Forensic Book questions

8 Thanatology

Definition: Thanatology (Greek *thanatos*: death) is the scientific study of death in all its aspects including its cause and phenomena.[1] It also includes bodily changes that accompany death (postmortem changes) and their medico-legal significance.

Death occurs in two stages (Diff 8.1):

i. Somatic, systemic or clinical
ii. Molecular or cellular.

Somatic death: The question of death is important in resuscitation and organ transplantation. Skin and bone remains metabolically active for many hours and these cells can be successfully cultured days after somatic death.

During early 20th century, irreversible cessation of circulatory and respiratory functions was sufficient basis for diagnosing death.

Molecular death

- Molecular death occurs piecemeal. Initial changes occur due to metabolic dysfunction and later from structural disintegration.
- Nervous tissues die rapidly, the vital centres of the brain in about 3–7 min, but muscles survive upto 1-2 h.

Supravital reactions

- **Mechanical excitability of the skeletal muscle**
  i. Tendon reaction (*Zsako's phenomenon*): Contraction of the whole muscle (e.g. quadriceps) due to propagated excitation following a mechanical stimulation, seen within 2-3 h after death.
  ii. Localized idiomuscular contraction at the point of stimulation may be seen several hours after cessation of Zsako's phenomenon.
- **Electrical excitability of the skeletal muscles** of the face may be observed for few hours after death.
- **Pharmacological excitability** of the iris muscle resulting in change of pupil diameter following the administration of miotic or mydriatic solutions can be seen during the first hours of the postmortem period.

Brain/Brainstem Death

As ventilator technology advanced, circulation and respiration could be maintained by means of a mechanical respirator, despite loss of all brain functions and thus have brought the concept of **brain death**, i.e. irreversible loss of cerebral functioning.

- Brain death is the complete and irreversible cessation of functioning of the brain. Brain includes all the CNS structures, except the spinal cord.

Differentiation 8.1: Somatic death and molecular death

S.No.	Feature	Somatic death[2]	Molecular death[3]
1.	Definition	Complete and irreversible cessation of function of brain and stoppage of the circulation and respiration	Death of individual tissues and cells
2.	Onset	Precedes molecular death	Succeeds somatic death (1-2 h after stoppage of vital functions)
3.	Response to external stimuli	Muscle responds thermal, electrical or chemical stimulus	Does not respond
4.	Confirmation	Flat ECG and EEG, and absent breath sounds	Rigor mortis, algor mortis, postmortem lividity, putrefaction
5.	Resemblance	Suspended animation, coma, hypothermia	Does not resemble any condition

Vagal Inhibition (Vasovagal Shock/Reflex Cardiac Arrest/Nervous Apoplexy)

- Sudden death occurring within seconds or minutes as a result of minor trauma or harmless peripheral stimulation may be caused by vagal inhibition.
- Pressure on the baroreceptors situated in the carotid sinuses, carotid sheaths and the carotid body (located in the internal carotid artery and situated near the angle of mandible) causes an increase in blood pressure in these sinuses with resultant slowing of the heart rate, dilatation of blood vessels and fall in blood pressure.
- Some individuals show marked hypersensitivity to stimulation of the carotid sinuses, characterized by bradycardia and cardiac arrhythmias ranging from ventricular arrhythmias to cardiac arrest.

Mechanism: It acts through a reflex arc in which the afferent (sensory) nerve impulses arise in the carotid complex of nerve endings, but not in the vagal nerve trunk itself. These impulses pass through glossopharyngeal nerves to the tenth nucleus in the brainstem, then return through the vagus (efferent) supply to the heart and other organs. This reflex arc acts through the parasympathetic autonomic nervous system and is independent of the main motor and sensory nerve pathways. Affarent fibres are present over the skin, pharynx, glottis, pleura, peritoneum and cervix, which pass into the lateral tracts of spinal cord and finally to the brain.

Causes

i. Pressure on the carotid sinuses, as in hanging or strangulation.
ii. Unexpected blow to the larynx, chest, abdomen and genital organs.
iii. Impaction of food in the larynx or sudden inhalation of fluid into the upper respiratory tract.
iv. Sudden immersion of body in cold water.
v. The insertion of an instrument into the bronchus, uterus, bladder or rectum.
vi. Puncture of a pleural cavity producing a pneumothorax.
vii. Sudden evacuation of pathological fluids, e.g. ascitic tap.

Postmortem examination: There are no characteristic postmortem findings. The cause of death can be inferred only by exclusion of other pathological conditions and from the observation of reliable witnesses, history and clinical findings concerning the circumstances of death.

MULTIPLE CHOICE QUESTIONS

1. Study of death in all its aspects is known as: *AIIMS 08*
A. Eugenics **B.** Thanatology
C. Dactylography **D.** Tricology

2. True about somatic death are all, *except*: *PGI 03*
A. Cooling of the body
B. Cessation of spontaneous respiration
C. Cessation of circulation
D. Flat isoelectric EEG

3. Molecular death is: *PGI 10; Kerala 11*
A. Complete and irreversible cessation of brain, heart and lungs function
B. Death of individual tissues and cells after somatic death
C. Total loss of EEG activity, but heart is functioning
D. Vitals functions are at low pitch that cannot be detected by clinical examination

4. NOT important in brain death: *PGI 07*
A. EEG
B. ECG
C. Absence of brainstem reflex
D. Body temperature

5. Brainstem dead are all, *except*: *JIPMER 08*
A. Weaned off from ventilator, no respiration for 15 secs
B. Absent pupillary response
C. Absent nystagmus
D. Absent corneal reflex

6. All the following are found in brain dead patients, *except*: *NIMHANS 07; Karnataka 11*
A. Decreased deep tendon reflex
B. Absent pupillary reflexes
C. Complete apnea
D. Heart unresponsive to atropine

7. A woman with infertility receives an ovary transplant from her sister who is an identical twin. Type of graft is: *AI 05*
A. Xenograft **B.** Autograft
C. Allograft **D.** Isograft

8. Xenograft is transplantation of tissue: *FMGE 10*
A. From a different species
B. From same species
C. From genetically identical twins
D. From one part of body to another

1. B **2. A** **3. B** **4. B** **5. A** **6. A** **7. D** **8. A**

9. Agonal period is the duration between: *Maharashtra 08*

A. Traumatic event and information given to the relatives
B. Traumatic event and starting of the operation
C. Lethal trauma upto death
D. Death and postmortem examination

10. An old lady with mitral stenosis underwent hysterectomy for uterine fibroid and died after developing pulmonary edema. The order of cause of death in international certificate is: *NIMS 11*

A. Mitral stenosis, pulmonary edema, hysterectomy
B. Pulmonary edema, mitral stenosis, hysterectomy
C. Pulmonary edema, hysterectomy, mitral stenosis
D. Hysterectomy, pulmonary edema, mitral stenosis

11. Gordon's clarification of death signifies: *Orissa 11*

A. Mechanism of death **B.** Causes of death
C. Modes of death **D.** Manner of death

12. Diffusion of oxygen at the tissue level is affected in all the following poisonings, *except*: *AIIMS 05*

A. Carbon monoxide **B.** Curare
C. Phosgene **D.** Cyanides

13. Cyanide poisoning causes: *AFMC 10*

A. Histotoxic anoxia **B.** Anoxic anoxia
C. Anemic anoxia **D.** Stagnant anoxia

14. All the statements regarding atherosclerosis are true, *except*: *AP 10; SGPGI 11*

A. Naked eye changes are not visible for the first 12 hours
B. Triphenyl tetrazolium chloride can help in detecting infracted area
C. Most commonly involves the left coronary artery
D. Common site is the anterior wall of right ventricle

9. C **10. C** **11. C** **12. B** **13. A** **14. D**

9 Signs of Death

The changes which occur after death are helpful in estimation of the approximate time of death and to differentiate death from suspended animation. It can be classified into: (Table 9.1)

- Immediate changes
- Early changes
- Late changes.

