

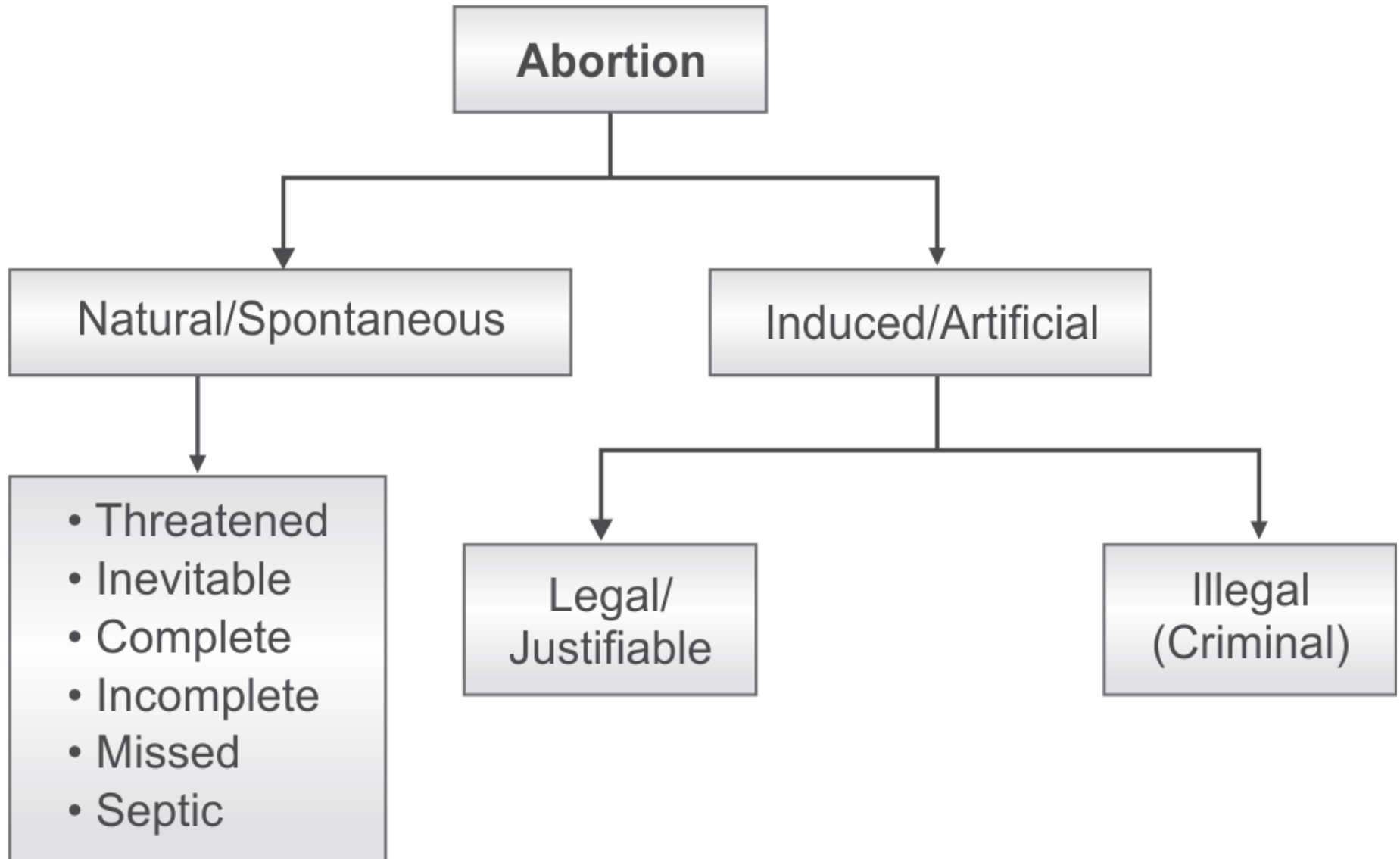
Abortion

Definitions

- **Medically**, abortion (**Latin *aboriri*: to get detached from the proper site**) is expulsion or extraction from its mother of an embryo or fetus weighing 500g (22wks) or less, when it is not capable of independent survival (WHO).
- **Legally**, abortion is defined as expulsion of products of conception from the uterus at any period before full term .
- **Criminal abortion**: It is the termination of a pregnancy in violation of the legal regulations in force.
- **Abortus** : The non-viable product of abortion.
- **Abortifacient** : Any agent that induces abortion.

