

and less ~~deep~~ deeper at the end as it tails off to a superficial skin wound. Tailing indicates the direction of wound.

5) Punctured wounds: Caused by more or less pointed objects such as knives, daggers, ~~knives~~, spears, when driven through the skin. Depth is the greatest dimension. When a weapon enters a body cavity it is called penetrating wound when object after penetration comes out on the other side making an exit wound is called perforating wound. The opening is small but the wound is deep.

6) Gun - Shot wound: The entrance of wound is smaller and ~~more~~ round than the exit wound. It is circular when hit closely and area will be burned, blackened by smoke. The exit is bigger than the bullet.

Theory

Postmortem changes in carcasses and
Estimation of Postmortem interval

11/04/19

Immediately following death sequence of physical & chemical changes begin, which are unavoidable, irreversible and progressive.

Algor mortis: 1st change - Cooling of Body after death.

~~Theory~~ Theoretically the body may be considered as a mass of water which subjects to the ^{Laws} of Newtonian cooling \rightarrow rate of change to temp of an object is proportional to the difference b/w its own temp and ambient temperature

Forensic \rightarrow The temp of the death body with respect to the temp around

The concept of estimating postmortem interval (PMI) using

Algor
Livor
Rigor

Algor mortis based on the premise that the body begins to cool upon death and the cessation of cellular activities that generate heat & maintain body temp in life. Upon death body undergoes laws of heat exchange.

Livor mortis: Purple red discoloration of soft tissue due to postmortem gravity-dependent pooling of blood is called livor mortis.

Can be observed in skin, mucous membranes or in abdominal or thoracic viscera, Most noticeably the lungs. It typically develops within 30 minutes to 2 hours after death in humans.

→ when weight of body ↑ → livor mortis early.

It must be distinguished from hemorrhages.

In livor mortis pooling of blood is entirely within dilated vascular channels while in hemorrhages escape of blood from the blood vessels into the connective tissue.

Rigor mortis: Immediately after death series of biochemical reactions occurs within the skeletal and cardiac muscles throughout the body. Specifically ATP continues to be consumed by the muscle cells. The muscle fibers remain in a state of permanent contraction, unable to relax because of lack of additional ATP.

The onset and resolution of rigor mortis is variable. Typically the onset begins at approximately 2-6 hours after death and persists for roughly 36 hours after which it slowly resolves.

However this time course is highly subject to ambient temp & patient factors such as antemortem activity & cause of death.

→ The more animal ill and weak → rigor mortis early.

- Animal healthy → rigor mortis late & prolonged

It affects all the muscles in the body uniformly & simultaneously. But they are soonest visible in the small muscle groups of body such as jaw. Later progressing to the larger muscles of the upper extremities and then to lower extremities. Resolution typically follows this same pattern. It is more prominent in bodies with greater muscle mass.

Desiccation: The postmortem drying of mucous membranes & delicate skin surfaces may result in artifactual changes in color or texture. It begins immediately upon death and may progress quite rapidly. It is most prominent in eye. There is discoloration of sclera where eyelids fail to close → called tachenoire.

Decomposition: The most definitive & distinctive postmortem change is the decomposition of soft tissue. It begins on a molecular-level upon death because of the failure to maintain ion gradient and cell membrane integrity. Simultaneously a 2nd pathway of decomposition often begins as a result of bacterial proliferation & consumption referred to as putrefaction.

Summary

Classically the phases of decomposition have been categorized as:

- ① Fresh stage → death until bloating begins → 4 to 36 days.
- ② Bloated stage → on set of bloating until resolution of the bloating - 3 to 19 additional days
- ③ Decay : Resolution of bloating until drying of carcass → 6 to 183 days
- ④ Dry stage : Drying of carcass until no evidence of insects. → 13-27 days.

Mummification Under dry environmental conditions either cool or warm with low humidity and sufficient ventilation, the body may become desiccated rather than undergoing decomposition. Skin becomes tight & yellow brown to black and takes on a leathery consistency. In such conditions the processes of autolysis and putrefaction are retarded or completely inhibited, and the tissue becomes dehydrated.

Blow Fly → First to come to lay eggs after death, and on the basis of stage of blow fly towards ^{terrestrial} environment is typically the first insect to arrive on dead carcass, in industrial environment is Blow flies. It may occur within seconds to minutes. This is a critical feature in the interpretation of entomologic evidence which is essential in estimating the minimum time since death. Adult female blow flies will deposit eggs on the body in orifices of head, eye, nose, mouth, ear and the anogenital region. Any deviation in this pattern is suggestive of trauma as the insects will also colonize there. PMI can be estimated by looking the life cycle of the fly.

Non-infectious causes of deaths.

1. Drowning: Asphyxial death due to ~~total~~ lack of access of air in lungs by submersion of body in water.
- Death occur before or after drowning.

- Cause of death in drowning is.
 - Asphoxia (Asphyxia)
 - Shock
 - Hypothermia
 - Trauma.

External Signs - Postmortem findings:

- Wet hair coat & body
- Congested conjunctiva
- Corrugated appearance (washer women appearance)
- A fine white leathery froth at mouth & nostrils.

Rigor mortis sets early.