Immediate Changes (Somatic Death)

a. **Irreversible cessation of the function of brain including brainstem:** This is earliest sign of death with stoppage of functions of the nervous system. There is insensibility and loss of both sensory and motor functions. There is loss of reflexes, no response and no tonicity of the muscles. Pupils are widely dilated. This condition is sometimes seen in:
   - Prolonged fainting attack
   - Vagal inhibitory phenomenon
   - Epilepsy, mesmeric trance, catalepsy, narcosis, electrocution.

b. **Irreversible cessation of respiration:** Complete stoppage of respiration for > 4 min usually causes death. The stoppage of respiration can be established by the following tests:
   i. *Inspection*: No visible respiratory movement.
   ii. *Palpation*: No respiratory movement can be felt.
   iii. *Auscultation*: Breath sounds cannot be heard from any part of the lungs.
   iv. Feather test, mirror test and Winslow's test are no longer utilized.

   Respiration may stop briefly without death as in:
   - Voluntary breath holding
   - Drowning
   - Cheyne-Stokes respiration
   - Newborns.

c. **Irreversible cessation of circulation:** Stoppage of heart beat for > 3-5 min is irrecoverable and results in death. The following tests may be performed to test circulation:
   i. Radial, brachial, femoral and carotid pulsations will be absent, if the circulation has stopped.
   ii. *Auscultation of heart:* Absence of the heart beat over the whole precordial area and particularly over the area of the apex.
   iii. *ECG:* In case of cessation of circulation, the ECG curve is absent and the tracing shows a flat line without any elevation or depression.
   iv. *Other tests:* Various tests, like diaphanous, magnus, I-card, pressure, cut and heat tests are now obsolete.[2]

Tests to detect stoppage of respiration *(obsolete)*
- *Winslow's test:* No movement of reflection of light shone on mirror or surface of water in bowl kept on the chest.[3,4]
- *Feather test:* No movement is seen, if a feather or fine cotton fibres are held before the nostrils.
- *Mirror test:* No haziness is seen on the reflecting surface of the mirror held in front of mouth and nostrils.

Table 9.1: Changes after death

Immediate changes[1]	Early changes[2]	Late changes
Irreversible cessation of: • Function of brain • Circulation • Respiration	• Loss of elasticity of the skin, and facial pallor • Primary relaxation of the muscles • Contact pallor and flattening • Changes in the eye • Algor mortis • Livor mortis • Rigor mortis	• Putrefaction • Adipocere formation • Mummification

for a long period or for claiming insurance money when the individual is alleged to be dead and body is not found.

Sec. 107 IEA states that a person is presumed being alive, if there is nothing to suggest the probability of death within 30 years. **Sec. 108 IEA** states that, if it is proved that the said person has not been heard of for 7 years by them, who are expected to hear about him, if he would be alive, then death is presumed.

MULTIPLE CHOICE QUESTIONS

1. Immediate sign of death is: *DNB 10*
- **A.** Rise in body temperature
- **B.** Dilatation of pupil
- **C.** Changes in skin
- **D.** Cessation of respiration & circulation

2. Following is an early sign of death: *Karnataka 03*
- **A.** Rigor mortis
- **B.** Adipocere formation
- **C.** Putrefaction
- **D.** Mummification

3. All are tests associated with cessation of circulation, *except*: *Orissa 04; UP 05*
- **A.** Winslow's test
- **B.** Magnus test
- **C.** Diaphanous test
- **D.** I-card's test

4. Test of historical importance to detect respiration: *MAHE 09*
- **A.** I-card test
- **B.** Winslow test
- **C.** Magnus test
- **D.** Diaphanous test

5. True about suspended animation: *PGI 10*
- **A.** Common phenomenon
- **B.** Can be voluntary
- **C.** Similar to molecular death
- **D.** Resembles brain death

6. Suspended animation may be seen: *BHU 11*
- **A.** Electrocution
- **B.** Hanging
- **C.** Drowning
- **D.** Burn

7. The phenomenon of suspended animation may be seen in: *AIIMS 04*
- **A.** Throttling
- **B.** Drowning
- **C.** Strangulation
- **D.** Brain hemorrhage

8. Tache noire is: *TN 05*
- **A.** Postmortem caloricity
- **B.** Change in eye after death
- **C.** Postmortem lividity
- **D.** None of the above

9. Algor mortis is: *JIPMER 03; Punjab 11*
- **A.** Cadaveric spasm
- **B.** Hypostasis
- **C.** Cooling of body
- **D.** Rigor mortis

10. The ideal place to record body temperature in dead body is: *AIIMS 05, 06; BHU 10*
- **A.** Rectum
- **B.** Axilla
- **C.** Mouth
- **D.** Groin

11. The rate of cooling down of dead bodies in tropical climate is: *Delhi 05, 06; Kerala 06; UP 07*
- **A.** 0.2°C/h
- **B.** 0.5°C/h
- **C.** 1.5°C/h
- **D.** 2°C/h

12. Postmortem caloricity may be seen in all the following causes of death, *except:* *AIIMS 05; MP 07*
- **A.** Septicemia
- **B.** Barbiturates poisoning
- **C.** Strychnine poisoning
- **D.** Tetanus

13. Postmortem caloricity is seen in all, *except:* *JIPMER 03; AP 06*
- **A.** Burns
- **B.** Sunstroke
- **C.** Tetanus
- **D.** Septicemia

14. Postmortem staining gets fixed within: *BHU 10*
- **A.** 1 h after death
- **B.** 6 h after death
- **C.** 12 h after death
- **D.** 24 h after death

15. Postmortem lividity is unlikely to develop in a case of: *AI 03*
- **A.** Drowning in well
- **B.** Drowning in a fast flowing river
- **C.** Postmortem submersion
- **D.** Drowning in chlorinated swimming pool

16. Statement NOT true about postmortem staining is: *PGI 05*
- **A.** Disappears within 24 h with discoloration
- **B.** Seen only in dependent parts
- **C.** Appears immediately after death
- **D.** Not seen in parts tied with a tight cloth or at pressure point

17. Postmortem lividity is useful to access: *TN 06*
- **A.** Time since death
- **B.** To know the weapon used
- **C.** Position of the body after death
- **D.** All of the above

18. Difference between postmortem staining and contusion are all, *except*: *PGI 10*
- **A.** Bluish in color
- **B.** Disappear on pressure
- **C.** Margins are regular
- **D.** Extravasation is found

19. True about rigor mortis are all, *except:* *PGI 03; FMGE 08*
- **A.** Seen immediately after death
- **B.** It last 18-36 h in summer
- **C.** It disappears in the sequence as it appears
- **D.** It last 24-48 h in winter

1. D	2. A	3. A	4. B	5. B & D	6. A & C	7. B	8. B	9. C	10. A
11. B	12. B	13. A	14. B	15. B	16. A	17. A & C	18. D	19. A	

20. Rigor mortis develops in: *Bihar 10*
A. 1-2 h **B.** 3-6 h
C. 6-8 h **D.** 10-12 h

21. Rigor mortis starts in: *PGI 04; TN 03, 05; UP 08*
A. Eyelids **B.** Heart
C. Voluntary muscle **D.** Limbs

22. Rigor mortis occurs first in which voluntary muscle: *Delhi 05, 06, 07; COMEDK 08; SGPGI 11*
A. Muscles of eyelids **B.** Small muscles of hands
C. Neck muscles **D.** Face muscles