- Some authors use the term **abortion** as expulsion of ovum within first 3 months of pregnancy .
- **Miscarriage** for the expulsion of fetus from 4th–7th months; and **premature delivery** as the delivery of baby after 7 months of pregnancy and before full-term.
- **The term miscarriage is synonymous with spontaneous abortion.**

Classification of Abortion



- **Natural or Spontaneous Abortion**
- **Incidence:** 10–20% of all pregnancies (approx).
- Most frequent within first 3 months, owing to weak attachment of ovum to uterine wall (75% abortions occur before 16th week, and out of these, 75% before 8th week of gestation). Abortion occurs without any induction procedures and usually coincides with menstrual flow.

❖ Causes

- i. Genetic (50%)
- ii. Anatomic (10–15%)
- iii. Endocrine (10–15%)
- iv. Infections (15%)
- v. Immunological (5–10%)
- vi. Others

❖ **Common causes of abortion**

- First trimester:

Genetic factors, endocrine disorders, immunological disorders, infections and unexplained.

- Second trimester:

Anatomic abnormalities, maternal medical illness and unexplained.

i. Genetic:

Majority of early abortions are due to chromosomal abnormality .

Autosomal trisomy is the commonest cause (50%) and most common is trisomy 16 (30%).

Monosomy and chromosomal aberration (including deletion, duplication, translocation and inversion) constitutes 20% and 2–4% of all abortions respectively.

ii. **Anatomic:**

Cervico-uterine factors usually cause second trimester abortions.

1. Cervical incompetence.
2. Congenital malformation of uterus, e.g. hypoplasia, bicornuate/septate uterus or duplication of upper part of uterus.
3. Uterine fibroid.

iii. **Endocrine and metabolic abnormalities**

- Diabetes mellitus.
- Hypo- or hyperthyroidism.
- Luteal phase defect.
- Deficient progesterone secretion from corpus Luteum .

iv. **Infections (ex. TORCH)**

- *Viral*: Rubella, cytomegalovirus, vaccinia, variola or HIV.
- *Bacterial*: Ureaplasma, *Chlamydia* or *Brucella*.
- *Parasitic*: *Toxoplasma* or malaria.

v. **Immunological**: Both autoimmune and alloimmune factors can cause miscarriage.

vi. **Others**

- *Maternal illness*: Cyanotic heart disease or hemoglobinopathies .
- Antifetal antibodies.
- *Blood group incompatibility*: Incompatible ABO and Rh group.
- Premature rupture of the membranes.
- *Environmental factors*: Cigarette smoking, drugs, chemicals, noxious agents, *in-situ* contraceptive agents, X-ray exposure and antineoplastic drugs.

- **Unexplained (40%):**

In spite of the numerous factors mentioned, it is sometimes difficult to pinpoint exact cause of abortion.

❑ Artificial or Induced Abortion

- It means willful termination of pregnancy before viability. It can be:
- **☒ *Legal or justifiable***: When it is done in good faith to save the life of the woman, and performed within the legal provisions of the MTP Act .
- **☒ *Criminal or illegal***: Induced destruction and expulsion of fetus from womb unlawfully. It is usually induced before the 3rd month, and causes infection and inflammation of the endometrium.

Criminal Abortion

- **Legal aspects:** Dealt under **Section 312–316 IPC.**
- **Sec. 312 IPC:** Whoever (including the pregnant women herself) voluntarily causes criminal abortion *with the consent* of the patient is liable for imprisonment upto 3 years and with/without fine, and if the woman is quick with child, then imprisonment may extend upto 7 years and fine.
- **Sec. 313 IPC:** If miscarriage is caused *without the consent* of the woman, whether the woman is quick or not, then the person is punished with life imprisonment or imprisonment upto 10 years and fine.

- **Sec. 314 IPC:** If pregnant woman *dies from the act* done with the intent to cause miscarriage, then imprisonment is upto 10 years and fine. If the act is done without the consent of the woman, then the person is punished with life imprisonment or upto 10 years and fine.

