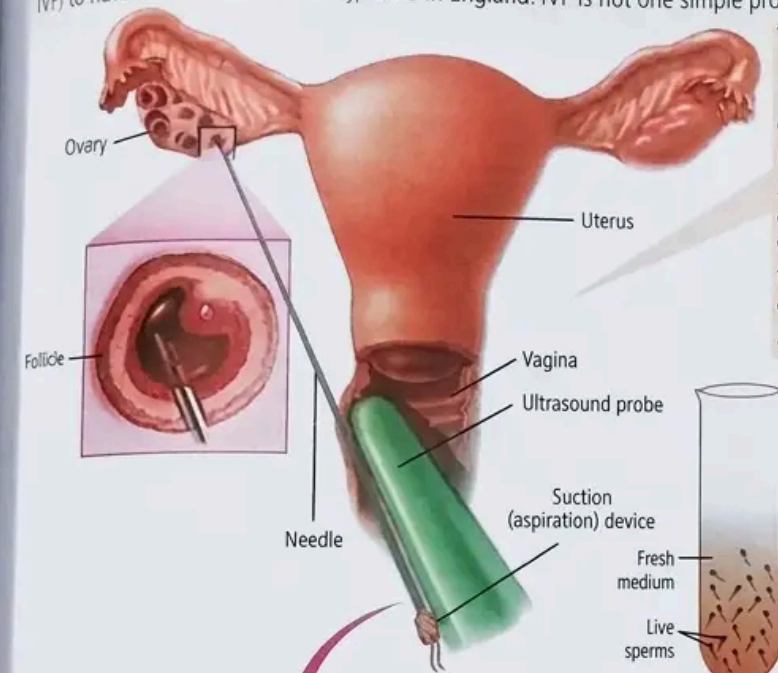
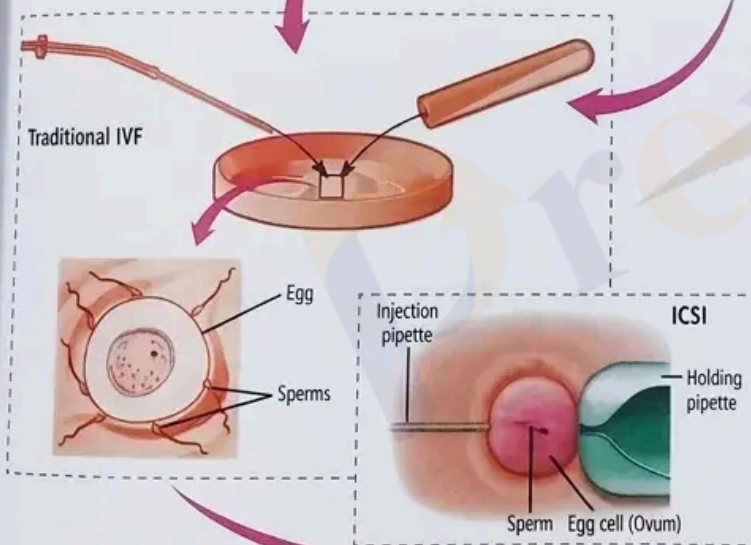
In vitro fertilisation

In vitro fertilisation (fertilisation outside the body) is one of the several assisted reproductive technologies (ARTS) commonly referred to as IVF, used to help infertile couples to conceive a child. This technique was developed to treat infertility caused by tubal damage, endometriosis, sperm disorders and unexplained infertility. **Louise Joy Brown** was the first test tube baby (the baby that is conceived through IVF) to have been born on 25th July, 1978 in England. IVF is not one simple procedure but a series of steps performed over several weeks.

The woman is given hormonal therapy to stimulate her ovaries to produce more than one egg per cycle. The response of ovaries is monitored with ultrasounds or blood tests to control the size and quantity of follicles. Egg maturation is achieved by administering HCG hormone *via* injections. Egg retrieval is scheduled 34-36 hrs after HCG injection is given. At the time of egg collection, an ultrasound probe or transducer is placed in vagina while woman is under light sedation. A fine needle (connected to suction device) is passed through the vaginal wall into the ovaries. Each follicle in the ovary is pierced in order to collect eggs along with some fluid which is monitored *via* ultrasonography.

A couple of hours after egg collection, sperms are obtained from male partner. An optimal sample can be collected after abstaining for two days. Sperm sample is analysed and processed. Testicular aspiration is performed in case of males with very low sperm count. Donated sperms are required for couples where female partner (wife) is unable to conceive due to severe sterility of male partner (husband).

Within a few hours after retrieval, the embryologists prepare to fertilise the eggs. This may be done with either traditional IVF (when sperm parameters are normal) or with ICSI (when sperm parameters are abnormal). In the former, a high concentration of sperms is placed around each egg in dishes and they are left overnight in an incubator to allow natural fertilisation to take place. With ICSI (intra cytoplasmic sperm injection) a single sperm is injected into each egg. The fertilised eggs called embryos grow in incubators for 3 to 5 days. The development of embryos is monitored by embryologists.



Once the embryos have grown to a predetermined size, one or two are transferred to the woman's uterus at appropriate time of her menstrual cycle. The embryos chosen for transfer are loaded into a transfer catheter which is passed through the cervix into the uterus under ultrasound guidance. It is painless and involves no anaesthetic. The good quality embryos that are not transferred are frozen and stored which can be used in subsequent cycles if the first cycle is not successful. Two weeks after the transfer of embryo into uterus, blood test is done to determine if the woman is pregnant or not.

Memory Aids

- IVF = Fertilisation outside body.
- ZIFT = Zygote transferred to fallopian tube.
- IUT = Embryo transferred to uterus.
- Surrogate mother = Female who carries embryo for another.

Quick Checkpoints

- What is the difference between ZIFT and IUT?
- Who is a surrogate mother?
- What Nobel Prize was awarded related to IVF?

Gamete Intra Fallopian Transfer

Technique

- Used when female cannot produce ova but can support embryo development.
- Sperm and ovum from donor introduced into fallopian tube of recipient female.

Memory Aids

- GIFT = Gametes placed directly in fallopian tube.

Quick Checkpoints

- When is GIFT preferred over IVF?
- What gametes are used in GIFT?

Intra Cytoplasmic Sperm Injection

Technique

- Sperm directly injected into ovum cytoplasm in lab.
- Embryo transferred by ZIFT or IUT into female.

Memory Aids

- ICSI = Direct sperm injection into ovum.

Quick Checkpoints

- How does ICSI differ from IVF?
- What happens after sperm injection in ICSI?

Artificial Insemination

Technique

- Used when husband cannot inseminate or has low sperm count.
- Semen from husband or donor introduced into vagina or uterus (IUI).

Memory Aids

- AI = Artificial introduction of semen.
- IUI = Intrauterine insemination.

Quick Checkpoints

- When is AI recommended?

- What is IUI?

Detection of Fetal Disorders

Techniques

- Amniocentesis: Fluid from amniotic sac tested for chromosomal disorders and fetal sex.
- Chorionic Villi Sampling (CVS): Fetal tissue from placenta used for karyotyping.
- Ultrasound imaging: Non-invasive fetal condition assessment.
- Fetoscopy: Direct viewing of fetus using a thin tube inserted into uterus.

Memory Aids

- Amniocentesis = Amniotic fluid test.
- CVS = Placental tissue test.
- Ultrasound = Non-invasive imaging.
- Fetoscopy = Direct fetal view.

Quick Checkpoints

- What is the purpose of amniocentesis?
- How is CVS performed?
- Which technique is non-invasive?
- What does fetoscopy allow?