23. Rigor mortis is simulated by all, *except:* *PGI 06*
A. Cold stiffness **B.** Heat stiffness
C. Tetanus **D.** Putrefaction

24. Immediate reaction after death is: *Kerala 08; Punjab 09*
A. Cadaveric spasm **B.** Pugilistic attitude
C. Rigor mortis **D.** Algor mortis

25. When a group of muscles of a dead body were in state of strong contraction immediately prior to death and remain so even after death, the condition is termed as: *AIIMS 05*
A. Gas stiffening **B.** Rigor mortis
C. Cadaveric spasm **D.** Cold stiffening

26. Statement NOT true about cadaveric spasm is: *Delhi 03; PGI 05; Maharashtra 08; Kerala 11*
A. It indicates the mode of death
B. It appears instantaneously after death
C. All muscles of the body are involved
D. Great force is required to overcome it

27. Color changes of putrefaction are first observed in the: *Delhi 05*
A. Right iliac fossa **B.** Popliteal fossa
C. Cubital fossa **D.** Arm pits

28. Marbling in summer occurs within: *WB 11*
A. 18 h **B.** 36 h
C. 48 h **D.** 72 h

29. Foamy liver is seen in: *TN 08; UP 08; NIMS 11*
A. Arsenic poisoning **B.** Electrocution
C. Hanging **D.** Putrefaction

30. Sequence of putrefaction: *WB 07*
A. Heart-brain-uterus-spleen
B. Spleen-brain-heart-uterus
C. Heart-spleen-brain-uterus
D. Heart-brain-spleen-uterus

31. Which one of the tissues putrefies late: *AIIMS 03; Gujarat 07; WB 09; Jharkhand 11*
A. Brain **B.** Prostate
C. Liver **D.** Stomach

32. Casper's dictum for rate of decomposition in air: water: buried bodies is: *TN 09*
A. 8 : 4 : 1 **B.** 4 : 2 : 1
C. 1 : 2 : 4 **D.** 1 : 4 : 8

33. Casper's dictum is related to: *AI 09; MP 11*
A. Identification of dead body
B. Calculation of time since death
C. Floatation of a dead body
D. Rate of putrefaction

34. Putrefaction of body in air compared to earth is: *AP 07*
A. Same **B.** Two times
C. Four times **D.** Eight times

35. Entomology of cadaver helps in finding: *TN 09*
A. Time since death **B.** Mode of death
C. Manner of death **D.** Identify the disease

36. All are features of adipocere, *except:* *Manipal 11*
A. It consists of fatty acids
B. Takes place in bodies buried in shallow graves
C. Takes about 3 weeks to form
D. Bacterial enzymes are necessary for its formation

37. Environmental condition needed for adipocere formation: *AIIMS 11; MP 11*
A. Hot and dry **B.** Humid and optimum
C. Hot and humid **D.** Cold and moist

38. Over dead body, maggots do not appear before: *UP 05*
A. 8 h **B.** 12 h
C. 24 h **D.** 52 h

39. From vitreous humor, estimation of time since death is done by: *WB 11*
A. K^+ level **B.** Na^+ level
C. Glucose level **D.** Urea level

40. Best medium to estimate time since death: *Maharashtra 09*
A. Blood **B.** Vitreous humor
C. CSF **D.** Pericardial fluid

41. NOT a constituent of embalming fluid: *AIIMS 08*
A. Formalin **B.** Methanol
C. Ethanol **D.** Glycerin

20. D	**21. B**	**22. A**	**23. C**	**24. A**	**25. C**	**26. C**	**27. A**	**28. B**	**29. D**
30. B	**31. B**	**32. D**	**33. D**	**34. D**	**35. A**	**36. B**	**37. C**	**38. D**	**39. A**
40. B	**41. C**								

Asphyxia

10

Definition: Asphyxia (Greek, 'pulsenessness' or 'absence of pulse') is a condition caused by interference with the exchange of oxygen and carbon dioxide in the body.

- Asphyxia literally means 'defective aeration of blood' due to any cause.

Pathophysiology of Asphyxia

Pathophysiology of asphyxia is depicted in Flow chart 10.1.

Etiology of Asphyxia (Table 10.1)

It can be:

i. **Mechanical/violent:** Mechanical interference to the passage of air into the respiratory tract by (Fig. 10.1):
   - Closure of the external respiratory orifices by closing the nose and the mouth (e.g. smothering).
   - Closure of the air passages by external pressure on the neck (e.g. hanging, strangulation and throttling) or impaction of foreign bodies (e.g. gagging and choking).
   - Occlusion of the respiratory tract and lungs by fluid (e.g. drowning).
   - Pressure on the chest in a stampede or collapse of a building (e.g. traumatic asphyxia).

ii. **Pathological:** Entry of oxygen to the lungs is prevented by disease of the upper respiratory tract or lungs, e.g. laryngeal edema, spasm, tumors and abscess.

iii. **Toxic or chemical:** Cessation of the respiratory movements due to paralysis of the respiratory centre in poisoning with morphine, barbiturates and

Flow chart 10.1: Pathophysiology of asphyxia (vicious cycle)

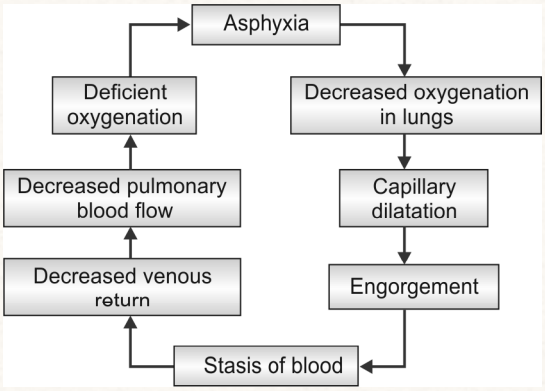


Table 10.1: Asphyxial conditions

Classification	Level of obstruction	Cause
Strangulation/hanging	Neck (including larynx, trachea and major blood vessels)	Occlusion of the internal airways by external pressure
Smothering	Mouth and nose	Blockage of the external orifices
Gagging	Nasopharynx	Blockage of the internal airways
Choking	Larynx	Blockage of the internal airways
Overlaying	Mouth, nose, chest	Occlusion of mouth and nose and blockage of the internal airways by external pressure
Traumatic asphyxia	Chest	Restriction of chest movement due to external mechanical fixation
Wedging	Neck and chest	Occlusion of the internal airways by external pressure
Drowning	Upper and lower respiratory tract	Occlusion of the internal airways by fluid
Toxic asphyxia	Lung	Failure of oxygen transportation/utilization, CO or cyanide poisoning

In skin diving, a mask and fins are used and it is an extension of swimming with similar hazards.

Sexual Asphyxia (Autoerotic asphyxia/ Hypoxyphilia, Asphyxiophilia)

Definition: Autoerotic asphyxia is a paraphilia in which sexual arousal and orgasm depend on self-induced asphyxia upto, but not including loss of consciousness.

- Partial asphyxia caused by pressure on carotid vessels or obstruction of air passages causes cerebral ischemia and may lead to hallucinations of an erotic nature in some men.
- The degree of asphyxia produced by mechanical means is controlled, i.e. the victim is in a position that allows self-release. but in some cases death occurs accidentally.
- These cases are associated with some form of abnormal sexual behavior, usually masochism, cisvestism and transvestism.
- Victims are usually young males, scene is usually the victim's own house, bedroom, bathroom, basement and the door is locked from inside.

