Contraception

429 OB/GYN Team

Sources: Dr. Johara Al-Mutawa’s lecture, BRS Obstetrics & Gynecology 2ed by E. P. Sakala, and Essentials of Obstetrics & Gynecology 4ed by Hacker & Moore

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Contraception

Types of birth control

Reversible

1. Hormonal.
2. IUCD.
3. Barrier methods.
4. Natural methods.
5. Spermicides.

Irreversible

Surgical methods:

• Laparoscopic sterilization:
  a. Vasectomy: ligation of the vas deferens in males
  b. Tubal ligation: ligation of the fallopian tubes in females. Ligating the tubes using:
     i. Rings (tubal ligation using rings)
     ii. Clips
     iii. Bipolar diathermy
     iv. Laser

Ideal Contraception

1. Acceptable – requires no user motivation so compliance not problem
2. Safe
3. Accessible
4. Fewer side effects
5. Low failure rate
6. Non-invasive
7. Rapidly reversible
8. Provides prevention of STDs

Reversible Contraception

1. Hormonal Methods

A. Combined Oral Contraceptives (COC) contain a mixture of estrogen and progesterone.
B. Progesterone-only contraception (less side effects than COC):
   a. Pills - levonorgestrel
   b. Injectables - DMPA (depot medroxyprogesterone acetate, AKA, Depo-provera)
   c. Implants

Pills are safe and effective when taken properly. They are over 99% effective.

A. Combined Contraception Pills (COC)

A. Estrogen component of most modern (COC) is ethinyl estradiol (EE2) 20-50 µg.
B. Progesterone Component:
a. Second generation (e.g. norethisterone and levonorgestrel)
b. Third generation (e.g. desogestrel and gestodene): have higher affinity for progesterone receptors and lower affinity for the androgen receptors than second generation, i.e. they confer greater efficacy with few androgenic side effects. They also have fewer effects on carbohydrate and lipid metabolism.

**Mechanism Of Action**

1. **Stop ovulation** by inhibiting pituitary FSH and LH secretion.
2. **Cervical mucus** becomes scanty and viscous with low spinnbarkeit and thus inhibits sperm transport
3. **Make the uterine lining** thin and unreceptive to implantation
4. **Direct effect** on fallopian tubes impairing sperm and ovum transport

Combined oral contraceptive formulations are either:

- Fixed dose
- Phasic: the dose of estrogen and progesterone changes once (biphasic) or twice (triphasic) in each day course

High doses of estrogen component are associated with more side effects. The 50-µg pills are not commonly used nowadays. The dose used is usually **30 µg**.

Phasic preparations are designed to mimic the cyclical variation in hormone levels

**Benefits Of Oral Contraceptive Pills (OCP)**

1. Prevent pregnancy (the goal)
2. **Less** dysmenorrhea and menorrhagia
3. **Less** incidence of carcinoma of the endometrium and ovary
4. **Less** incidence of benign breast disease
5. **Less** incidence of pelvic inflammatory disease (PID)
6. **Less** incidence of ovarian cysts
7. **Protective** effect against rheumatoid arthritis, thyroid disease and duodenal ulceration.
8. Decrease acne and hirsutism (OCPs with anti-androgen progesterone)

**Side Effect And Risks**

1. **Weight gain** – With pills containing levonorgestrel (2nd gen.) but not desogestrel or gestodene (often due to fluid retention)
2. Carbohydrate metabolism – effect on **insulin secretion** (by causing peripheral insulin resistance and by diminishing the insulin-secreting capacities of the islets of Langerhans)
3. Lipid metabolism – affect ratio of HDL/LDL
4. No protection from STDs e.g. HPV
5. Cardiovascular effects – increase risks of **thromboembolism** 3-4 fold in patients with other risk factors, e.g. congenital or acquired thrombophilias, obesity, age and immobility.
6. Risk of **myocardial infarction and hemorrhagic stroke** increase with:
   a. Higher estrogen doses
   b. **Hypertension**
   c. **Smoking**
7. **Breast cancer** – Can occur with long-term oral contraceptive use before age 25 especially with more potent progesterone
8. **Cervical cancer** – ↑ incidence due to ↓ immunity to antigenic causal factor (e.g. HPV), with greater sexual activity without benefits of barrier contraception (OCPs do not prevent STDs)
Contraindication:

1. Arterial or venous thrombosis
2. Ischemic heart disease (↑ risk of MI)
3. Focal migraine (migraine with aura)
4. Atherogenic lipid disorder (atherosclerosis)
5. Inherited or acquired thrombophilia
6. Post cerebral hemorrhage (↑ risk of hemorrhagic stroke)
7. Pulmonary hypertension
8. Disease of the liver: Acute liver disease i.e. with:
   a. Abnormal liver function test (LFTs)
   b. Adenoma or carcinoma
   c. Gallstones
   d. Acute hepatic porphyrias
9. Others
   a. Pregnancy
   b. Undiagnosed genital tract bleeding
   c. Estrogen dependent neoplasm (e.g. breast cancer)