Signs whether the death was due to drowning:

- Fine froth at nasal opening
- Fine Froth in lungs and air passages
- Increased volume of lungs.
- Oedematous
- water in lung, stomach, intestine with same composition
- Early rigor mortis

If animal thrown dead in water \rightarrow No water in body.

Lightning:

Electrical discharge From cloud to earth through an object.

- Current 20,000 Amp. or 100-1000 million volts.
- Single Flash is $\sim 1/1000$ sec.
- Death from lightning is due to Cardiac or respiratory arrest

Direct effects

- Burning by heat
- ~~Ar~~ Arborescent marks on skin (marks like branching +ress due to rupture of small blood vessel)
- Fusing & magnetization of metallic articles.
- ~~Phy~~ Physical damage to the point of exit.
- Cardiac failure
- ~~Q~~

Signs

Instantaneous death with out any struggle

Postmortem Findings:

- history of recent storm
- Finding dead or injured animal under a tree or near a fence.
- Rigor mortis develop & passes quickly.
- Postmortem distention of Rumen occurs rapidly.
- Blood tends to clot slowly or not at all.

3 Electricity or Electro cution:

DC → Adison

AC → Tesla

Human body can bear 60 volt.

→ AC current more dangerous

→ It signifies contact burns.

→ The Effect of passage of current through the body depends upon -

1 - Strength of current

2 - length of exposure

3 • Direction

→ 110 to 220 to kill large size animal

Strength → 110 to 220 volt current is sufficient to kill a large size animal.

110 current can be dangerous if standing in water or damped floor.

Length of exposure is fatal. Low voltage for longer time

Direction of current: Electric current follows the route which offers least resistance.

Blood filled vessels take it to the heart.

It is more dangerous when current passage involve heart.

Resistance offered: Dry skin has bad conductivity, wet skin good conductivity & more dangerous.

- Ground compose of sand, clay, marbles, & chalk (in that order) enhances conductivity where as rocky area are resistants.

Starvation:

In early stages of starvation hunger is felt by the animal. but feeling of hunger is lost after 48 hrs.

- 1 - Thirst become intense.
- 2 - weakness becomes evident.
- 3 - Animal easily Fatigue
- 4 - Body fat from fat deposits start begining to decrease after about 4-5 days
- 5 - Emesiation starts
- 6 - sunken eyes.
- 7 - dilated pupils.
- 8 - Voice becomes weak & faint.
- 9 - Skin become dry, rough & wrinkled
- 10 - tongue is coated with thick fur and is dry.
- 11 - Urine gets concentrated
- 12 - Pregnant animals may abort.

Thermal injury or Burns

(classified into 3 categories according to willson's classification)

① Epidermal Burns - (First & 2nd degree burns)

1. Affected part is red, Blisters are surrounded by a red ring of inflammation (superficial), singeing of hair is present.

Repair occurs without scar formation.

② Dermo-epidermal burns: (3rd & 4th degree)

Whole thickness of skin is involved. affected part appears as shriveled surrounded by hyperemic blistered skin. Within a week an ulcer forms that heals with scar formation.

Highly Painful burns.

③ Deep burns: (5th & 6th degree)

Affected area is completely charred (completely burned).

Gross destruction of skin, SC tissue, muscles & bones.

Nerve endings are also destroyed.

Effect of Burn Depends Upon

— ① Temp

— ② Duration of exposure

— ④ Age of animal - new born and young ones face complication even if they are recovered.

— ⑤ Age of Burn: immediately redness occurs, blister formation within 2-3 hrs. pus formation in 32-36 hrs. 36-72 hrs.

superficial sluffs (3rd degree) in about a week. Deeper sluffs in 1st degree burn in fortnight period (15 days) granulation tissue then start covering & healing occurs by scar.

— ③ Extent & position

1st degree burn over a wide area is more dangerous than a 3rd degree burn over a limited area.

Destruction of 1/3rd of skin is fatal.

Burns in head, neck, trunk and genitalia are more dangerous.

SNAKE BITE

3000 sp of snake in world.

two types

① Poisonous

② Non poisonous

⑥ Venemous snakes

① Elapidae

② Viperidae

③ Hydrophiidae

① Elapidae → Cobra, mamba, coral snakes etc

② Viperidae → True vipers → Puff adder, russel viper, Common European adder snakes.
↳ Pit vipers → rattle snakes.

③ Hydrophiidae → sea snakes

↳ Actually they are water venemous of Elapidae which are modified for sea.

— snake venom contain

- toxalbumin
- Fibrinolysin
- Neurotoxins
- Hemolysins (vipers)
- Agglutinins
- Coagulase
- Phospholipase
- Proteolysin
- Cholinesterase (Cobra)
- Thromboplastin (vipers)
- Cardiotoxins
- Hyaluronidase (Facilitates the venom spread in body)

Normally → Elapidae → toxins are neurotoxin

hydrophiidae → toxin are myotoxin,

Vipers → toxins are vacuole toxins, → damage blood.

• Effect of snake bite depends upon

- 1 - amount of venom injected
- 2 - Toxic components in venom
- 3 - Age of snake. ~~young~~ young more dangerous
- 4 - Size of snake compared with animal size
- 5 - Any recent bite to other animal

• venom more dangerous in spring.

7 - location of bite → head neck, shoulder → preferred site for

⑥ National Institute of health in Islamabad → make antivenom (NIH)