Methods

i. **Hanging:** Most frequent method. The presence of padding under the noose, nakedness of the victim, feminine attire and exposed genitalia are the hallmarks of these deaths. Frequently, the person ties his arms, legs and sometimes waist and genitalia (*bondage*) with a rope, string or chain.

ii. Sexual gratification may be obtained by **electrical stimulation**. For this, electrodes are applied to the genitals or on abdomen; usually a low voltage supply from a battery is used.

iii. **Other methods** include covering the head in plastic or some impervious bag which may be secured around the neck by an elastic band to achieve partial anoxia. It is sometimes combined with the inhalation of volatile solvents ('glue sniffing').

iv. Carbon tetrachloride, paint thinners, petrol or amyl acetate are either directly inhaled from container or re-breathed after placing in a plastic bag.

The scene should be examined for:

- Evidence of abnormal sexual behavior and nakedness of the deceased with presence of pornographic material. There may be mirror(s) positioned in such a way to allow viewing of the act.
- Evidence that the act has been practiced previously, such as worn grooves in rafter or door, where ropes or pulleys have been placed, from verbal communication with others regarding the nature of activities or from diaries, etc.
- Evidence of attempts to conceal the act by some method, padding to prevent a ligature from leaving marks around neck.

There is no evidence to suggest it a suicidal act and the situation is ruled as an accident.[37]

MULTIPLE CHOICE QUESTIONS

1. When a person has suspended himself with the knot situated in the region of the occiput, such hanging is called: *AIIMS 04*
A. Typical **B.** Atypical
C. Partial **D.** Incomplete

2. In typical hanging, knot is placed at: *FMGE 09*
A. Occiput **B.** Chin
C. Left side of mandible **D.** Right side of mandible

3. *'La facies sympathique'* is a condition seen in cases of: *AIIMS 05; Maharashtra 10, 11; Punjab 11*
A. Hanging **B.** Strangulation
C. Throttling **D.** Railway accidents

4. Increased salivation is seen in death due to: *JIPMER 03*
A. Strangulation **B.** Hanging
C. Drowning **D.** Cyanide poisoning

5. Following is most suggestive of antemortem hanging: *Karnataka 04; DNB 09*
A. Salivary dribbling **B.** Congestion of lungs
C. Ligature marks **D.** Petechial hemorrhages

6. Lynching is a type of: *Orissa 11; AFMC 11*
A. Homicidal hanging **B.** Suicidal hanging
C. Judicial hanging **D.** Accidental hanging

7. The 'knot' in judicial hanging is placed at: *AIIMS 06*
A. Behind the neck **B.** Side of the neck
C. Below the chin **D.** Choice of hangman

8. Hangman's fracture is: *COMEDK 07; Bihar 10; Manipal 11*
A. Spondylolisthesis of C2 over C3
B. Fracture of odontoid process
C. Fracture of transverse process
D. Dislocation of C5

1. A **2. A** **3. A** **4. B** **5. A** **6. A** **7. C** **8. A**

9. Spanish windlass is practiced in which form of strangulation: *AIIMS 10*
A. Bansdola **B.** Garroting
C. Throttling **D.** Mugging

10. Characteristics of strangulation are all, *except:* *Delhi 03*
A. Fracture of thyroid cartilage
B. Bleeding from nose
C. Saliva running out of mouth
D. Transverse ligature mark

11. NOT a feature of ligature strangulation: *Kerala 08*
A. Horizontal ligature mark
B. Incomplete ligature mark
C. Marked congested face
D. Sub-conjunctival hemorrhage

12. On postmortem examination, contusion of neck muscles is seen along with fracture of hyoid bone. The most probable cause of death is: *AI 08; AIIMS 08*
A. Smothering **B.** Mugging
C. Burking **D.** Throttling

13. Fracture of hyoid bone is indicative of: *FMGE 09,11; Maharashtra 09; AP 11*
A. Manual strangulation **B.** Ligature strangulation
C. Bansdola **D.** Hanging

14. Outward displacement of fractured hyoid bone is seen in: *UP 10*
A. Manual strangulation **B.** Ligature strangulation
C. Hanging **D.** Bansdola

15. Death due to suffocation are all, *except:* *AI 08*
A. Smothering **B.** Choking
C. Throttling **D.** Gagging

16. A person was brought to the emergency with a history of something stuck in his throat during his dinner which progressed to dyspnea, the probable diagnosis is: *AI 09*
A. Myocardial infarction **B.** Foreign body
C. Pulmonary embolism **D.** Aortic dissection

17. During autopsy, foreign body is found in respiratory tract; manner of death is: *MP 07*
A. Homicide **B.** Suicide
C. Accident **D.** Natural

18. 'Café-coronary' refers to death in intoxicated person during meals due to: *Karnataka 04*
A. Suffocation **B.** Cardiac arrest
C. Choking **D.** Smothering

19. A 5-year old boy while having dinner suddenly becomes aphonic and is brought to the casualty with the complaint of respiratory distress. Appropriate management should be: *AI 11*
A. Cricothyroidotomy
B. Emergency tracheostomy
C. Humidified oxygen
D. Heimlich maneuver

20. All may cause traumatic asphyxia, *except*: *AI 09*
A. Railway accident
B. Road traffic accident
C. Accidental strangulation
D. Stampede

21. NOT true about fresh water drowning: *Kerala 09*
A. Hyperkalemia
B. Hypovolemia
C. Ventricular fibrillation
D. Hemolysis

22. In fresh water drowning, the death occurs within 4-5 min of submersion due to ventricular fibrillation. Following reason is responsible for this: *AIIMS 04*
A. Total asphyxia is produced due to fresh water
B. Laryngospasm causing vagal inhibition
C. Hemoconcentration of blood caused by the osmotic pressure effect
D. Hemodilution, overloading of heart and hemolysis resulting in release of potassium

23. In case of drowning in sea water: *TN 06*
A. Hb increases **B.** Hb decreases
C. No change **D.** Either

24. NOT seen in salt water drowning: *Maharashtra 11*
A. Hyperkalemia **B.** Progressive hypovolemia
C. Circulatory collapse **D.** Acute pulmonary edema

25. In dry drowning: *FMGE 09; AP 11*
A. Death occurs in few days of submersion episode
B. Death occurs due to sudden immersion in cold water
C. Water does not enter lungs because of laryngeal spasm
D. Seen in alcoholics due to drowning in shallow pool

26. Hydrocution is: *UP 05; AIIMS 08*
A. Wet drowning **B.** Immersion syndrome
C. Near drowning **D.** Dry drowning

27. Death occurs faster in: *MP 08*
A. Fresh water drowning
B. Salt water drowning
C. Near drowning
D. Warm water drowning

28. Best indicator of antemortem drowning is: *Delhi 07; TN 11*
A. Froth in nostrils
B. Cutis anserina
C. Washerwoman's hand
D. Water in stomach

29. A dead body in casualty showed fine lathery froth coming out of the mouth and nostrils, cause of death is: *PGI 03*
A. Drowning **B.** Morphine poisoning
C. Strangulation **D.** Dhatura poisoning

9. B	10. C	11. B	12. D	13. A	14. C	15. C	16. B	17. C	18. C
19. D	20. C	21. B	22. D	23. A	24. A	25. C	26. B	27. A	28. A
29. A									

30. Cutis anserina is seen in: *Delhi 03; PGI 05*

A. Drowning **B.** Firearm injury
C. Hanging **D.** Strangulation

31. Paltauf's hemorrhages are seen in: *AP 11*

A. Brain **B.** Lungs
C. Heart **D.** Liver

32. Gettler's test is used to diagnose death due to: *Delhi 06*

A. Hanging
B. Strangulation
C. Burns
D. Drowning

33. NOT correct regarding diatoms: *AI 05*

A. They are aquatic unicellular plant
B. Has an extracellular coat composed of magnesium
C. Acid digestion technique is used to extract them
D. Its presence in bone marrow indicates antemortem drowning

