



Guidelines on Autopsy Practice

Scenario 4: Autopsy for suspected acute anaphylaxis (includes anaphylactic shock and anaphylactic asthma), 2nd edition

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Preamble

Anaphylaxis kills either by shock or asphyxia. These typically occur with no other signs of an allergic reaction. Consequently:

- anaphylactic shock is likely to be misdiagnosed as myocardial infarction.
Shock in hospital is usually rapid (median 5 minutes) and associated with arrhythmia and pre-existing cardiac disease. Outside hospital, it is typically slower (median 15 minutes), often with pulseless electrical activity and a healthy heart. Myocardial ischaemia is very probable (almost inevitable) in shock deaths, which may therefore be mistaken for primary myocardial infarction
- food and aspirin anaphylaxis are likely to be misdiagnosed as fatal asthma.
Asphyxia may be due to asthma (most common for food allergy or aspirin/NSAID sensitivity) or laryngeal oedema (most common for stings). Death may be delayed for up to three hours, for example after ingestion of NSAIDs.

The role of the autopsy

To determine whether there is:

- morbid anatomical evidence to support the suspected anaphylaxis and its timing
- evidence of other pathological conditions that could account for death or contributed to death
- biochemical evidence of anaphylaxis
- serological evidence of the agent responsible for initiating anaphylaxis.

Pathology encountered at the autopsy

1. Often there is little or nothing specific to see, grossly or histopathologically.
2. There may be laryngeal (or pharyngeal, or other upper airway) oedema.
3. Pulmonary oedema, if present, may indicate epinephrine (adrenaline) overdose.
4. If the patient was resuscitated, survived but then died in intensive care, much additional pathology may supervene.

Specific health and safety aspects

None.

Clinical information relevant to the autopsy

- The complete medical notes, with statements from witnesses as to the final events at collapse.
- Poorly controlled asthma, e.g. due to under treatment or recent exacerbation.
- Previous history of food, drug or insect sting allergy or asthma aggravated by NSAIDs (these patients usually have nasal polyps).
- Any medication or food taken immediately prior to collapse, or any wasp or bee sting.
- The complete drug schedule, with times and doses and routes of administration.

The autopsy procedure

- A complete autopsy examination.
- Careful search for bee or wasp stings if there is reason for suspicion.
- Examine site of emergency epinephrine (adrenaline) injection, if known, and determine skin-to-muscle depth for comparison with length of injector needle.

Specific significant organ systems

- Lung, larynx and airways examination for significant oedema (often difficult to identify after death, even if recognised during attempted resuscitation).
- Lung for evidence of acute asthma (airway plugging and eosinophilia), chronic asthma (airway remodelling, basement membrane thickening, mucinous metaplasia, bronchial wall inflammatory cell infiltrate).
- Nasal sinuses for evidence of extensive nasal polyps, which would support the diagnosis of NSAID-intolerant asthma.
- Coronary arteries and heart for contributory ischaemic heart disease (myocardial ischaemia is an inevitable consequence of anaphylactic shock, even with normal coronary arteries).
- During coronary artery stenting, some patients may suffer allergic reaction to anti-clotting drugs or materials incorporated into the stent; this may also lead to local thrombosis from hypotension.

Organ retention

None specific required.

Recommended blocks for histological examination – best practice

- Heart; note contraction band necrosis that may reflect inotropic resuscitation measures.
- Coronary artery.
- Lung with airways.
- Vocal cord mucosa.

Other samples required

- Urgently seek any pre-mortem blood specimens (in pathology laboratories) before they are discarded.
- Peripheral cadaveric blood, spun-down, for mast cell tryptase (MCT): samples remain useful for up to three days after death.
- Note that MCT is not always raised in anaphylaxis, and may be raised for other reasons, such as major trauma.
- Serum drug levels, e.g. for aspirin, opiates, paracetamol.
- Spun-down blood for total IgE, specific IgE antibodies to drugs eg morphine, suxamethonium, penicillin, amoxicillin and cephalosporins and serum specific IgE levels for food (including nuts, milk, fish, shellfish) and bee or wasp venom.

- Gastric content may allow identification of drugs and foods recently ingested. Immediate visual inspection with photographic confirmation can be valuable: post-mortem activity of digestive enzymes can rapidly destroy food materials, so stored samples may be useless unless promptly frozen. Immunochemical identification may also be useful.

If in doubt, contact an allergist or immunologist to discuss samples.

Modes of death in anaphylaxis

- Cardiac arrest secondary to peripheral vasodilation and myocardial ischaemia.
- Asphyxia and respiratory arrest due to upper airway oedema, lower airway mucus plugging or aspiration of vomit.
- Delayed deaths: coma due to hypoxic encephalopathy, respiratory failure due to pneumonia.

The clinicopathological summary

1. Document:
 - the gross and histological findings
 - the blood mast cell tryptase
 - other serological investigations if done.
2. Decide whether:
 - the death was reasonably attributable to anaphylaxis and, if possible, which agent or drug was responsible
 - a raised blood mast cell tryptase truly indicates anaphylaxis, in which case discuss with an allergist or clinical immunologist
 - the death was caused by other natural or unnatural conditions
 - the cause of death is not ascertainable.

Specimen cause of death statements

- 1a. Anaphylactic shock.
- 1b. Allergy to penicillin.

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