
بسم الله الرحمن الرحيم

Learning objectives

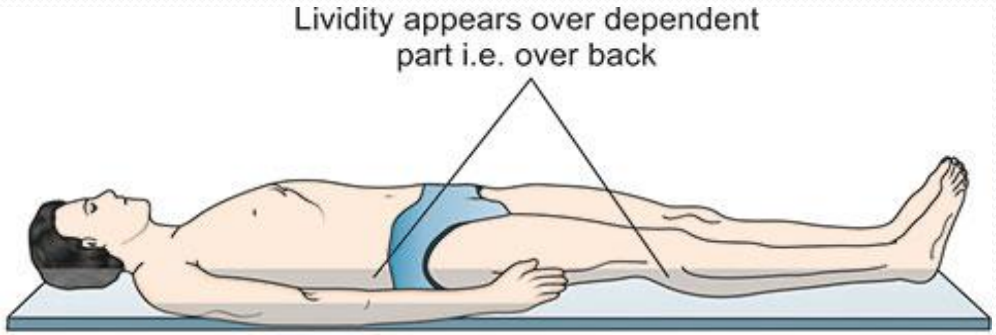
- Define post mortem lividity.
- Describe the development of post mortem lividity.
- Discuss the characteristics of post mortem lividity.
- Differentiate between lividity and bruise, and between congestion of viscera and lividity.
- Describe the medico legal importance of post mortem lividity.

- Define Rigor Mortis
- Describe the mechanism of formation of Rigor Mortis.
- Describe the special features of Rigor Mortis.
- Describe the time consumed to develop Rigor Mortis.
- Describe chemical basis of Rigor Mortis.

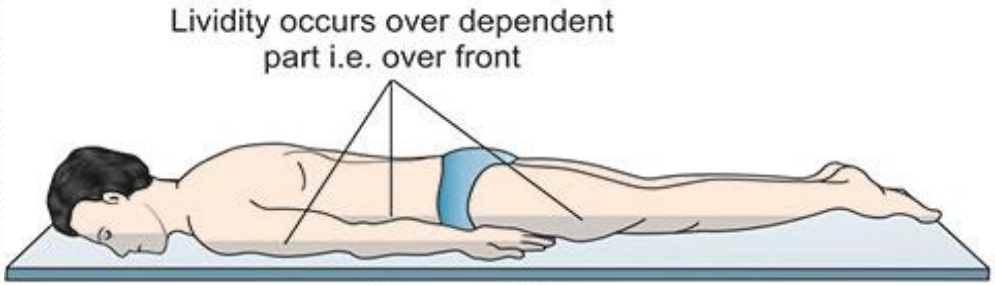
- Describe factors affecting Rigor Mortis.
- Describe the conditions simulating Rigor Mortis.
- Describe the procedure of its confirmation.
- Describe the medicolegal importance of Rigor Mortis.

Post mortem lividity

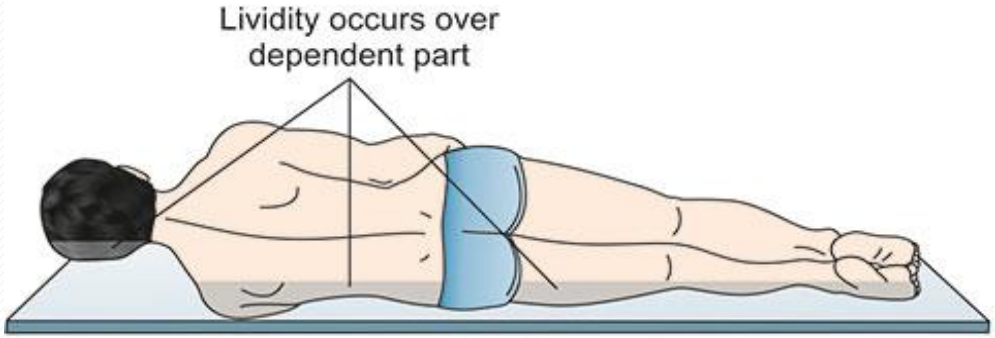
- (Postmortem staining ,hypostasis, Livor mortis, P.M Suggilation)
- Discoloration of the skin and organs after death due to accumulation of fluid blood in the toneless capillaries and small veins of the dependent parts of the body.
- Being the result of stasis of blood due to gravitational forces, the staining is of the same color as that of the blood.



