FORENSIC TEAM 431

LEDARES

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Postmortem changes

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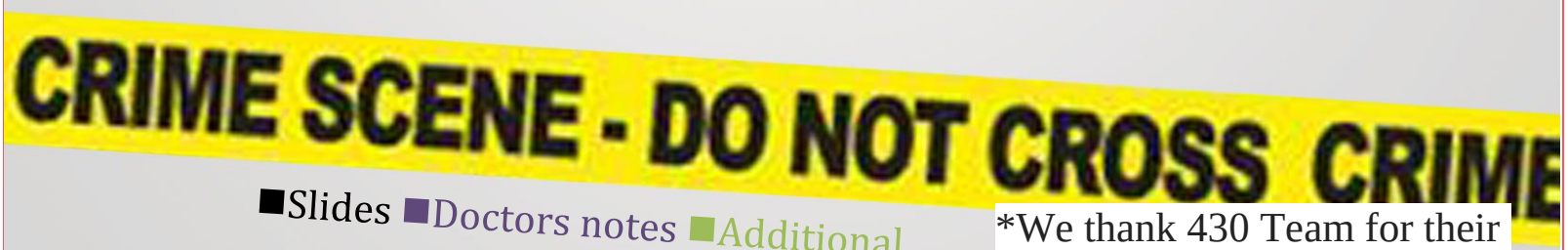


■Slides ■Doctors notes ■Additional

*We thank 430 Team for their

For further and better explanations take a look at Simpson's Forensic Medicine book, chapter 5

Thanatology:

- The scientific study of death, deathbed visions
- Death is the transition of life, not the extinction.
- Biologically, organs and tissues die at different rate
- The cause of death, injury or disease resulting in death
- Manner of death, how the COD (cause of death) came out?
- Mechanism of death, the physiological changes produced by the COD

Importance Of Thanatology :

- Time of death
- Death Certification
- Life support
- Organ transplantation
- burial

Death..

- Occurs in 2 stages:
    1. Somatic 2. molecular
- The immediate signs: pallor, loss elasticity of the skin, ocular signs(retinal segmentation, decreased IOP), 1st flaccidity of muscles, cessation of circulation not heart, cessation of respiration
- Brain death Vs brainstem death. After 5 minutes? (from what I've read both of them considered as dead organs after 5 min.)
- Legal death? (Legal death occurs when a qualified individual proclaims that additional medical care is no longer suitable for a patient, and that the patient should be declared dead under the law).

PM changes :

1. Pallor Mortis: It is a Latin for paleness of death. This is a post mortem paleness which happens in those with light skin almost instantly (in the 15–20 minutes after the death) because of a lack of capillary circulation throughout the body. The blood sinks down into the lower parts (due to gravity) of the body creating livor mortis.
2. Cooling of the body (Algor mortis) (The body temperature will increase 2hrs after death, and then decrease. It's important to determine time of death + when pt die he will enter first in flaccidity for 2 hrs. and then stiffness from 24hrs – 34hrs)
3. Rigor Mortis.
4. Hypostasis (Livor mortis) .
5. Putrefaction

Cooling of the body (Algor mortis):

- A body is not a uniform structure: its temperature will not fall evenly and because each body will lie in its own unique environment, each body will cool at a different speed, depending upon the many factors surrounding it.
- 1 C, the difference between Rectal > and Mouth temperature.
- 1.5 C/ 6 hours. (every 6 hours the temperature will decrease 1.5 .. and during 18 to 12 hrs. will reach the room temperature)
- Reach the environment temperature by 12-18
- Factors affecting PM cooling : (you have to know it)
  (Air current, Body weight, Surface area relation with weight (children>), Coverings of Body, atmosphere temp., Season, Night time, Body temp. at the moment of death)

Rigor Mortis:

- Flaccidity , stiffening or RM
  Caused by exhaustion of ATP and accumulation of lactic acid.
  It is affected by temperature: the colder the temperature the slower the reaction is and vice versa.
  In a cold body, the onset of rigor will be delayed and the length of time that its effects on the muscles can be detected will be prolonged, whereas in a body lying in a warm environment, the onset of rigor and its duration will be short.
- The smaller the muscle, the earlier the onset of RM
- The younger, the more fit, the more (Children and older adults have RM earlier than young adults.)
- The more fit
- Sever burn, No RM
- 0, 2, 12, 24
- M/L importance: Sure sign, the time of death 24 hours (1st flaccidity0-2, RM2-24, 2ND flaccidity>24), the position, the cause.

*RM could be mistaken with other conditions of stiffness after death like Cadaveric spam..

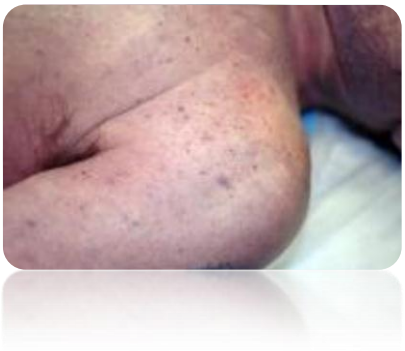
RM vs Cadaveric spam, heat and cold stiffness :

- DDx of RM:
- Cadaveric spam (form of muscular stiffening that occurs at the moment of death)
- Heat stiffness (Coagulation of muscle protein in case of burn, leading to stiffening of the body)
- Cold stiffness (Due to freezing of the intra and extra cellular fluid and also the synovium).