B. Progesterone Only Contraceptive Pills (Mini Pills)

Formulations: Pills, subdermal implants (Norplant®), and injections (DMPA: depot medroxyprogesterone acetate)

Mechanism Of Action Of Progesterone Only Contraception

1. Cervical mucus modification, which inhibits sperm penetration
2. Endometrial modifications to prevent implantation
3. Suppression of FSH and LH secretion and inhibition of ovulation

Advantages of Progesterone-only Contraception

1. Minimal impact on lipid profile and hypertension, so it can be used safely in cardiovascular disease
2. Can be used by lactating mothers (estrogen stops lactation)
3. Depot medroxyprogesterone acetate (DMPA) provides protection against:
   a. Endometrial cancer
   b. Ovarian cancer, endometriosis, and fibroids
   c. Acute PID
   d. Vaginal candidiasis
4. DMPA also has other advantages:
   a. Relief from dysmenorrhea and pre-menstrual syndrome (PMS)
   b. No daily pills to remember
   c. Given once every 3 months
   d. 99.7% EFFECTIVE in preventing pregnancy
Disadvantages of Progesterone-Only Contraception

1. Menstrual disturbance – **amenorrhea** with injections
2. Irregular prolonged **spotting or bleeding** with pills
3. May develop functional **ovarian cyst** due to luteinization of unruptured ovarian follicle
4. Protect against intrauterine pregnancy but **not ectopic** because it modifies tubal function - ↓ ovum transport
5. Acne, headaches, breast tenderness, weight changes, mood changes and loss of libido (androgenic progesterone effect – third generation progestines have less androgenic side effects)

Sub-dermal implants:

**Norplant®,**

- Need **trained** people for insertion and removal
- **Outpatient** procedure
- **99.5% effectiveness** rate
- Require no user motivation, so compliance is not problem
- **Amenorrhea** is common
- **Not as rapidly reversible as pills** (It takes 8-9 months for the effects to disappear)

Failure of the Pill:

1. Patients forget to take the pill.
2. Gastroenteritis.
3. Drugs
   a. Anticonvulsants
      i. Phenytoin
      ii. Phenobarbitone
   b. Antibiotics (cephalosporins, chloramphenicol, macrolides, penicillins, tetracyclines, sulfas)

2. Intrauterine Contraception Devices

- Most commonly used reversible method of contraception worldwide
- Effective > 97%
- The newer devices have **failure rate of < 0.5%**

Types of IUCD

1. **Inert**: These are polythene IUCDs. They are a little bulkier than other IUCDs and **more likely to**:
   - Cause **heavy bleeding**
   - Cause infections - pelvic actinomycosis
   - No longer available

   The progestin released affects the endometrium causing disturbances of bleeding patterns, which become unpredictable. Woman can alternate among amenorrhea, oligomenorrhea, and regular menses.
2. **Copper-bearing IUCD:**
- Consist of a plastic frame with copper wire around the stem
- Surface of the copper determine the effectiveness and active life of the device
- Most IUCD licensed for use over 5-10 years and because of gradual absorption of copper. These IUCDs are renewed after 3-5 years
  - Copper salt gives some protection against bacterial infections

3. **Hormone releasing IUCD (Mirena):**
- It releases levonorgestrel (20 µg /24hrs) over at least 5 years
- Reduces menstrual blood flow and markedly reduces blood loss in menorrhagia (used to treat menorrhagia in old ladies)
- Protects against pelvic inflammatory disease
- Causes irregular uterine bleeding for first 6 months following insertion

**Mechanism of Action of IUCDs**

1. All IUCDs cause a foreign body reaction in the endometrium with increased prostaglandin production and leukocyte infiltration. This reaction enhanced by copper affects endometrial enzymes and estrogen uptake and also inhibits sperm transport
2. Alteration of uterine and tubal fluid impairs the viability of the gametes
3. The progesterone IUCD (Mirena®, AKA Levonorgestrel-Releasing Intrauterine System (LNG.IUS)) cause endometrial suppression and changes in the cervical mucus and utero-tubal fluid, and impair sperm migration

**Complications**

1. **Dysmenorrhea** and menorrhagia, treated with:
   - a. Antifibrinolytic agent (e.g. tranexamic acid)
   - b. Antiprostaglandin agents
   - c. Non-steroidal anti-inflammatory drugs (NSAIDs)
2. **Infection** – Actinomycosis associated with granulomatous pelvic abscesses
3. **Pregnancy** rate 1-1.5% most likely in the first 2 years of insertion (copper-bearing coils have a lower rate of 0.5%)
4. The risk of **ectopic pregnancy** is greater with IUCD especially progesterone releasing IUCD. Levonorgestrel-releasing (Mirena®) has 0.1% risk of ectopic pregnancy – copper-bearing has a lower risk
5. **Expulsion** of the device – usually during menstruation
6. **Translocation** – the IUCD passes through the uterine wall into the peritoneal cavity or blood ligament usually a consequence of unrecognized perforation at insertion – LAPAROSCOPY should be performed.
Contraindications