34. The best site for taking sample for diatoms test is: *PGI 05*

A. Lungs
B. Bone marrow of ulna
C. Bone marrow of femur
D. Muscle

35. Diatoms are seen in death due to: *Jharkhand 11*

A. Strangulation **B.** Drowning
C. Electrocution **D.** Asphyxia

36. Death due to drowning is suggested by all, *except:* *Delhi 06*

A. Profuse fine froth which increase on pressure on chest
B. Cadaveric spasm
C. Absence of mud/weeds in stomach
D. Diatoms in bone marrow

37. Sexual asphyxia is: *Maharashtra 08; Gujarat 10*

A. Suicidal death **B.** Homicidal death
C. Natural death **D.** Accidental death

30. A **31. B** **32. D** **33. B** **34. C** **35. B** **36. C** **37. D**

11 Injuries

Definitions

- **Injury:** Any harm, whatever illegally, caused to any person in *body, mind, reputation or property* **(Sec. 44 IPC).**
- **Wound:** *Clinically,* it means any injury where there is breach of natural continuity of skin or mucous membrane. *In medico-legal practice,* the terms wound and injury are synonymous, but strictly wound will include any lesion, external or internal, caused by violence, with or without breach of continuity of skin.

Classification of Wounds/Injuries

Injuries can be classified in many ways:

Based on Causative Factors

1. **Mechanical or physical injuries** (*produced by physical violence,* Fig. 11.1)
   i. Abrasion
   ii. Bruise or contusion
   iii. Lacerated wound
   iv. Incised wound
   v. Stab wound
   vi. Firearm wound
   vii. Fracture/dislocation of bone, tooth or joint.

- Blunt force trauma is caused when an object, usually without a sharp or cutting edge, impacts the body or the body impacts the object. Abrasion, contusion, laceration and fracture/dislocation of bone of tooth result from such an impact.
- Sharp force trauma occurs when an object with a sharp or sharpened edge impacts the body. Incised and stab wounds results from such trauma.
- For any given amount of force, the greater the area over which it is delivered, the less severe the wound (as applicable to blunt and sharp trauma).

The severity, extent and appearance of blunt trauma injuries depend on:
- The amount of force delivered to the body
- The time over which the force is delivered
- The region struck
- The extent of surface over which the force is delivered
- The nature of the weapon

2. **Thermal injuries**

Due to application of heat

a. General effects (may not cause any visible injury), e.g. heat cramps and heat stroke
b. Effects of local application, e.g. burns and scalds

Due to application of cold

a. General effects, e.g. hypothermia
b. Local effects, e.g. frost bite and trench foot

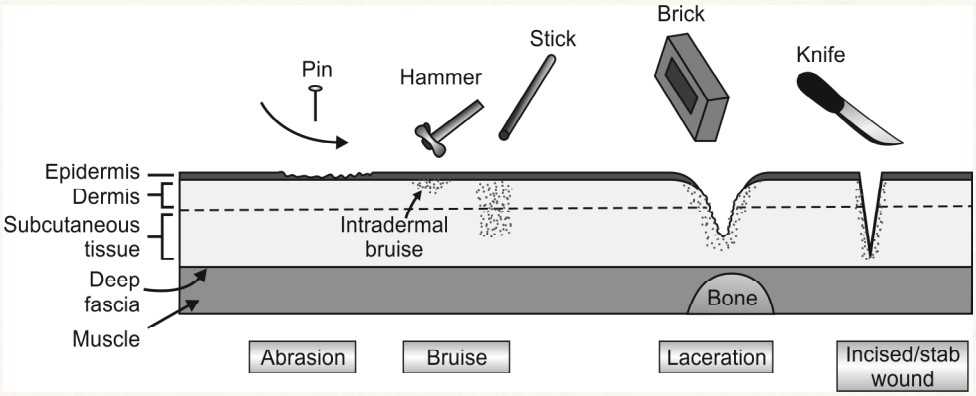


Fig. 11.1: Mechanical injuries caused by blunt and sharp objects

- Charge an enemy with assault or attempted murder.
- Convert simple injury into grievous one.
- By prisoners, to bring a charge of beating against officers.

ii. To avert suspicion
- Destroy evidence of certain injury which might connect a person with crime.
- Assailant may pretend self-defense.
- Policemen/watchmen may feign robbery or alleged attack.

iii. By soldiers and prisoners to escape difficult task
iv. Suicidal gestures, attempted suicide
v. For the purpose of insurance frauds

Diagnosis: The diagnosis can be done by careful history taking and examination of injuries (Box 11.1).

- **Types of wound**: Mostly incised wounds, sometimes contusions, stab wounds and burns. Lacerated wounds are rarely fabricated. Burns are superficial and usually seen on left upper arm.
- **Most commonly used object** is a knife. Razor, glass piece, scissors and ice pick are some of the other objects used.
- **Body parts where found:** Top of the head, forehead, neck, outer side of left arm, front and outer side of thighs and front of abdomen and chest (Fig. 11.18).

Box 11.1: Typical features of fabricated injuries (Fig. 11.18)

- History of assault incompatible with injuries
- Multiple shallow, non-penetrating cuts or fingernail abrasions
- Uniform in shape, linear or slightly curved course of lesions
- Grouped and/or parallel and/or criss-cross arrangement
- Location is easily reachable—usually on the left side (non-dominant side)
- Avoidance of pain sensitive regions of the body
- Absence of defense injuries
- No damage to clothes or inconsistent damage

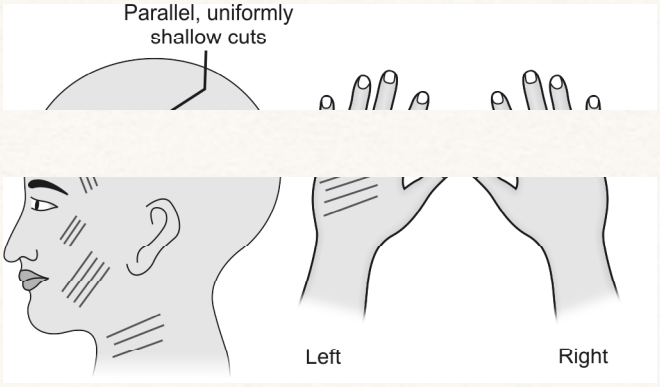


Fig. 11.18: Characteristics of self-inflicted injuries seen mostly in left side and avoid eyes, nose, mouth and ears

MULTIPLE CHOICE QUESTIONS

1. Graze is a form of: *Maharashtra 08, 09*
A. Contusion **B.** Abrasion
C. Lacerated wound **D.** Incised wound

2. The commonest type of abrasion seen in road traffic accidents is: *Karnataka 07*
A. Scratch abrasions **B.** Graze abrasions
C. Contact abrasions **D.** Imprint abrasions

3. Graze abrasions mimics: *AI 09*
A. Eczema **B.** Pressure sore
C. Burns **D.** Scalds

4. Brush burn is injury due: *MAHE 03*
A. Friction **B.** Electrocution
C. Steam **D.** Burns

5. Brush burn is: *AP 09*
A. Graze abrasion **B.** Imprint abrasion
C. Electric burn **D.** Arborescent burn

6. 'Patterned' abrasion is variety of: *AIIMS 05*
A. Linear abrasion **B.** Pressure abrasion
C. Sliding abrasion **D.** Superficial bruise