Methods for Inducing Criminal Abortion

- i. Abortifacient drugs
- ii. General violence
- iii. Local violence

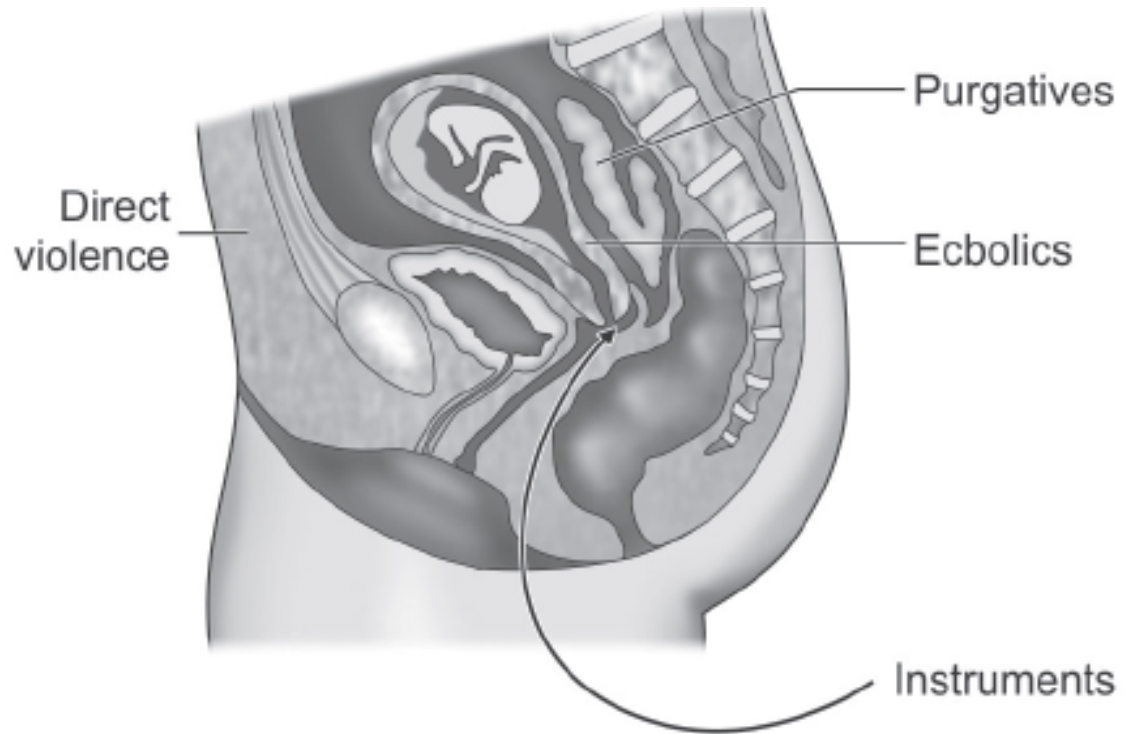


Fig. 22.1: Various sites of action of methods designed to induce an abortion

Abortifacient drugs

- i. *Ecbolics*:** They increase uterine contractions, e.g. ergot preparations, synthetic estrogens, pituitary extract, strychnine or quinine.
- ii. *Emmenagogues*:** These drugs initiate or increase menstrual flow, e.g. estrogen, savin, borax or sanguinarin.
- iii. *GIT irritants*:** These causes irritation of uterus, e.g. purgatives, like castor or croton oil, julap, senna or MgSO₄.
- iv. *Genitourinary irritants*:** They produce reflex uterine contraction, e.g. cantharides, oil of turpentine or tansy or pennyroyal.
- v. *Drugs having systemic toxicity***
 - Inorganic irritants, e.g. lead, copper, iron or mercury.
 - Organic irritants, e.g. *Abrus precatorius*, *Calotropis*, seeds of custard apple and carrots, and unripe fruit of papaya or pineapple.
- vi. *Abortion pills*** made of lead (diachylon) or diphenyl-ethylene.

- In *De Materia Medica Libri Quinque*, the Greek pharmacologist
- Dioscorides listed the ingredients of a drink called '**abortion wine**'– hellebore, squirting cucumber and scammony. Hellebore ('Christmas rose'), in particular, is known to be abortifacient.