Supine position



Prone Position



Lateral position

Development of P.M lividity

- The process commences within an hour after death.
- In most cases of sudden death it presents itself first as a series of mottled patches on the dependent part within about 1-3 hours.
- These patches gradually increase in size and coalesce in about 3-6 hours and the lividity is fully developed.
- It becomes unchangeable in about 6-8 hours. (Fixed)

Fixation of P.M lividity

- Fixation of lividity is due to packing and complete stagnation of blood in the distended toneless capillaries and small veins and is not due to coagulation of blood.

- After the development of lividity, but before it becomes fixed, if the position of the body is changed these patches will disappear and fresh ones will develop in the new dependent areas.
- But lividity to a slight degree will remain in the original area due to staining of the tissues by haemolysis.

- If the position of the body is changed after lividity is fixed, its pattern of distribution is not changed significantly, because:
- The blood cannot flow away from ditended capillaries and
- The tissues are already stained by diffusion of haemoglobin

Time since death

- Generally it can be said that if the pressure of the thumb blanches the area, the lividity is not fixed and the time since death is less than 8 hours if the pressure of thumb does not blanch the area the lividity is fixed and the time since death is more than 6 hours.

- From the distribution and fixation of lividity, therefore, it may be possible to determine the position in which the body has lain after death and to form some estimate with regards to the time since death.


medcol
unfixed Livor mortis
Pressure results in blanching of skin

Distribution of post mortem lividity

- The site of distribution and pattern of lividity depends upon the position of the body after death.
- In hanging the lividity is observed circumferentially over the dependent lower limbs, external genitalia and lower parts of forearms and hands.

- In drowning as the body usually floats face downwards with hands extended, the lividity is observed in the head and upper parts of the body which are heavier and therefore dependent.
- If a body is constantly changing its position eg in a case of drowning in moving water lividity may not develop at all.
- The lividity is sharply limited to horizontal line corresponding to the water level if electrocution occurs in water (usually a bath tub).

- As the discoloration is due to filling of blood vessels, it is not developed over areas of contact flattening that is in those areas of the body which are in actual contact with the surface on which the body is lying.
- Thus in person lying on his back while the lividity is observed on the back portion of his body, it is not seen on the back of shoulder blades, buttocks and back of calves, as these are areas of contact flattening in this case.

- As for example the white band on the neck produced by a tight collar, beaded threads or ornaments may be mistaken as a mark of ligature strangulation
- The parallel marks on the neck of a body whose head is turned to one side may be mistaken as pressure marks of the fingers and the alternate dark and light strips of the back of a body lying on a crumpled blanket, may be mistaken as bruises due to assault.

Color of P.M lividity

- The color and intensity of lividity depends on the color of blood and mode of death.
- Normally the staining is at first bluish pink and afterwards bluish purple.
- In severe anemia and death from hemorrhage the staining is very faint.
- In death from asphyxia where the blood is deoxygenated and may not readily coagulate the lividity is intensely developed and purple in colour.

Certain poisons impart a distinct color to lividity

Carbon monooxide	Bright cherry red
cyanide	pink
Chlorates	Chocolate brown
Phosphorus	Dark brown
Nitrites	Red brown
Sulphide	Bluish green
Opiates	Black
Cyanide	Pink

Differences between P.M lividity and bruise

Postmortem lividity	• Bruise
1. due to engorged vessels showing through the skin	• due to ruptured vessels either superficial or deep
2. on dependent parts and front and sides of the neck in supine position	situated anywhere (at site of blunt force
3. Margins clearly defined, usually horizontal	margins irregular not horizontal

4. Uniform in color	May be variegated in color
5. No swelling	Swelling
6. No superimposed abrasion	Superimposed abrasion may be present
7. incision shows a few oozing points at the site of severed capillaries. This blood can be easily washed away	incision shows extravasated blood staining the surrounding tissues which cannot be easily be easily washed away
8. microscopically blood elements are found within the blood vessels and there is no evidence of inflammation	microscopically blood elements are found outside the blood vessels and there may be evidence of acute inflammation

Lividity of internal organs

- Lividity of internal organs develops in the same way as that on the skin.
- The site of distribution depends on the position of yhe body.
- It is important to differentiate such livid staining from congestion due to disease.