7. An auto rickshaw ran over a child's thigh, there is a mark of the tyre tracks, it is an example of: *AIIMS 10*
A. Patterned bruise
B. Patterned abrasion
C. Pressure abrasion
D. Graze abrasion

8. Bite mark is an example of: *FMGE 11*
A. Pressure abrasion **B.** Graze abrasion
C. Scratch abrasion **D.** Pattern abrasion

9. Scab or crust of abrasion appears brown in: *AI 06; PGI 11*
A. 12-24 h **B.** 2-3 days
C. 4-5 days **D.** 5-7 days

1. B **2. B** **3. C** **4. A** **5. A** **6. B** **7. B** **8. D** **9. B**

10. Prominent bruise with minimum force is seen in: *AIIMS 09*
A. Scalp **B.** Soles
C. Palm **D.** Face

11. Blue color of contusion is due to: *Gujarat 07*
A. Bilirubin **B.** Hemosiderin
C. Hematoidin **D.** De-oxyhemoglobin

12. Color of hemosiderin is: *DNB 09*
A. Brown **B.** Green
C. Yellow **D.** Red

13. Green color of contusion is due to: *TN 08*
A. Bilirubin **B.** Hemosiderin
C. Hematoidin **D.** Biliverdin

14. No color change is seen in sub-conjunctival hemorrhage due to: *WB 09*
A. Continuous CO_2 supply
B. Little amount of blood is present
C. Continuous O_2 supply
D. Color change occurs but not visible to naked eye

15. Antemortem bruise is differentiated from postmortem bruise by: *AIIMS 09*
A. Well-defined margin
B. Capillary rupture with extravasation of blood
C. Yellow color
D. Gaping

16. Split lacerations are due to: *DNB 09*
A. Blunt object **B.** Sharp object
C. Sharp heavy object **D.** Pointed object

17. Split laceration resembles: *Jharkhand 11*
A. Incised wound **B.** Abrasion
C. Gunshot wound **D.** Contusion

18. Sites notorious for incised looking wound are all, *except:* *UP 04*
A. Chest **B.** Zygoma
C. Iliac crest **D.** Shin

19. Flaying is seen in which type of lacerated wound: *AIIMS 11*
A. Split **B.** Stretch
C. Avulsion **D.** Cut

20. Tissue bridges are seen in: *DNB 10*
A. Abrasion **B.** Contusion
C. Laceration **D.** Stab wound

21. In an incised wound, all of the following are true, *except:* *COMEDK 07*
A. It has clean-cut margins
B. Bleeding is generally less than in lacerations
C. Tailing is often present
D. Length of injury does not correspond with length of blade

22. Hesitation cuts are seen in a case of: *Karnataka 03; PGI 04, 09; Maharashtra 09; Bihar 10; MP 11*
A. Homicide **B.** Suicide
C. Accident **D.** Fall from height

23. Incised wounds on genitalia: *AIIMS 09, 10*
A. Homicidal **B.** Suicidal
C. Accidental **D.** Self-inflicted

10. D	**11. D**	**12. A**	**13. D**	**14. C**	**15. B**	**16. A**	**17. A**	**18. A**	**19. C**
20. C	**21. B**	**22. B**	**23. A**						

Firearm Injuries

12

Definitions

- **Ballistics** (Greek *ba'llein*: throw): It is the science of projectile motion and conditions affecting that motion.
- **Forensic ballistics:** Science which deals with the investigation of firearms, ammunition and the problems arising from their use.

Ballistics is subdivided into:
- *External ballistics:* Study of the passage of the projectile through space or the air.
- *Internal ballistics*: Study of the projectile in the gun.
- *Terminal ballistics:* Study of the interaction of a projectile with its target.
- *Wound ballistics:* It is concerned with the motion and effects of the projectile in tissue.

- **Firearm:** Any instrument or device that discharges a missile by the expansive force of gases produced by burning of an explosive substance.

  It consists of: (Fig. 12.1)

  i. **Barrel:** A hollow metal cylinder in which the propellant charge is placed. It is long in rifles and shotguns and short in pistols and revolvers. The lumen is known as *bore.* The rear end where the cartridge is inserted is known as the *breech end* and the front end where the bullet/shots comes out is the *muzzle end.*

  ii. **Action:** It consists of a bolt, a striker or hammer and a trigger.

  iii. **Butt/grip:** Rear portion of stock in a shoulder arm or bottom of a handgun containing a magazine.

  iv. **Magazine:** The receptacle for the cartridges in a repeating type of weapon from which the cartridges are fed automatically into the chamber by the action of mechanism.

Velocity

- *Muzzle velocity*: The velocity of the projectile as it emerges from the muzzle end. Depending on it, firearms can be of low, medium and high velocity.
- *Striking velocity*: Velocity of the projectile at the point of impact. The velocity diminishes as the missile travels ahead to strike the target.

Trajectory: Path traced by the projectile during flight.

Classification of Firearms

Firearms are broadly classified into two categories depending on the type of barrel:

i. **Rifled weapons**

- Rifles: 0.22, single shot, lever action, bolt-action, pump action, auto-loading
- Revolvers: Swing-out, break-top, solid-frame
- Single shot pistols
- Auto-loading pistols
- Submachine guns
- Machine guns

ii. **Smooth bore weapons (shotguns)**

- Single-shot
- Double barrel
- Lever action
- Bolt action
- Pump-action
- Auto-loading

- Broadly, single-shot pistols, derringers (variant of single-shot pistols), revolvers and auto-loading pistols are considered as handguns.
- Country made firearms (*katta* or improvised firearms) are mostly 12 bore smooth bore weapons.

Rifled Firearms (Fig. 12.2)

The bore is scored internally with number of shallow spiral grooves varying from 2 to 22, most common are 4, 5 or 6, which run parallel to each other, but twisted spirally from breech to muzzle end. These grooves are called '*rifling*' and the projecting ridges between the grooves are called '*lands*' (Fig. 12.3).

- Rifles, pistols, revolvers, submachine guns and machine guns—all have rifled barrels.
- The direction of rifling can be either right (clockwise) or left (counter-clockwise)—majority of handguns have a right-hand twist.

When the bullet passes through the bore, its surface comes in contact with the projecting spirals which gives

- the chest or abdomen and thigh and lower leg, producing six wounds. This occurs when the person is running or sitting in an unusual position (thigh and leg flexed).

Q. Is it possible that entry wound is present but the bullet is not found in the body?

It may occur when the bullet entering the:

- Stomach, may be vomited out.
- Windpipe, may be coughed up.
- Mouth, may be spat out.
- Body and coming in contact with the bone, and exiting by the same wound from where it entered.

Notes

- **Bullet emboli:** Vascular embolization is usually associated with small calibre, low velocity bullet and usually involves the arterial system. It should be suspected whenever there is a penetrating bullet wound with failure to discover the bullet in the expected region or to visualize the bullet on routine X-ray. The most common sites of entry for a bullet are the aorta, heart and the inferior vena cava.
- **Lead snowstorm:** This is seen in radiograph of an individual shot with centrefire ammunition. Fragments of lead break off the lead core as the bullet moves through the body and gets lodged into surrounding tissue. X-ray shows small radiopaque bullet fragments scattered along the wound track—'lead snowstorm'. A rifle bullet need not have to hit bone for this phenomenon to occur.