Cadaveric Spam:

- A muscular stiffness, voluntary muscle (only Associated with violent death in circumstances of intense emotion e.g. (fear, drowning…etc).
- An object usually is held by hand e.g.(gun, knife or even grass!)
- Extension of not all the body, but only groups of muscle in actions; so, no 1st flaccidity.
- Start at 0
- With sever nervous tension, Nevous?, not chemical ATP

Postmortem Hypostasis: (The discoloration of the skin surface which appears on dependent body parts after circulation has ceased and gravity pulls the stagnant blood to the lowest points of the body)



- Liver mortis, staining
- Gravitation of blood inside the vessels, violent colour
- At the moment (start), 2 hours (appear), 8 hours(get completed).
- M/L importance: the position not before 2 hours, Sure sign of death 2-6 hours, may identify the COD, Lung and intestine are involved, absent in some cases(newborn, elderly, anemic pt)
- Contusion vs Hypostasis (Contusion is an extravasation of blood in to tissues following traumatic rupture of veins, venules and small arteries (Hypostasis inside the vessels)
- Might be mistaken
- **Contusion:** outside capillaries, swelling, colour is changed, any site not dependent area, +ve cellular reaction, no washing with pressure.
- Color might help: Red (CO, cyanide, cold, nitrate), pale (bleeding).

Burn:

- Coagulation of muscle protein
- Leads to Heat stiffness
- No 1st flaccidity
- Heat vs Cold Stiffness due to frozen of the body, also synovium

A crude but useful aide-memoire is:

- Body feels warm and flaccid – dead less than 3 hours.
- Body feels warm and stiff – dead 3–8 hours.
- Body feels cold and stiff – dead 8–36 hours.
- Body feels cold and flaccid – dead more than 36 hours.

Putrefaction:

- The last stage (produced mainly by the action of bacterial enzymes, mostly anaerobic organisms derived from the bowel ..it starts from the cecum, appendix)
- Mainly due to bacteria (Blood vessels provide an excellent channel through which bacteria can spread with some ease throughout the body. Their passage is marked by the decomposition of hemoglobin which, when present in the superficial vessels, results in linear branching patterns of brown discoloration of the skin that is called 'marbling'.)
- Autolysis (FOR YOUR KNOWLDAGE > **soon after death, cell membranes become permeable and breakdown, with release of cytoplasm containing enzymes. The proteolytic, glycolytic and lipolytic action of ferments leads to auto-digestion and disintegration of organs, and occur without bacterial influence**)
- 24 hours in summer, 36 hours in winter.

- Greenish discoloration.
- Opposite to Rt. Iliac fossa.
- marbling phenomenon, arborization after 48
- 1-3 days of PM: Greenish all over, the face is swollen
- After a week: putrefactive bullae under skin, tongue protrusion, a foul coarse bloody froth at the mouth and nostrils.
- After 2 weeks: peeling of skin, abdominal bursts, larvae (entomology), the body color is black and hair and nails fall
- At 6 months: bones attached to bones
- At a year: dissolved ligaments and loose bones
- After a year: the estimation of the time of death by the weight of bones.

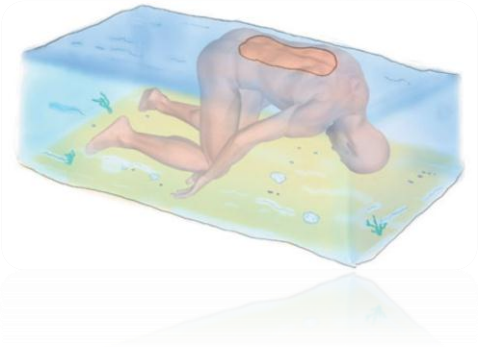
Factors affecting the rate of putrefaction:

- the warmer the temperature, the earlier the process starts and the faster it progresses.
- Age: less in child
- Poisoning delays it.
- High temp and moisture accelerate it.
- Air
- Manner of burial.
- Blood (no putrefaction without blood).
- Mutilated bodies
- Last organs to putrefy are prostate in male / uterus in female.

Replacing putrefaction :

- Adipocyte formation, saponification : a chemical change in the body fat**, wet conditions**, take weeks or months, (bodies may undergo saponification and develop a waxy substance called adipocere, caused by the action of soil chemicals on the body's proteins and fats. The formation of adipocere slows decomposition by inhibiting the bacteria that cause putrefaction).
- Mummification (It's the postmortem drying of the body: skin is leathery, tissues are dehydrated and organs become desiccated) may desiccate instead of putrefying …, It is most commonly seen in warm or hot environments such as the dessert, >thin, young (newborn). (Mummification of newborn infants whose bodies are placed in cool dry environments (e.g. below floor boards) is common, but adults may also be mummified if they lie in dry places)

- Embalming (is the practice of delaying decomposition of human and animal remains)
- Maceration: it happens to fetus in utero (uterus is sterile has no bacteria, so, fetus not putrefied when die inside it)



Immersion and burial :

- the most common in the early stage is with the air-containing chest floating upper most and the head and limbs hanging downwards

Estimation of PM changes interval :

- the most useful method of estimating the time of death is **Henssge's Nomogram**.
- The rate of body cooling
- K in CSF, increased after death
- Other electorates.
- the extent of hypostasis, putrefaction, RM
- Entomology (is the scientific study of insects)
- gastric content (may occasionally assist in an investigation, where such analysis identifies food components capable of corroborating (or refuting) other evidence that suggests that a particular meal had been eaten at a particular time, but cannot reliably be used to determine time of death. It is important, where time of death may be an issue that all stomach contents are retained for sub sequent analysis)