Cellular Pathology

Postmortem Artifacts
(web)

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Postmortem Scavenging

- postmortem removal of organs of carcass by carrion eating animals
A predator is an animal that hunts and kills prey for food in an act called predation.
Rigor Mortis

- contraction of muscles after death.
- usually within 1-6 hrs after death & lasts 1-2 days (~ glycogen stores, ambient temp).
- after death, circulation of blood ceases →

  muscle cells resort to anaerobic glycolysis →

  glycogen stores run out & ATP depleted (required for muscle relaxation) →

  $\text{Ca}^{++}$ floods into muscle cells causing myofilaments to “lock-up” (all muscles affected, flexors / extensors, causing rigidity of joints) →

  rigor gradually dissipates with autolysis of structural and functional muscle proteins.
Algor Mortis

- gradual cooling of cadaver to ambient temperature (in humans 1.5°F per hr)

Livor Mortis (postmortem lividity)

- hypostatic congestion, i.e., gravitational pooling of blood to the dependant regions ("down side") of the body.

Pig has been turned over to show the gravitation pooling of blood that occurred on the “down side” of the carcass after death
Postmortem Clotting

- occurs in heart and vessels.

- rbc’s may separate from plasma; esp in animals with high fibrinogen, eg horses = “chicken fat clot” (as seen in image)
Figure 01-24 (McGavin & Zachary). Postmortem clot, dog. The postmortem clot is pale white to yellow (chicken fat clot) in some areas and shiny red (currant jelly clot) in others. Note how it conforms to the shape of the lumen of the vessels from which it was removed.
Hemoglobin Imbibition

- HgB released by rbc breakdown (after death) → staining tissues.
- especially lining of heart & blood vessels; also common in tissues of aborted fetuses.
Figure 01-25 (McGavin & Zachary). Imbibition of hemoglobin, viscera, pig that has been dead for several hours before being necropsied. Note the pink color on the serosal surfaces of the stomach and small intestine. This is termed imbibition of hemoglobin and is due to staining by hemoglobin that has seeped out of autolyzed red blood cells.
Calf. Bile imbibition of tissues adjacent to gall bladder due to leakage of bile from gall bladder. Note rib “imprints” on the liver; this is due to the expansion of the intestines with postmortem gas, compressing the liver against the ribs and “squeezing” the blood from these areas.
Pseudomelanosis

- term used to describe an artifactual black discoloration of tissues (similar in appearance to melanosis).

- due to saprophytic / putrefactive bacterial production of hydrogen sulfide ($H_2S_2$) + iron $\rightarrow$ iron sulfide ($Fe_2S_2$).
Postmortem Autolysis / Decomposition

- after death, tissues decompose
  1) initially by progressive release of endogenous enzymes (autolysis)
  2) more gradually by saprophytic / putrefactive bacteria (esp from gut).

- rate of progression dependent upon several factors, eg
  - body temperature at time of death;
  - ambient temperature;
  - size of body;
  - amount of fat / hair / wool;
  - cause of death (eg bacterial infection, hyperthermia, etc)
Figure 01-28 (McGavin & Zachary). Postmortem autolysis. Pig livers at various intervals after death. Pale foci on the middle liver are due to blood being forced out of the parenchyma by intestinal swelling (intestinal imprints) and from pressure from the overlying ribs (rib imprints). Multiple small pale foci can sometimes be caused by colonies of postmortem bacteria and can be confused with antemortem necrosis.
Figure 01-26 (McGavin & Zachary). Postmortem autolysis. Cross sections of livers from three different pigs at different stages of postmortem autolysis. The section on the right has green staining around the bile ducts due to leakage of bile into the surrounding parenchyma after death (bile imbibition). All of these livers are softer than normal, but the one on the left is notably softer, another characteristic of autolytic tissue.
Bovine, kidney, infarct and marked autolysis.

Porcine, liver, autolysis with postmortem emphysema.
Bovine, liver, autolysis with postmortem emphysema causing liver to float.

Bovine, liver, histo, autolysis with postmortem emphysema.
Putrefaction and Postmortem Emphysema (bloating)

• putrefaction (rotting), refers to the enzymatic decomposition of organic material (tissue) with production of foul-smelling compounds (eg H₂S, NH₃, mercaptans), especially by saprophytic / putrefactive bacteria.

• postmortem emphysema occurs when saprophytic bacteria produce gas, causing gaseous distention of G-I tract, organs and body cavities.
Postmortem Ruptures and Organ Displacements

- swelling of viscera (via postmortem emphysema) → rectal prolapse, visceral dislocation, gastric rupture (horses), diaphragmatic hernia.

Other Abnormalities

- rib indentations on pulmonary pleura.
- pale discolored compressions on capsular surface of liver from distended intestine loops and rib imprints.
- euthanasia with barbiturate → splenomegaly, accumulation of fluid & blood in lung.
- lens opacity in carcasses that have been frozen.
Figure 01-29 (McGavin & Zachary). Postmortem autolysis, eye, lens, calf. Note that the cornea is clear. The cloudiness of the lens is due to cooling or freezing and is reversible as the carcass warms up. It should not be confused with cataracts.