II. General violence

- Any act directly on the uterus or indirectly to produce congestion of pelvic organs or hemorrhages between uterus and membranes.
- Resorted to upto end of 1st month.
- It is more likely to cause injury than abortion.
- It can be

A. Intentional

B. Accidental.

Intentional

- i. Severe pressure on abdomen by kneeling, blows, kick, tight bandage and massage of uterus through abdominal wall.
- ii. Violent exercise, like horse riding, cycling, skipping, rolling downstairs, or jumping from height.
- iii. **Cupping:** A mug is turned upside down over a lighted wick and placed on the hypogastria. Air escapes due to heat and the mug sets tightly on the abdomen. The mug is then pulled which may result in partial separation of placenta.
- iv. Very hot and cold hip bath alternately.

Accidental

- A general shake-up in advanced pregnancy can produce abortion, but if the fetus is healthy, abortion will not occur.

III. Local violence

- Usually employed **in 3rd–4th month** when other methods have failed.
- Interference may be skilled, semi-skilled or unskilled.

Table 22.1: Different methods of interference

<i>Unskilled Interference</i>	<i>Semi-skilled Interference</i>	<i>Skilled Interference</i>
♦ Self-instrumentation	♦ Instrumentation	♦ Dilatation and evacuation
♦ Abortion stick	♦ Abortion paste—Utus paste	♦ Vacuum aspiration
	♦ <i>Slippery elm bark</i>	♦ Laminaria tent
	♦ Syringing	♦ Prostaglandins
		♦ Electric current
		♦ Intrauterine instillation of hyperosmotic solution



