In previous lectures you have learned about different definitions of Death, different criteria of death, Modes of deaths. Natural and sudden deaths and few changes after deaths in skin and eyes. This lecture give you some ideas about further changes after death

Dr S K Pandey

Other Early changes are-

1. Postmortem cooling,chill of death (Algor mortis) 2. Post mortem staining, Hypostasis (Livor Mortis) 3. Cadaveric rigidity, death stiffening (Rigor Mortis)

Cooling of Body- occurs after death since all metabolism comes to a stop. There is a constant balance between heat production od heat loss during life. After death heat production is lost and therefore body starts cooling. The dead body loses the heat by **conduction, convection and radiation**.

Measurement of rate of cooling helps in estimating time since death. When the rate of cooling is plotted on a graph pattern of curve assumes a **sigmoid shape(double exponential curve or flipped S).**

Body surface starts cooling rapidly, but core body (Visceral) temperature does not alter until a gradient is established between the core body temperature and the surface. There is no significant change in core body temperature for 2-3 hours after death and initial plateau is seen.

Newton's law says that loss of heat from body is directly proportional to the temperature difference between surface of body and the surrounding and this law is not useful in case of rate of heat loss from a cadaver.

When the gradiant is established between core body temp. and surface, then the rate of cooling is regular and constant and is in accordance with the Newton's law of cooling. After the initial plateau the curve dips down progressively before it becomes nearly flat at bottom. The curve may even rise before becoming flat due to heat produced by putrefactive changes.

Preferred site for measuring inner core body temperature is either rectum(best) or abdominal cavity and ears, nose ,eye, trachea and muscle. Chemical thermometer with graduation 0 to 50 degree Celsius introduced deep into rectum for two minute or Thermocouple is better option at the same time environmental temperature is also measured.

Calculation of TSD(time since death) in hours= Rectal temp. at the time of death- Rectal temp. at the time body was found/Rate of temp. fall. Average rate of fall of temp. during summers .75 degree F and 1.5 degree F during winters.

Factors affecting rate of cooling-1. Environmental temp.- more the difference faster heat loss.2Build- rate of heat loss is directly proportional to surface area/ body wt.3. Physique- Fatty bodies cool slowly.4 Position of body 5. Environment. i) Air- well ventilated room cooling faster. ii) Humid atmosphere- cooling faster than in dry atm. iii) Water- cooling faster 6. Covering

- **Medicolegal Important of algor mortis-1-H**elps to estimate TSD.2 PM caloricity- is a condition where the temperature of body increases after death instead of decreasing. **i)** Dead body lying in open in hot summers. **ii)** Infections- Like cholera, malaria, septicemia, tetanus,typhoid cause tempmay already be raised at the time of death and bacterial and other microorganism metabolism going on after death.
- **Livor mortis(Post mortem(PM) lividity)-** P M lividity(Syn-cadaveric lividity, darkening of death, hypostasis, livores,P M hypostasis, PM staining, subcutaneous hypostasis and suggillation) is bluish purple or purplish red discoloration which appears after death on most dependent part of the body due to collection of blood in toneless capillaries and small veins of the most superficial layer of dermis due to gravity.
- **Cause-** stoppage of circulation and tendency of blood to sink by gravity to most dependent part and its collection in toneless blood vessels and capillaries.
- **Colour-** Bluish purple or purplish red, intensity depends on amount of reduced Hb in blood.
- **Place-** in general well marked in ear lobes, back of chest and abdomen which is not in direct contact with ground when body in supine position area of body in direct contact with ground is pale and is called contact pallor.
- **Visibility-** More clearly seen in fair complexioned person and good amount of blood and less clearly visible in dark people, old and anemic and died due to hemorrhage.

