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.

Contraception: Prevention of fertilization.

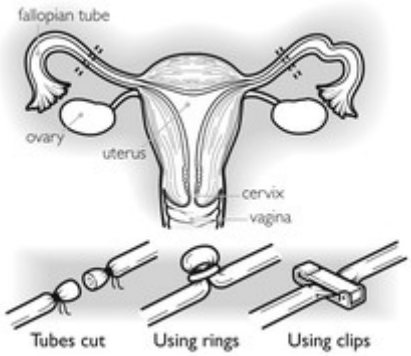
Interception: An action that blocks implementation.

Abortion: Disruption of an established pregnancy.

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 (EE_2) 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)*

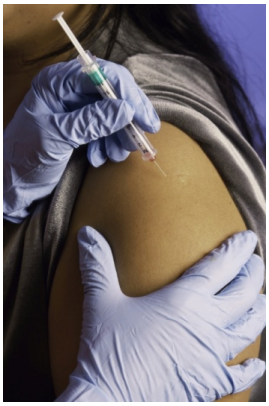
Spinnbarkeit: *The stringy and stretchy quality of cervical mucus at the time just prior to ovulation. The mucus becomes abundant, clear, and stretchable – like "egg white". It provides an ideal medium for sperms.*

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

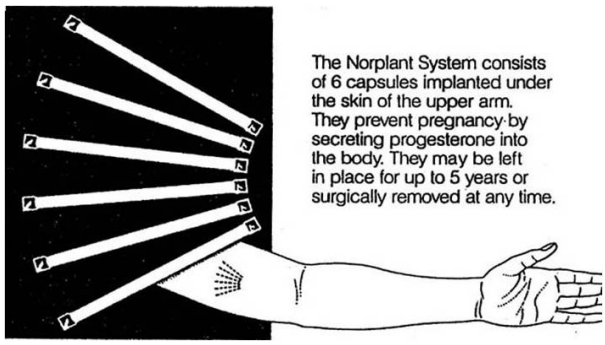
1. Menstrual disturbance – **AMENORRHEA** with injections
2. Irregular prolonged **spotting or bleeding** with pills
3. May develop functional ovarian cyst due to luteinization of unruptured ovarian follicle
4. Protect against intrauterine pregnancy but **not ectopic** because it modifies tubal function - ↓ ovum transport

   COC do not prevent ectopic pregnancy either
5. Acne, headaches, breast tenderness, weight changes, mood changesand 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.

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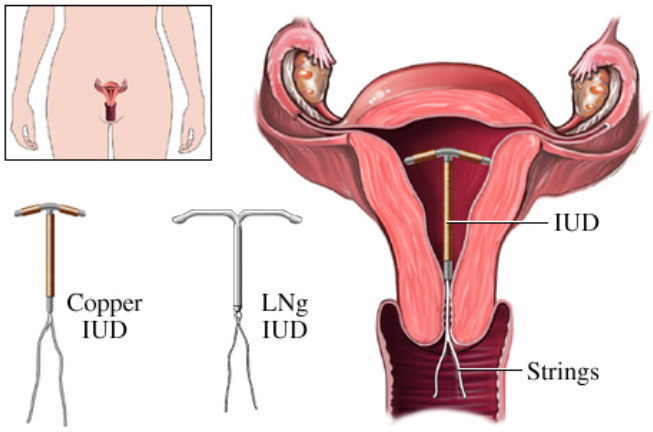
2. ***Copper-bearing IUCD:***
   - *Consist of a plastic frame with copper wire around the stem*
   - *Surface of the copper determine the effectiveness and active life of the device*
   - *Most IUCD licensed for use **over 5-10 years** and because of gradual absorption of copper. These IUCDs are renewed 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

***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.*

- *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*

Barrier Methods:

- *Male – Condom*
- *Female*
  - *Condom (Femidon)*
  - *Diaphragm*
  - *Cervical cap, pessaries, sponges in combination with spermicides*

A. Condoms

- *Most common and effective barrier when used porperly.*
- *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*
- *Widly 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.*
- *Intially need to be fitted by trained person (need high degree of motivation for successful use)*
- *Efficacy 4-20%*

C. Female Condome

- *Polyurethane sheath inserted to and lines the vagina*
- *Wildly 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*

- *Carrier for spermicide*
- ***Higher failure rate***
- *Advantage – nanoxynol-9 provides protection against STD*

Moore: "N-9 offers NO protection against STIs"

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 spam 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 adher to this method*

B. Ovulation method (The billing's method)

- *Ovulation prediction can be enhaced 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) – ethinylostradiol (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 recepitivity*
- *Progestegen only*
  - *Levonorgestrel (0.75 mg) – **given twice with 72 hrs of intercourse***
  - *It also alter 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 azooospermia***
- *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*