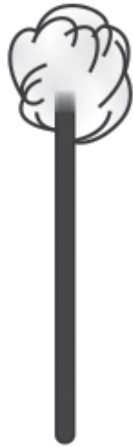
Hair pin



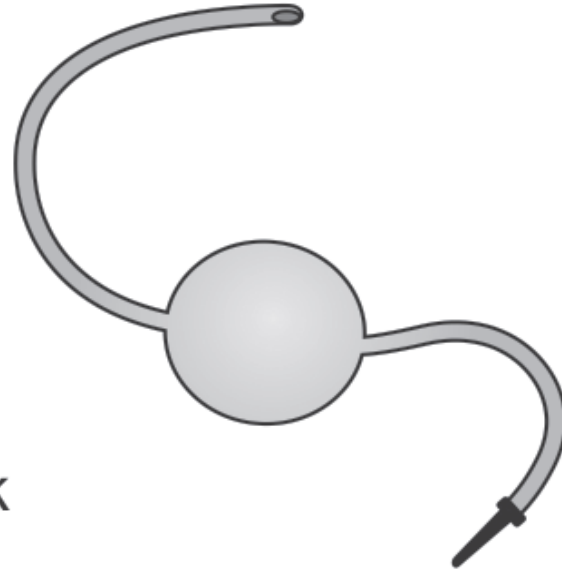
Wire probe



Syringe with nozzle



Abortion stick



Higginson's syringe



Root of irritant plant

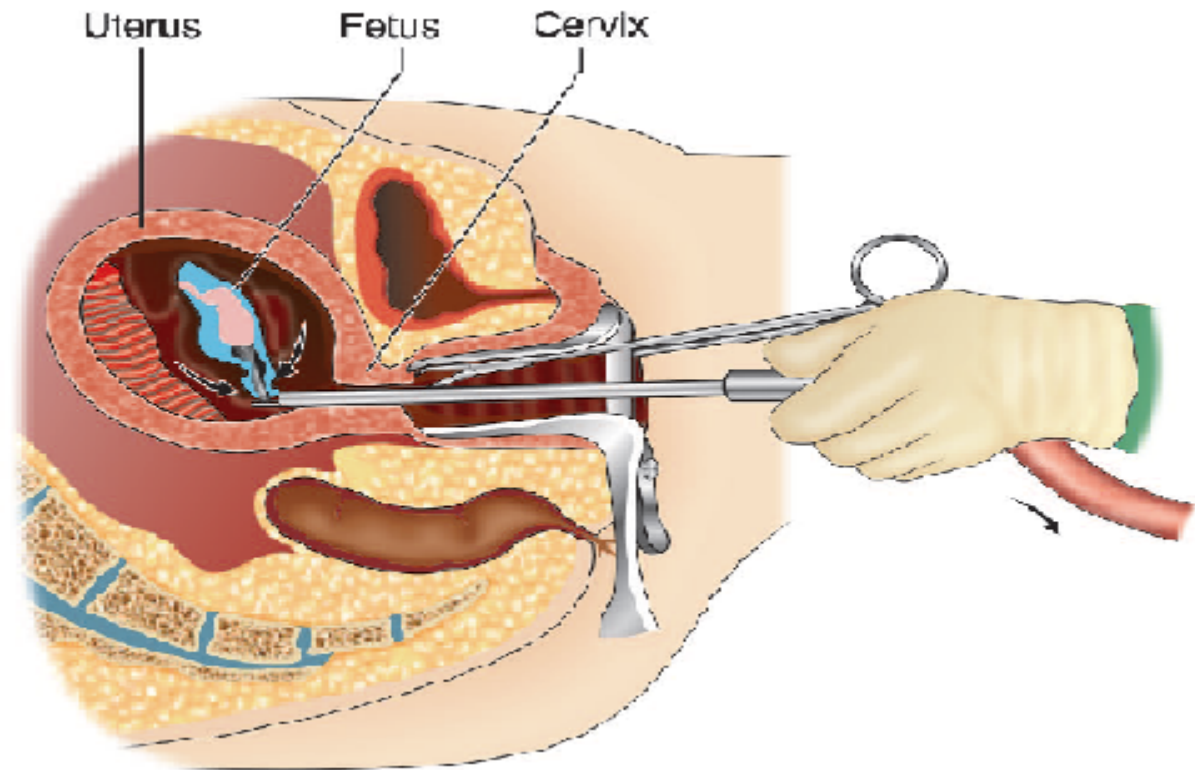
i. **Syringing:** Ordinary enema syringe with a hand bulb is commonly used to inject fluid into uterus, the hard nozzle being inserted into cervix.

Higginson's syringe can also be used. Soap water is often used as injection material. Irritating substances are added to water, such as lysol, cresol, alum, KMnO_4 or formalin.

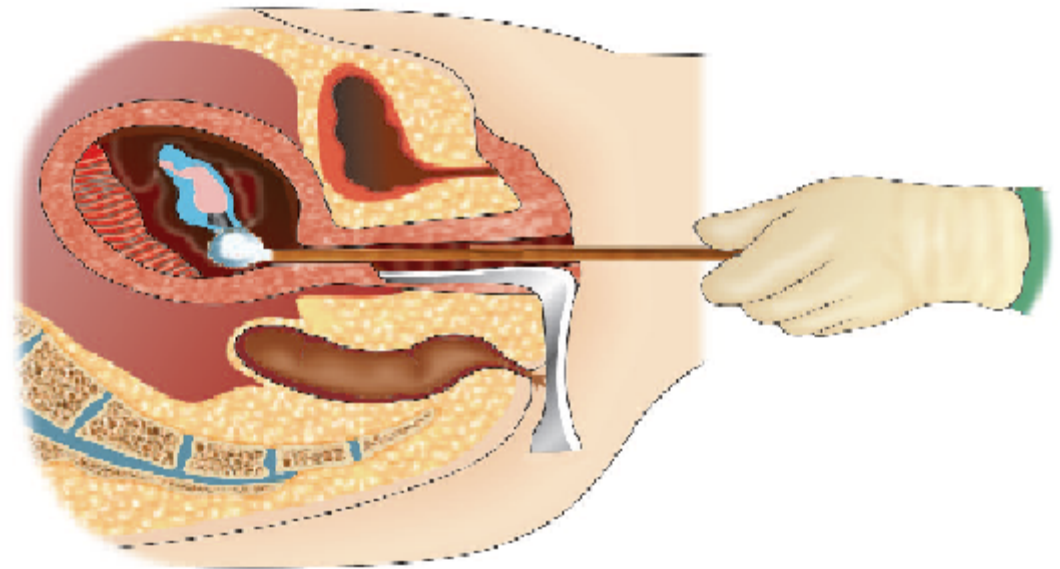
ii. **Syringe aspiration:** Large syringe with a plastic cannula is inserted into cervix; develops suction which ruptures early gestational sac, and leads to aspiration and expulsion of contents.

iii **Rupturing of membranes:** The membranes are ruptured by introduction of an instrument, like probe, stick, uterine sound, umbrella ribs, catheter, pencil, pen holder, knitting needle or hairpin.

iv. **Vacuum aspiration:** The cervix is dilated and a tube attached to a suction pump extracts the fetus.