Continue---

P M staining creates confusion with congestion. Vibises (postmortem ecchymoses, death spots)- These are tin y spot like sometime confluent, oval to round bluish blackish hemorrhage of p m origin exclusively limited to areas of P M staining due to increased intravascular hydrostatic pressure as a result of pooling of blood in turn rupture of capillaries and small vessels. More common in obese and posture of body after death more common in legs in hanging where IVHP is to much.

- Difference between P M staining and congestion-

Feature	P M staining	True congestion
Redness	Irregular , occurs only on dependent parts	Uniform all over the organ
Mucus membranes	Dull & lusterless	congested
Exudate	No inflammatory exudate	Inflammatory exudate seen
Hollow viscus	Staining present only on dependent parts of intestinal coils	Stomach and intestine show uniform congestion(redness)

Formation & fixation of P M Staining- when dead body left undisturbed without change of posture staining starts appearing in small patches at dependent parts of the body by the end of 1st hour after death. Gradually these small patches increases in size and coaleases with each other to form uniformly stained large areas on the dependent part of the body. For completion of spreading of staining it takes about 5-6 hours. After formation staining gets fixed over the areas. After the complete formation of staining if the position of body left undisturbed for a period of next 5-6 hours then the staining over the areas get fixed.

Continue---

If the position of body changed or altered after fixation of staining then staining will not be disturbed and will remain more or less as such, though the colour may slightly fade in intensity is due to mild degree of resettling of blood to newer dependent part of body. But if the position of body reversed after formation of staining but before its fixation then there may be total resettling of blood with formation of staining at the undersurface of

the newly assumed dependent parts of the body.

Fixation of staining is due to i) clotting of blood in capillaries ii) rigor mortis of muscles occurs around capillaries does not allow blood to move away.

Testing of fixation of P M staining- Firmly press the area with thumb for a minute if fixed staining will not disappear on pressure if not fixed staining disappears and the area appears pale (blanched).

Factors influencing development of P M staining- i) Volume of blood in circulation at the time of death. ii) Length of time blood remain fluid after death. iii) More marked in conditions where blood does not readily coagulate causing more accumulation to occur. Iv) Less marked in Anemia, Hemorrhage, wasting disease, lobar pneumonia.

P M Staining in poisoning-

Colour	Cause of death	Colour	Cause of death
Black	Mummified bodies, opiate	Cherry red	Burn, CO
Bluish green	H2S	Chocolate	Acetanilide,aniline,bromate,chlorates,nitrites
Bluish violet	Asphyxia		Nitrobenzene, Potassium carbonate
Bright red	HCN	Dark brown or yellow	Phosphorus

Internal hypostasis-In supine position-In i)cerebrum and cerebellum posterior portion , ii)Heart- dorsal portion. Simulates Myocardial infarction iii) Intestine-Most dependent iv) Lung- dorsal portion simulates pneumonia.
With onset of putrefaction P M staining disperses off.
Medicolegal Importance- i) It is a sign of death ii) It must not be confused with bruise. iii) Estimation of time since death. iv)Indicates the position of body after death v) Color may indicate cause of death.
Difference between bruise and P.M Staining

Features	P.M. Staining	Bruise
Situation	On the dependent parts of the body	Anywhere
Tissue level	Undersurface of skin and skin level externally	Subcutaneous tissue level externally
Surface	Not elevated, cuticle not damaged	May be slightly elevated, cuticle may be damaged in the form of abrasion
Margin	Sharp and clearly defined	Diffused margin
Colour	Bluish and reddish purple, specific color in poisoning deaths	Reddish when fresh,changes in color with time
Cause	Due to capillovenous distention with blood	Extravasation of blood from capillaries
Nature of change	Post mortem	Antemortem
Effect of pressure	Pressed spot appears pale	No change on pressure
Cut section	Shows oozing of blood, cleaned by washing	Shows evidence of blood in tissue, can’t be washed
Enzymatic study	No Change	Change in level of certain enzyme in affected area
MLI	Tells about TSD, position of body	Tells about nature of injury and weapon used