Difference between P.M lividity and congestion due to disease

Postmortem lividity	Congestion due to disease
1. Irregular and on dependent parts of the organ only	Involves the whole organ diffusely
2. Normal appearance of the non-dependent part	Pathological change in the organ is evident
3. Hollow viscus such as stomach and intestine when stretched show altenate stained and unstained areas	Hollow viscus such as stomach and intestine when stretched show uniform staining
4. Cut surface shows variegated appearance with distinction between livid area and other areas	Cut surface oozes blood (and fluid) throughout

- Areas of lividity undergo changes when putrefaction sets in.
- There is haemolysis of blood and owing to the pressure of gases developed in the blood vessels, the position of postmortem staining is altered.
- It may extend to the upper parts of the body here it may be mistaken for violence to the head or smothering.

- As the process advances lividity undergoes a series of changes in color; dusky, brown and green before finally disappearing with destruction of blood.
- In mummification lividity turns from brown to black with desiccation of the body.

Medico legal importance of P.M lividity

- It is a reliable sign of death.
- It may give information about the position of the body at the time of death and if it has since been altered (as may happen in a case of murder).
- It helps to estimate the time since death.

- Its colour may suggest the cause of death.
- Its distribution may sometimes suggest the circumstances or position of the body at the time of death, eg, hanging drowning, electrocution.

RIGOR MORTIS

Presented By:
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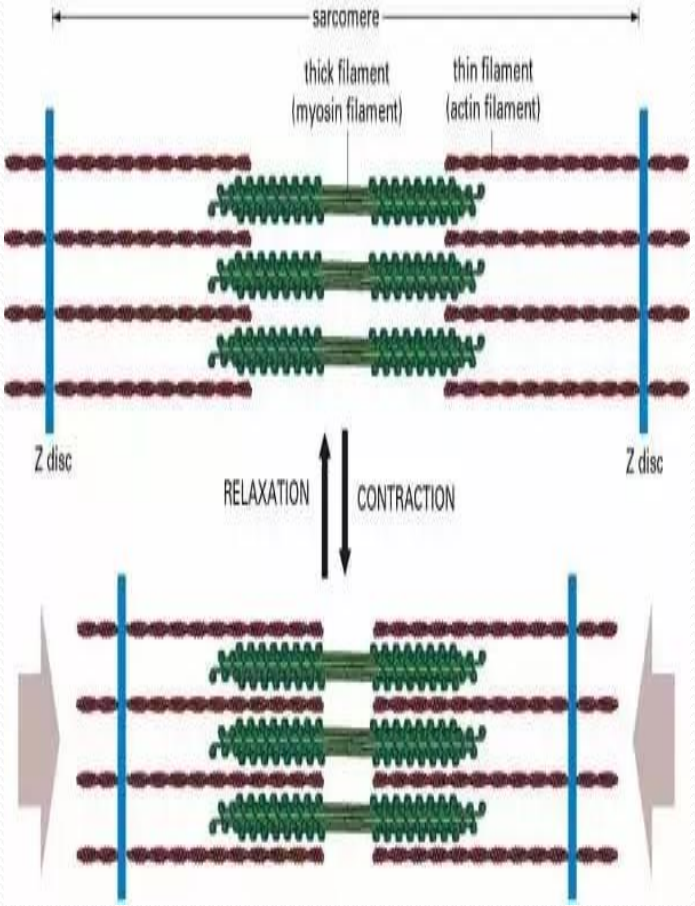
Changes in the Muscles