- v. **Abortion stick:** It is a wooden or bamboo stick, 12–18 cm long, wrapped at one end with cotton, wool or piece of cloth and soaked with juice of marking nut, calotropis or paste made of arsenious oxide or lead.
- It is introduced into the vagina or os by *dais* (traditional birth attendants) and retain there, till contraction starts .
- Instead of this stick, a twig of some irritant plant, like *Plumbago rosea*, *Calotropis* or *Nerium odorum* may be used.



vi. **Dilation of cervix:** Foreign bodies are introduced and left in cervical canal, like pessaries, laminaria (a dried seaweed) or sea tangle tent which dilate the cervix, irritate uterine mucosa and produce marked congestion and uterine contractions with expulsion of fetus.

- Cervical canal may be dilated by introducing a compressed sponge into the cervix and leaving it there. Sponge swells from moisture in the uterine segment with expulsion of fetus
- *Slippery elm* bark (*Ulmus fulva*) obtained from tree in Central America, is inserted into cervical canal in portions of 1–3 inches long. It absorbs moisture, and on each side of the bark, a jelly like layer is produced that is as thick as the bark itself, due to which the cervical canal is dilated

vii. **Air insufflations:** Air is introduced into vagina and uterus by various means, like pumps or syringes leading to abortion.

viii. **Electric current:** An electric current of 110 V with negative pole applied to posterior vaginal cul-desac and positive pole to lumbosacral region, leads to contraction of uterus and expulsion of contents.

ix. **Pastes:** Utus paste (semi-solid soap mixed with potassium iodide, thymol and mercury) or Fetex paste is introduced in the extra-ovular space for abortion.

Complications of Criminal Abortion

<i>Immediate</i>	<i>Delayed</i>
◆ Vagal inhibition	◆ Septicemia
◆ Air embolism	◆ Generalized peritonitis
◆ Fat embolism	◆ Pyemia
◆ Hemorrhagic shock	◆ Toxemia
◆ Amniotic fluid embolism	◆ Local infection
◆ Poisoning (rare)	◆ Tetanus
<i>Systemic complications</i>	<i>Remote complications</i>
◆ Jaundice, hepatitis	◆ Chronic debility
◆ Acute renal failure	◆ Chronic pelvic pain
◆ Endocarditis	◆ Dyspareunia
◆ Pneumonitis	◆ Ectopic pregnancy
◆ Pulmonary embolism	◆ Secondary infertility
◆ Endotoxic shock	◆ Depression

Septic Abortion

- It is defined as a type of abortion associated with sepsis of the products of conception and the uterus. ☐ Infection usually involves the endometrium and may spread into the myometrium and parametrium. Parametritis may progress into peritonitis. **Pelvic inflammatory disease is the most common complication of septic abortion.**
- ☐ Microorganisms causing uterine sepsis (mixed infection is more common) :
 1. **Anaerobic:** *Bacteroides* group (*fragilis*), anaerobic *Streptococci*, *Clostridium welchii* and tetanus bacilli.
 2. **Aerobic:** *E. coli*, *Klebsiella*, *Staphylococcus aureus*, *Pseudomonas* and hemolytic *Streptococcus*.
- **Cause of sepsis:**
 1. ☐ Proper antiseptic and asepsis is not maintained
 2. Incomplete evacuation
 3. Inadvertent injury to the genital organs and adjacent structures, particularly the gut.