MULTIPLE CHOICE QUESTIONS

1. Empty cartridge case is ejected after firing in: *AIIMS 03, 04*
A. Shotgun **B.** Revolver
C. Pistol **D.** Rifle

2. Calibre of a rifled gun is calculated: *DNB 09; TN 11*
A. Distance between a land and groove
B. Distance between two diagonally opposite lands
C. Distance between two diagonally opposite grooves
D. Number of spherical lead balls that can be made from one pound of lead

3. Spherical lead balls that can be made from one pound of lead for a 12-bore shotgun: *Manipal 09*
A. 6 **B.** 8
C. 12 **D.** 24

4. Number of bullets fired in a tandem bullet: *AIIMS 07*
A. 1 **B.** 2
C. 3 **D.** 4

5. Bullet that fragments on impact is called: *Kerala 06*
A. Duplex bullet **B.** Dum-dum bullet
C. Frangible bullet **D.** Soft-point bullet

6. Bullet that leaves a visible mark in its flight so that person can see the path is: *AI 10*
A. Tandem bullet **B.** Tracer bullet
C. Dum-dum bullet **D.** Incendiary bullet

7. Use of wadding in a smooth bore gun are all, *except:* *UP 04*
A. Seals the bore effectively
B. Helps in lubrication
C. Allows optimum pressure to develop
D. Causes fatal injuries

8. Black gunpowder contains all of the following, *except:* *PGI 03, 06; Punjab 09*
A. Potassium nitrate **B.** Lead peroxide
C. Charcoal **D.** Sulphur

9. Smokeless gunpowder is composed of: *Delhi 05, 07*
A. $KMnO_4$ **B.** HCN
C. Nitrocellulose **D.** Sulphur

10. One gram of smokeless gunpowder produces: *Karnataka 11*
A. 3000-4000 cc of gas
B. 9000-10,000 cc of gas
C. 12,000-13,000 cc of gas
D. 15,000-16,000 cc of gas

11. FG, FFG, FFFG is used to indicate: *PGI 08, 11*
A. Cartridge **B.** Black powder size
C. Base of gun **D.** Wadding of cartridge

12. Brain of cartridge is: *UP 04*
A. Black powder **B.** Smokeless powder
C. Primer **D.** Projectile

13. Damage produced by a bullet is in direct proportion to its: *AIIMS 09*
A. Size **B.** Shape
C. Velocity **D.** Weight

14. The capacity of a bullet to cause maximum destruction lies in its: *AIIMS 10*
A. Size **B.** Shape
C. Weight **D.** Velocity

1. C **2. B** **3. C** **4. B** **5. C** **6. B** **7. D** **8. B** **9. C**
10. C **11. B** **12. C** **13. D** **14. D**

15. In a firearm injury, blackening seen around the entry wound is due to: *DNB 09*

A. Flame **B.** Smoke
C. Unburnt powder **D.** Hot gases

16. Stellate wound is produced with firearm in: *TN 03; AI 09*

A. Contact shot
B. Close shot
C. Range within 60 cm
D. Distant shot

17. Contact wound shows: *AP 06*

A. Cruciate splitting **B.** Tattooing
C. Singeing of hair **D.** Abrasion collar

18. In firearm entry wound, arrangement of abrasion collar, dirt collar and tattooing from inside to outside: *NIMS 11*

A. Dirt collar, abrasion collar, tattooing
B. Abrasion collar, dirt collar, tattooing
C. Tattooing, dirt collar, abrasion collar
D. Dirt collar, tattooing, abrasion collar

19. In a firearm injury, there is burning, blackening, tattooing around the wound, and is circular in shape, the injury is: *AI 05*

A. Close shot entry **B.** Close contact exit
C. Contact shot entry **D.** Distant shot entry

20. Gunshot injury in the skull, following are features, *except:* *UP 04*

A. Entrance wound in beveled in the inner table
B. Entrance wound is beveled in the outer table
C. Exit wound is beveled in the outer table
D. Exit wound is clean cut in the inner table

21. Which of the following may be seen in the exit wound: *DNB 10*

A. Dirt collar **B.** Abrasion collar
C. Tattooing **D.** Inverted edges

22. Gunshot residue on hands can be detected by: *AIIMS 05; DNB 10*

A. Phenolphthalein test
B. Dermal nitrate test
C. Benzidine test
D. H_2 activation test

23. Detection of metals (heavy) is done by using all, *except:* *PGI 04*

A. Harrison-Gilory test
B. Atomic absorption spectroscopy
C. Neutron activation test
D. Paraffin test

24. Gunpowder on clothing can be visualized by: *AI 11*

A. Magnifying lens **B.** UV rays
C. Infrared rays **D.** Energy dispersive X-ray

15. B **16. A** **17. A** **18. A** **19. A** **20. B** **21. B** **22. B** **23. D** **24. D**

Thermal Injuries

14

Definition: Tissue injury due to application of heat or cold in any form to the external or the internal body surfaces.

Classification: Refer to Flow chart 14.1.

Cold Injury

Hypothermia

- Exposure to cold produce hypothermia which is defined as core temperature below 35°C (95°F).
- An esophageal or rectal probe that measures temperatures as low as 25°C is required; oral or axillary thermometers are inaccurate.
- Risk factors:
  - Low environmental temperature
  - Extremes of age (infants, children and elderly ≥ 60 years)
  - Immersion in water and wet clothing
  - Pre-existing diseases, such as hypothyroidism and atherosclerosis, dementia, inadequate nutrition
  - Intoxicated persons (alcohol, tranquilizers or opiates) and persons engaged in activities like mountaineering and sailing
- Effects of hypothermia
  - Direct effects are prominent in fatty tissues and myelinated nerve fibres.
  - Indirect effects are mostly ischemic.

Clinical features

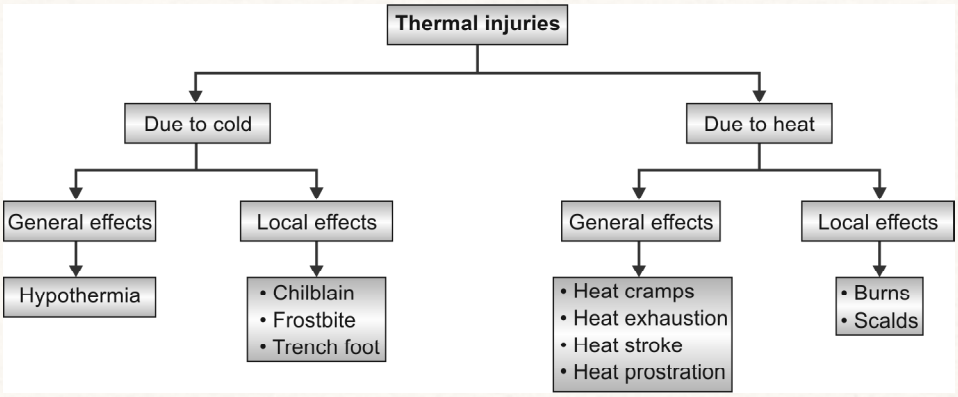
- When the temperature falls below 32°C to 24°C, there is disorientation, dulling of consciousness, loss of reflex, and fall in respiration, heart rate and blood pressure.
- Red patches and pallor of the skin, edema of the face, and stiffness of neck muscles may be seen.

Death is common due to ventricular fibrillation or asystole.

Complications: Patient who survives for a short time may develop hemorrhagic pancreatitis, pneumonia, ulcers or focal hemorrhages in the GIT, acute tubular necrosis and myocardial fibre necrosis.

Postmortem findings: There are no definitive autopsy findings of hypothermia. However, there are several features which taken together and in the presence of history (scene and circumstances) allow a reasonably confident diagnosis.