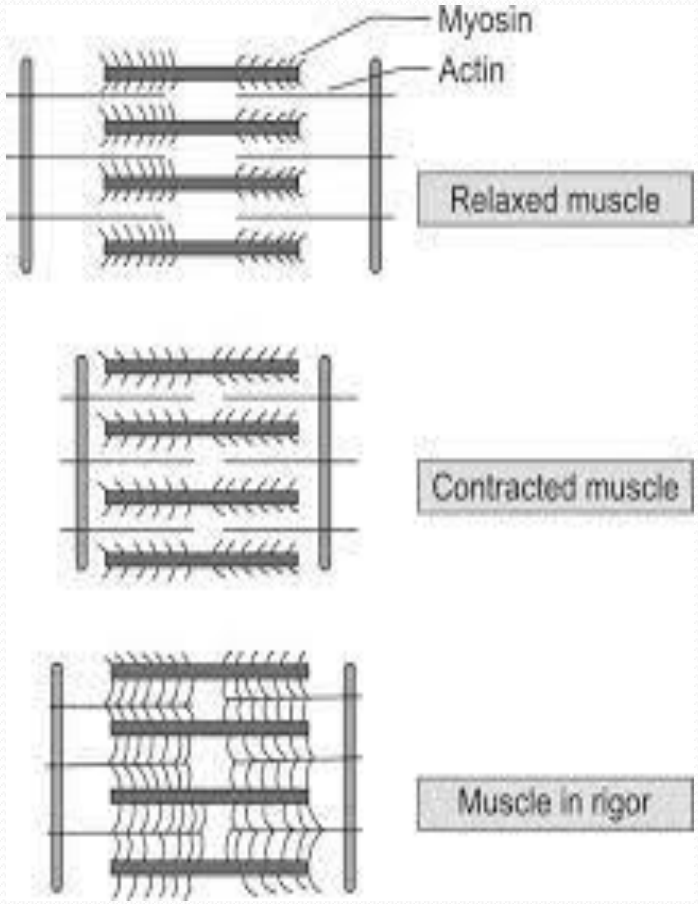
- Except where cadaveric spasm sets in, which is rare, the muscular tissues of the body, after death, pass through three stages.
- Primary relaxation or flaccidity
- Rigor Mortis or cadaveric rigidity and
- Secondary relaxation

Rigor Mortis

- Rigor mortis is a condition characterised by stiffening and shortening of the muscles which follow the period of primary relaxation.
- It is due to chemical changes involving the structural proteins of the muscle fibers (actin and)myosin and indicates the molecular death of its cells.

- The fusion of myosin and actin filaments into a dehydrated stiff gel results in the condition known as rigor mortis.
- During rigor mortis, the reaction of muscle changes from slightly alkaline to distinctly acid owing to the local formation of lactic acid.


sarcomere
thick filament
(myosin filament)
thin filament
(actin filament)
Z disc
Z disc
RELAXATION
CONTRACTION


Myosin
Actin
Relaxed muscle
Contracted muscle
Muscle in rigor

- Rigor mortis persists until autolysis of myosin and actin filaments occurs as a part of putrefaction. When autolysis occurs, the muscles soften and secondary relaxation sets in.
- Rigor mortis can also be broken by mechanical force. Thus, if a limb, which is stiff due to rigor, is flexed forcibly at a joint, the limb becomes flaccid and will remain so thereafter. This is known as breaking of rigor mortis.

- All muscles of the body, voluntary and involuntary, are affected by rigor. It first appears in involuntary and then in voluntary muscles. It is not dependent on the nerve supply as it also develops in the paralyzed limbs.

  It is tested by:

1. Attempting to lift the eyelids
2. Depressing the jaw
3. Gently bending the neck and various joints of the body

- In the involuntary muscles, rigor mortis appears in the heart within an hour after death.
- The left chambers being thicker appears more affected than the right.

Various muscles of the body and the time interval of developing rigor mortis

Muscle site	Time interval after death
Eye lids	3---4 hours
Face	4---5 hours
Neck and trunk	5----7 hours
Upper extremity	7---9 hours
Legs	9---11 hours
Fingers and toes	11---12 hours

- When rigor mortis is established, the jaw, neck and extremities become fixed.
- The rigidity generally passes off, in the same order in which it occurred, due to autolysis of muscle proteins.
- Rigor mortis commences in 2---3 hours, takes about 12 hours to develop from head to foot, persists for another 12 hours, and takes about 12 hours to pass off.

Medicolegal importance of rigor mortis

- It is a sign of death.
- It helps to estimate the time since death.
- It may give information about the position of the body at the time of death and if it has been altered after rigor has set in.

Factors which influence rigor mortis

- Age and condition of the body
- Mode of death
- surroundings

Conditions simulating rigor mortis

- Freezing or cold stiffening
- Heat coagulation or heat stiffening
- Putrefaction
- Cadaveric spasm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