Amniotic Fluid Embolism

- **Most of the cases occur during:**
 1. 1st and 2nd trimester abortion
 2. Active labor
 3. Amniocentesis
 4. Abdominal trauma
- ☐ Amniotic fluid embolism is a rare, unforeseeable and dreadful complication. This occurs when massive amount of amniotic fluid enters the maternal venous system.
- ☐ There may be tonic-clonic seizures, breathlessness and loss of consciousness. In half the cases, death occurs in the first hour. It causes DIC and fibrin deposition in many organs.
- **Diagnosis** is established by demonstration of mucin, lanugo hair, vernix caseosa, fat globules, meconium and fetal squamous cells in cut sections of the lung

- **Lendrum's stain (Phloxine-Tartrazine):** This stain is useful to detect amniotic fluid embolism deaths, since keratin of amniotic squames is stained red, nuclei blue and cytoplasm yellow.
- **The 'WHO' method:** It is helpful to demonstrate keratin and mucin-like substances in amniotic fluid embolism.

Medico-legal Aspects

- [?] Nearly all criminal abortion take place at about 2nd and 3rd month of pregnancy, when the woman is certain about her condition.
- [?] It is resorted mostly by widows and unmarried girls.
- **Fabricated abortion:** Rarely, when a woman is assaulted, she may try to exaggerate the offence by alleging that it caused her to abort. She may acquire a human or an animal fetus to support the charge.

Medico-legal Importance of Placenta

- ☐ Gives an idea of the length of gestation.
- Transfer of poisons, bacteria and antibodies across the placenta may result in death, disease or abnormalities of fetus.
- ☐ In criminal abortion, pieces are often retained in the uterus.

- Second trimester abortion (rate is among the highest in the world) increases the risk in women—they are more likely to go to an uncertified provider, and the risk of complications is higher for physiological reasons.
- Most common reasons for second trimester abortions—sex selective abortions and delay of accessing abortion services for an unwanted pregnancy.
- Legal abortion is not an option for most Indian women from lower socioeconomic classes, hence these women gets the abortion done from less trained, but more accessible providers.

Duties of a Doctor in Suspected Criminal Abortion

- i. He should ask the patient to make a statement about the induction of criminal abortion. If she refuses, he should not pursue the matter, but inform the police.
- ii. Doctor should keep all the information obtained by him as professional secret.
- iii. He must consult a professional colleague.
- iv. If the woman's condition is serious, he must arrange to record the dying declaration.
- v. If the woman dies, he should not issue a death certificate, but should inform the police for postmortem examination.

Examination of a Woman with Alleged History of Abortion

Differentiation 22.1: Natural and criminal abortion

S.No.	Feature	Natural abortion	Criminal abortion
1.	Cause	Predisposing diseases	Pregnancy in unmarried woman or widow
2.	Injuries on genital organs	Absent	Contusions and lacerations may be present
3.	Marks of violence on abdomen	Absent	May be present
4.	Foreign bodies in genital tract	Absent	May be present
5.	Fetal injuries	Absent	May be present
6.	Toxic effect of drugs	Absent	Inflammation of vagina, cervix, GIT or urinary tract may be present
7.	Infection	Rare	Frequent

Examination of a Living Individual

- It includes:
 1. ☐. Requisition from the concerned authority
 2. ☐. Identification of the female
 3. ☐. Written informed consent of the female
 4. ☐. A female nurse (if the doctor is male)
 5. ☐. Brief history—date time, place of abortion, method used to procure abortion. History of illegal termination by an unauthorized person is mostly concealed. The behavior of the woman may also be indicative, e.g. if she refuses medical help or if there is evidence of contradictory statements.

Clothing must be examined, especially the undergarments for bloodstains, stains from abortifacients (fluid, soapy materials)—preserved and sent to CFSL.

Clinical Examination

- Since, most of the abortifacients are irritants, the woman may show signs of ill health, GIT disturbances and exhaustion.
- ☐ In case of sepsis, there will be pyrexia with chills and rigor, pain abdomen and increased pulse rate (100–120/minute).

Local Examination

- [?] Appearance of perineum, vulva and vagina is noted.
- [?] Presence/absence of injuries (abrasions/contusions/lacerations) is noted.
- [?] Condition of os is noted. It remains dilated for few days and may also show some injuries due to instrumentation.
- [?] Presence of recent tears, the marks of forceps or other instruments in and around genitalia should be noted.
- [?] Character and amount of discharge is noted. In case of sepsis, offensive purulent vaginal discharge or a tender uterus with patulous os may be found

Laboratory investigations

- Serum and urine gives positive result for the test for hCG upto 7–10 days.
- In abortion during early months of gestation, the signs will be ill-defined, whereas signs persist for a longer time if sepsis has taken place and if abortion has been carried out in late months of gestation.