Flow chart 14.1: Classification of thermal injuries



MULTIPLE CHOICE QUESTIONS

1. Paradoxical undressing is seen in: *MAHE 06, 10; CMC (Vellore) 10*
- **A.** Hyperthermia
- **B.** Hypothermia
- **C.** Transvestism
- **D.** Immersion syndrome

2. A person working in hot environment who consumes more water without salt is likely to develop a condition called: *UPSC 03, 04*
- **A.** Heat stroke
- **B.** Heat exhaustion
- **C.** Heat cramps
- **D.** Heat hyperpyrexia

3. Sweating is absent in: *DNB 10*
- **A.** Heat syncope
- **B.** Heat exhaustion
- **C.** Heat stroke
- **D.** Heat cramps

4. NOT seen in heat stroke: *Kerala 06*
- **A.** Hypovolemic shock
- **B.** Rhabdomyolysis
- **C.** Pancreatitis
- **D.** Cerebral edema

5. Characteristic features of superficial burns are all, *except*: *TN 06; WB 09*
- **A.** Damage no deeper than papillary dermis
- **B.** Blisters absent
- **C.** Loss of epidermis
- **D.** Pinprick is not painful

6. Blister formation in burn is classified as: *DNB 09; Bihar 11*
- **A.** First degree
- **B.** Second degree superficial
- **C.** Second degree deep
- **D.** Third degree

7. All are features of deep burn, *except*: *UP 04*
- **A.** Leathery skin
- **B.** Painful
- **C.** No blister/vesicles
- **D.** Involvement of fat

8. A lady with burns, skin appears waxy and dry with little pain, the degree of burn is: *CMC (Ludhiana) 11*
- **A.** First degree
- **B.** Second degree superficial
- **C.** Second degree deep
- **D.** Third degree

9. According to 'rule of 9', perineum burns constitute: *FMGE 09*
- **A.** 1% burns
- **B.** 9% burns
- **C.** 18% burns
- **D.** 27% burns

10. Percentage of surface area of palm of a burn patient: *FMGE 10; AI 11*
- **A.** 1%
- **B.** 9%
- **C.** 18%
- **D.** 27%

11. Head and neck burns in infant constitute _____% of burns: *Kerala 08*
- **A.** 9
- **B.** 18
- **C.** 24
- **D.** 36

12. In a 6-year-old child with burns involving whole of head and trunk, the estimated body surface area involved: *JIPMER 09*
- **A.** 44%
- **B.** 48%
- **C.** 55%
- **D.** 58%

13. Most important aspect of management of burn injury in the first 24 h: *UPSC 07*
- **A.** Fluid resuscitation
- **B.** Dressing
- **C.** Escharotomy
- **D.** Antibiotics

14. In adults, circulatory collapse occurs after a minimum of what percentage burns of total body surface area: *NIMHANS 08; TN 11*
- **A.** 5%
- **B.** 10%
- **C.** 15%
- **D.** 20%

15. Best fluid for resuscitation in burns: *FMGE 11; Punjab 12*
- **A.** Dextran
- **B.** Ringer lactate
- **C.** Albumin
- **D.** Hartmann's solution

16. Parkland formula for burns is for: *Maharashtra 09; UP 09*
- **A.** Ringer lactate
- **B.** Glucose saline
- **C.** Normal saline
- **D.** 25% dextrose

17. A 65 years male weighing 50 kg was admitted with 80% burn and RL was transfused with Parkland method. How much fluid should be infused in first 8 hours: *UP 11*
- **A.** 200 ml/hr
- **B.** 500 ml/hr
- **C.** 1000 ml/hr
- **D.** 8000 ml/hr

18. Muirs and Barclays formula is for: *AFMC 11*
- **A.** Colloid resuscitation in burns
- **B.** Polytrauma fluid resuscitation
- **C.** Crystalloid in trauma
- **D.** Dextran in burns

19. Not an indication for admission in burns ward: *Bihar 10; Maharashtra 11*
- **A.** Acid burns
- **B.** Inhalational injury
- **C.** 5% partial thickness burns in an unmarried female
- **D.** 10% deep burns in a male

20. Most common cause of death in thermal burns is: *UPSC 04*
- **A.** Convulsion
- **B.** Aspiration pneumonia
- **C.** Hypovolemic shock
- **D.** Arrhythmias

21. Cause of late death in burn patients is: *UP 04*
- **A.** Neurogenic shock
- **B.** Hypovolemic shock
- **C.** Sepsis
- **D.** Cardiogenic shock

22. Pugilistic attitude is due to: *Delhi 07; FMGE 10*
- **A.** Lipolysis
- **B.** Protein coagulation
- **C.** Carbohydrate coagulation
- **D.** Lipogenesis

23. True about pugilistic attitude: *MP 09; PGI 10*
- **A.** Indicate antemortem burns
- **B.** Indicate postmortem burns

1. B	2. C	3. C	4. C	5. D	6. B	7. B	8. D	9. A	10. A	11. B	12. B
13. A	14. C	15. B	16. A	17. C	18. A	19. C	20. C	21. C	22. B	23. C	

C. Cannot differentiate between ante- or postmortem
D. Indicate defense by victim

24. Difference between incised wound and heat rupture favoring heat rupture are: *AI 09*
A. Margins well-defined
B. Small and multiple wounds
C. Nerves and vessels are visible in floor
D. Seen only over scalp

25. Feature of ruptured skin caused by excessive heat: *AIIMS 10*
A. Irregular margin B. Clear regular margin
C. Contused margin D. Abraded margin

26. Appearance of burn hematoma: *DNB 09; Punjab 10*
A. Honeycomb like B. Disc shaped
C. Stellate shaped D. Smooth and rubbery

27. Curling ulcer is seen in: *UP 04; WB 10*
A. Head injury B. Burn
C. Corticosteroids D. TPN

28. Curling's ulcer in burns is seen in: *AIIMS 08*
A. Esophagus B. Stomach
C. Colon D. Duodenum

29. Curling's ulcer common in which part of duodenum: *DNB 09*
A. 1st part
B. 2nd part
C. 3rd part
D. Between 1st and 2nd part

30. A 25 years female was found dead in room having 100% burns with tongue protruding out, body in pugilistic attitude, heat ruptures, peeling of skin, and heat hematoma and heat fractures of skull. Carboxyhemoglobin was 25% and soot particles were present in trachea. Which of the combinations of two findings will establish that the burns were antemortem in nature: *AIIMS 04*
A. Heat hematoma and heat ruptures
B. Heat fracture of skull and peeling of skin
C. Heat hematoma and pugilistic attitude
D. Carboxyhemoglobin and soot particles in trachea

31. True regarding electrocution injuries are all, *except*: *SGPGI 04*
A. Direct current produces greater damage as compared to alternating current
B. The injuries are greater when associated with moist contact
C. The injuries are of higher intensity, if the body is partially not earthed
D. High voltages throw the victims clear

32. Electrocution is rare below: *MP 09*
A. 100 volt B. 150V
C. 200 V D. 240V

33. Joule burn is seen in: *Delhi 03; Bihar 11*
A. Blast injuries B. Electrocution
C. Firearm wounds D. Lightning stroke

34. Bone pearl's or wax drippings is pathogonomic of: *Orissa 11*
A. Burns B. Scalds
C. Lightening D. Electrocution

35. A dead body is found to have marks like branching of a tree on front of the chest. Most likely cause of death could be: *AIIMS 05; FMGE 10*
A. Firearm injury B. Lightning injury
C. Bomb blast injury D. Road traffic accident

36. Filigree burn occur in: *FMGE 09; NJI 10; JIPMER 11*
A. Lightning B. Electrocution
C. Vitriolage D. Infanticide

24. C **25. A** **26. A** **27. B** **28. D** **29. A** **30. D** **31. A** **32. A**
33. B **34. D** **35. B** **36. A**

By Doreen Zamawi