1. Pelvic inflammatory disease (PID)
2. Menorrhagia
3. History of previous ectopic pregnancy
4. Severe dysmenorrhea

Choices of Devices

- **Copper T380 is the first choice** as it has the lowest failure rate and longest life span (No side effects of hormonal therapy)
- **Women with** –
  - Small uterus
  - Experienced pain
  - Spontaneous expulsion

  Are given GyneFix® IUCD
- **Women with menorrhagia** – Are given Levonorgestrel-releasing IUCD (Mirena®)

3. Barrier Methods

- Prevent pregnancy by preventing the eggs and sperm from meeting
- Have higher failure rate than hormonal methods due to design and human errors

A. Condoms

- Most common and effective barrier when used properly.
- Thin rubber sheath fit on the penis, it interferes 3-23% with sensation and it is liable to come off as the penis withdraws after the act
- Widely accessible
- Inexpensive
- Reversible
- Provide protection against STD including HIV and premalignant disease of the cervix
- Contraindication to the condom use is latex allergy in either partner.
- **Failure rate 3-23%**

B. Occlusive Pessaries

- Diaphragm and cervical caps are inserted into the vagina, prior to intercourse, to occlude the cervix and should be used with spermicide to provide maximum protection and remain 6 hours after intercourse.
- Initially need to be fitted by trained person (need high degree of motivation for successful use)
- Efficacy 4-20%

C. Female Condom

- Polyurethane sheath inserted to and lines the vagina
- Widely available
- **Failure rate 5-21%**.

D. Vaginal Sponges

- Made of polyurethane foam - inserted with spermicide into the vagina to cover the cervix
- Provide contraception by-acting as Barrier
  - Absorbing the semen

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**GyneFix® IUCD:** An IUCD with special characteristics that makes expulsion virtually impossible. It has fewer side effects, and less menorrhagia and dysmenorrhea than other IUCDs.
4. Natural Methods

A. Calendar Method (Safe period)

- Relies upon the fact that there are certain days during the menstrual cycle when conception can occur following ovulation, the ovum is viable within reproductive tract for a max of 24 hrs
- The life span of sperm is longer (3 days)
- During a 28-day menstrual cycle, ovulation occurs around day 14. This means that coitus must be avoided from 8th to 17th day
- **Failure rate is high** so many couples find it difficult to adhere to this method

B. Ovulation method (The billing’s method)

- Ovulation prediction can be enhanced by several complementary methods including
  - Basal body temperature (BBT) rises by 0.2-0.4°C (due to progesterone) following ovulation until the onset of menstruation
  - Cervical mucus: several days **before** ovulation mucus appearance of raw egg white, clear, slippery and stretchy (spinnbarkeit). **The final day of fertile mucus is considered to be the day when ovulation** is most likely to occur and abstinence must be maintained from first day of fertile mucus until 3 days after the peak day. The end of the fertile period is characterized by appearance of (infertile mucus) which is scanty and viscous.

C. Personal fertility monitors

Small devices able to detect urine concentration of estrone and LH - indicate start and end of fertile period

Failure Rate

- **Failure rate of natural method (ovulation and calendar)** is 2.8%
- **Failure rate of fertility monitors** is 6.2%
- Disadvantages: no STI protection

5. Emergency Contraception

A. Hormonal Methods

- Yuzpe Regime (PC4) – ethinyllostradiol (100µg) levonorgesterel (500µg) Eugynon ovran with
  - **first dose taken within 72 hrs of intercourse** and **second dose taken 12 hrs after the first**
    - It inhibits or delays ovulation, altering endometrial receptivity
  - Progestogen only
    - Levonorgestrel (0.75 mg) – **given twice with 72 hrs of intercourse**
    - It also alters cervical mucus, impairing sperm transport and prevent fertilization which explains the **greater efficacy (99%)** compared Yuzpe regime (77%) in prevention of expected pregnancy [If commenced with 24 hrs of intercourse]
    - **Side effects**
      - N&V, theoretical risk of pregnancy & ectopic pregnancy
2. Copper IUCD

- Very effective if used **5 days after coitus** or ovulation due to **spermicidal** and **blastocidal** action of copper
- Has to lowest **failure rate** (<1%)
- Age, nulliparity and menorrhagia **NOT** contraindicated

**Irreversible Contraception (Sterilization)**

- It is a permanent, irreversible method, performed on a man or a women

**Female: Tubal ligation – by mini laparotomy**

- Laparoscopic sterilization: ring, clips, diathermy, laser
- Pre – counseling includes:
  - Irreversible and permanent nature of the procedure (successful reversal in <50%)
  - Failure rate 1:200 (0.5%)
  - Risks of laparoscopy and chance of requiring laparotomy (surgical and anesthetic risks e.g. hemorrhage, infection, damage to intraperitoneal structures, and even death)

**Male: Vasectomy**

- Vas deferentia can be devided by removal of a piece of each vas under **local** anaesthesia
- Advised to use effective contraception until there are two consecutive semen analysis showing azoosperma
- Failure rate 1: 2000, and it can occur in up to 10 years as a result of late recanalization.
- Minor complication can occur in 5% of patient
  - Vaso vagal reaction
  - Haematoma
  - Mild infection
  - Sperm auto-antibodies → difficulty in reversing the operation