Examination of a Dead Body

- The conviction of a person for criminal abortion should be based on autopsy, laboratory and circumstantial findings.
- **a. Sudden death of a woman of child-bearing age should give rise to the suspicion of criminal abortion if:**
 1. The deceased was pregnant and deeply cyanosed.
 2. Instruments to procure an abortion or abortifacient drugs are found at scene of death.
 3. Underclothing appears to be disturbed after death.
 4. Fluid, soapy material or blood coming out of vagina.
- **b. Following point should be proved to convict the abortionist:**
 1. The dead woman was pregnant.
 2. The accused was responsible for the act which resulted in the interruption of pregnancy.
 3. The accused acted for the purpose of procuring an illegal abortion.
 4. Death occurred as a result of attempt to interrupt the pregnancy.
- Moreover, any criminal charge must be substantiated not only by positive evidence of interference relating to the deceased's death, but also to exclude the possibility of self-induced abortion.

Postmortem Examination

- The autopsy involves identification of fetal remains and association with the alleged mother.

- Autopsy examination should include absolute identification of the victim and careful examination of the clothing including undergarments which must be preserved for any traces of foreign solutions.
- ☐ External features of pregnancy should be looked for.
- If death is due to hemorrhage, body will look pale.
- ☐ Presence of injuries (general or local) is noted.
- If abortifacient drug was injected, then the injection mark(s) can be detected over usual sites.
- ☐ *Local examination*: Labia majora, minora, vagina, cervix may show injuries and may be congested. It may be stained by locally used abortifacient agents.
- ☐ *To confirm or exclude air embolism*, the body must be opened after radiological examination as it may show **translucency of the right ventricle and pulmonary artery** .
- ☐ The *abdominal cavity* is opened and may be full of blood, if there is perforation of uterus. Uterine and adnexal tissues are assessed for crepitation due to gas formation in the uterine wall, and venous channels and the inferior vena cava is inspected for air or soap embolism bubbles.

- The *skull vault* must then be carefully removed, avoiding puncture of the meninges and vessels over the brain surface which allows air to enter these vessels; **a detailed examination of the basal sinuses, veins and arteries is made for the presence of air embolism.**
- Following removal of the thoracic and abdominal organs in the usual manner, the pelvic organs are excised *en-masse* following separation of the symphysis pubis and a circular dissection to include vagina, vulva and rectum with adjacent skin, taking care to collect any foreign fluid or material for chemical and bacteriological examination. The vagina and uterus are opened along their anterior surface because injuries are more likely to occur on the posterior vaginal wall following criminal interference.
- *Findings in the uterus:* Cavity may show presence of products of conception in full or in parts. It may be enlarged, soft and congested. Wall may show thickening in longitudinal section.

Samples to be collected in criminal abortion

- Vaginal contents pipetted in a clean sterile container for chemicals, drugs or soap.
- Pubic hair.
- Blood, urine and stomach contents.
- Blood from the inferior vena cava and both cardiac ventricles.
- Any fluid from the uterine cavity.
- Swabs of the uterine wall.
- Tissues for histology from all organs.

Trauma and Abortion

- Travel, in the absence of trauma, does not increase the incidence of abortion.
- ☐ Trauma may rarely cause an abortion, in the absence of serious or life-threatening injury to mother.
- ☐ ***Following criteria suggests a causal relationship between trauma and abortion:***
 - a. The traumatic event was followed within 24 hours by processes that ultimately lead to abortion.
 - b. Appearance of the fetus and placenta should be compatible with the period of pregnancy at which the traumatic event occurred.
 - c. The fetus and placenta should be normal

- **Factors known to cause abortion should be absent, such as:**

- i. History of repeated abortion without any cause or exposure to abortifacients, e.g. X-ray or lead.

- ii. Chronic infections in mother, e.g. syphilis, toxoplasmosis or tuberculosis.

- iii. Abnormalities of uterus including congenital defect of uterine development, leiomyomas, endometrial polyps and incompetent os.

- iv. Physical attempt to induce abortion.