

Death & its Causes:

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→ Types of death $\begin{cases} \text{somatic/systemic/clinical} \\ \text{molecular/cellular.} \end{cases}$

Somatic Death: complete & irreversible stoppage of circulation, respiration & brain functions (Bishop's tripod of life).

Brain Death:

i) Cortical/Cerebral death: intact brain stem.

→ vegetative state in which respiration continues, but there is total loss of power of perception by the senses (state of deep coma).

ii) Brain stem death: cerebrum may/may not be intact but it is cut off functionally by the stem lesion

→ loss of vital centres that control respiration & of the ascending reticular activating system that sustains consciousness \Rightarrow irreversible comatose.

iii) Whole brain death: permanent cessation of functions of cerebrum, cerebellum & brainstem.

Brain Stem: tissue in the floor of the aqueduct, between the 3rd & 4th ventricles.

→ contains vital respiratory centres & ascending reticular activating system.

Diagnosis of Brainstem Death:

Exclusions: — therapeutic drugs / overdose of drugs

— core temperature of body $< 35^{\circ}\text{C}$

— patient is suffering from severe metabolic/endocrine disturbances which may lead to severe, but reversible coma (eg: diabetes).

Tests: before performing tests, ensure that core body temperature $> 35^{\circ}\text{C}$.

- 1] Pupils are fixed in diameter & do not respond to changes in intensity of light.
- 2] Absence of corneal reflex.
- 3] Absent vestibulo-ocular reflexes \Rightarrow no eye movement occurs after the instillation of cold water into the outer ear.
- 4] No motor responses \Rightarrow patient does not grimace in response to a painful stimulus.
- 5] No gag reflex to bronchial stimulation by a suction catheter passed down the trachea.
- 6] No respiratory movements occur when the patient is disconnected from the ventilator for long enough to ensure that the carbon dioxide concentration in the blood rises above the threshold for stimulating respiration (after giving 100% oxygen for 5 minutes)

\rightarrow 2 doctors must have performed these tests twice with negative results to pronounce the patient dead.

Persistent Vegetative State: if cortex is alone damaged \rightarrow deep coma \rightarrow brainstem continues to function \rightarrow spontaneous respiration is maintained.
 \rightarrow death may occur months / years later.

Molecular Death: death of cells & tissues individually.

\rightarrow takes place 1-2 hours after the stoppage of the vital functions (\because individual cells live on their residual oxygen for a variable time after the circulation has stopped).

Negative Autopsy: when gross & microscopic examination, toxicological analyses & laboratory investigations fail to reveal a cause of death.
→ 2-5% of all autopsies are negative.

Causes:

- 1] Inadequate history: deaths from vagal inhibition in status epilepticus, hypersensitivity reaction, laryngeal spasm in drowning, etc.
- 2] Inadequate external examination
- 3] Inadequate/improper internal examination
- 4] Inufficient laboratory examinations
- 5] Lack of toxicological analysis
- 6] Lack of training of the doctor.

Obscure Autopsies: those which do not show a definite cause for death, in which there are minimal, indefinite or obscure findings, or even no positive findings at all.

Causes:

- 1] Natural diseases: — with obscure or some microscopic findings
— death precipitated by emotion, work-stress — functional failure (epilepsy).
- 2] Biochemical disturbances: — uraemia, diabetes, potassium deficiency
— respiratory pigment disorders (anaemic anoxia, porphyria).
- 3] Endocrine dysfunction: — adrenal insufficiency — thyrotoxicosis / myxoedema.
- 4] Concealed trauma: — cerebral concussion — self-inflicted neck injury
— blunt injury to the heart — reflex vagal inhibition.
- 5] Poisoning: — delayed suboxic / narcotic poisoning — anaesthetic overdose
- 6] Miscellaneous: — allergy — drug idiosyncrasy.

Sudden Death: death is said to be sudden or unexpected when a person not known to have been suffering from any dangerous disease, injury or poisoning, is found dead or dies within 24 hours after the onset of terminal illness.

Causes:

1] Disease of CVS:

- coronary atherosclerosis with coronary thrombosis
- coronary atherosclerosis with haemorrhage in the wall causing occlusion of lumen.
- coronary artery disease → spontaneous rupture of aorta
- coronary artery embolism → angina pectoris
- occlusion of the ostium of coronary artery associated with atherosclerosis/syphilitic aortitis.
- arterial hypertension with atherosclerosis
- rupture of fresh myocardial infarct → cardio-myopathies
- pulmonary embolism → acute endocarditis
- rupture of aortic/other aneurysm. → senile myocardium
- aortic stenosis, aortic regurgitation, mitral stenosis

2] Disease of RS:

- lobar pneumonia → Influenza
- bronchitis, bronchopneumonia → Diphtheria
- Pulmonary embolism & infarction. → Lung abscess
- Air embolism → Pleural effusion
- Pneumothorax → Neoplasm of the bronchus.

3] CNS:

- Cerebral haemorrhage → Pontine haemorrhage
- Cerebellar haemorrhage → Brain abscess
- Meningitis → Acute poliomyelitis.

4] GIT: → strangulated hernia

→ appendicitis

→ perforation of ulcers

→ obstructive cholecystitis

→ acute haemorrhagic pancreatitis

→ paralytic ileus.

5] Genito-urinary system: → chronic nephritis → nephrolithiasis

→ obstructive hydronephrosis, pyonephrosis → rupture of ectopic pregnancy

→ toxæmia of pregnancy

→ uterine haemorrhage due to fibroids.

6] Miscellaneous: → Addison's disease

→ Diabetes mellitus

→ Haemochromatosis

→ Hyperthyroidism

→ Cerebral malaria

→ Reflex vagal inhibition

→ Anaphylaxis due to drugs

→ Mismatched blood transfusion.