

Diagnosis of Drowning in Autopsy Practice.

Dr S Hamilton, Leicester.

Dr M Whibley, Brighton.

Aims

- To understand the range of possibilities in potential drowning cases.
- To highlight the significant findings and potential artefacts in bodies recovered from water.
- To consider the additional tests proposed in potential drowning cases.

Scope

- Bodies recovered from water in circumstances considered non-suspicious.
- Not SCUBA or other diving deaths.
- Not the pathophysiological considerations.

Bodies from water.

- Died before going into the water.
 - Natural causes.
 - Trauma / intoxication.
- Died in the water.
 - Drowning.
 - Non-drowning effects of immersion e.g. hypothermia.
 - Natural disease.
 - Trauma.

Overlaps.

- Intoxication leading to immersion?
- Head injury causing unconsciousness?

Circumstances.

- “Domestic”.
 - Baths, swimming pools etc.
- Open water.
 - Rivers, lakes, seas.
- Domestic more likely to be recovered quickly.

Rapidly recovered.

- *Champignon de mousse.*
 - May be pink-tinged.
 - May be transient/ effaced by resuscitation.
 - Similar findings in opioid deaths.
- Hyperinflated lungs.
 - Often overlap.
 - Can be seen in asthma.

Rapidly recovered.

- Water in stomach.
 - People drink water!
 - Evidence of swallowing, not inhalation.
 - Plant material or similar may also help.
- *Emphysema aquosum*.
- Hypostasis is affected by water pressure.

Prolonged immersion.

- Body sinks.
- Water is (usually) cold.
- Algae grows.
- Predators.
- Bloating.
- Decomposition.

Confounding factors.

- Bodies float face down.
 - Knuckles drag on the riverbed or seabed.
- Bodies bump into things.
 - Abrasions and lacerations.
- Blood is washed away.
- Predation mimics injury.
- Decomposition mimics bruising.

Spurious findings.

- Middle ear haemorrhage.
- Low spleen weight.
- Pink teeth.
- Excessively fluid blood.

Approaching the case.

- Adequate circumstantial information.
 - Where the body was found.
 - Resuscitation.
 - Initial observations.
- Medical history / records.
 - Including drug, psychiatric and family history.

The autopsy.

- A complete and detailed external and internal examination (of course!).

The autopsy.

- Toxicology.
 - If authorised.
 - Peripheral blood (plain and preserved).
 - Urine (plain and preserved).
 - Vitreous humour.
 - Stomach contents.

The autopsy.

- Histology.
 - If authorised.
 - Lung.
 - Heart.
 - Other relevant samples.
- CT scanning.
 - No definitive answer... yet.

“Tests for drowning”

- Historical.
 - Diatoms.
 - Differential measurements of strontium (or chloride, or specific gravity...).
- Of possible value.
 - Bacterioplankton PCR.

Conclusions.

- Is there sufficient evidence for drowning?
- Are there obvious significant contributory factors?
 - Natural or unnatural.

A salutary tale.

- 65 year old female.
- Holiday in Spain.
- Been swimming, recovered deceased.
- Embalmed.
- Repatriated to the UK.
- Autopsy requested.

A salutary tale.

- Findings.
 - Limited first autopsy.
 - All organs present.
 - Impossible to interpret lungs in the context of drowning.
 - Cardiomegaly and coronary atheroma.

A salutary tale.

- Conclusion.
 - Unascertained.
 - Could be drowning but insufficient objective evidence.
 - Sufficient heart disease to cause collapse.

A salutary tale.

- Inquest.
 - More translated documents available.
 - (Not seen by pathologist prior to inquest).
 - Had walked 10 m up the beach before becoming short of breath and collapsing.

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Questions?