The Royal College of Pathologists

Guidelines on Autopsy Practice:

Scenario 3: Suspected illicit drugs

Updates made August 2005

1. Pathology encountered: causes of death re-ordered, with addition of chronic alcohol keto-alcoholic syndrome (plus reference).
2. Histopathology and toxicology sampling guidance expanded.

The role of the autopsy

To determine the presence or absence of toxic drugs and their effects, in the context of ascertaining the clinicopathological events that resulted in death:

- their contribution to the death
- to ascertain if possible their route and timing of administration.

Pathology of drug abuse encountered at the autopsy

1. Direct effects leading to death, for example:
   - cardio-respiratory depression from opiates, antidepressants
   - intracerebral haemorrhage from cocaine abuse
   - cardiac necrosis from cocaine, amphetamine abuse
   - acute alcohol (ethanol) toxicity.

2. Indirect effects relevant to death, for example:
   - cardiac fibrosis from amphetamine and cocaine abuse
   - ketoalcholic death syndrome
   - aspiration of gastric contents and inhalational pneumonia
   - hypoxic encephalopathy, if resuscitated and survived after collapse.

3. Complications related to the process of drug use, for example:
    - infective endocarditis and mycotic aneurysm in intravenous (IV) drug users
    - HCV, HBV and HIV infection in IV drug users
    - pulmonary hypertension in IV drug users
    - injection abscess in injectors
    - secondary amyloidosis.

Specific health and safety aspects

Risk of blood-borne virus infection, as indicated from clinical data.

Clinical information relevant to the autopsy

- Full details of the scene of death.
- Place, posture and clothing of the body.
- Presence/absence of needles, syringes, medicine containers and pills, substances of abuse.
- Provisional description of body with regard to injuries, if any.
- Past and current history of drug use; drug maintenance programme.
- Previous imprisonment and date of release from HM Prison.
- Identity of person discovering the dead person.
- General practitioner or other medical contact of the deceased.
- Known or suspected blood-borne virus status (HIV, HBV, HCV).

The autopsy procedure

- Inspection of the whole skin surface for old and recent needle injection marks, bruising, fractures, injuries to the anus, genitalia and face.
- Complete autopsy.
- If HIV +ve, consult the protocol for HIV/AIDS.

Specific significant organ systems

- Liver – chronic hepatitis, ethanol-related pathology.

- Heart – acute damage and fibrosis.
- Lung – aspiration pneumonia and embolism.
- Brain – haemorrhage, stroke and meningitis.
- Intestines – drug capsules in a drug courier.

Organ retention

No particular requirement.

Recommended blocks for histological examination – best practice

Standard set

- Liver – hepatitis, fibrosis. steatosis, Mallory hyaline.
- Heart left ventricle - fibrosis, contraction bands, ischaemic heart disease.
- If suspected cocaine or amphetamine toxicity, sample the heart systematically as in Scenario 1 – 'Sudden death with likely cardiac pathology'.
- Lung (at least one sample from each) – aspiration pneumonia, inhalation of vomit, presence and effect of injected material.
- Kidney – glomerulosclerosis, amyloid, myoglobinuria.
- Cerebellum – evaluation of hypoxic/ischaemic neuronal damage.

Additional histology samples according to case

- Skin injection sites, if determining presence and their age is critical.
- Quadriceps and psoas muscle, if excited delirium and rhabdomyolysis suspected.
- Brain, if hypoxic encephalopathy requires documentation; cocaine-related haemorrhage.

Other samples required

1. For toxicology, recommended for best practice:
    - peripheral blood (femoral vein is best), whole unpreserved and in fluoride bottle
    - urine
    - vitreous humour
    - stomach contents.

    If the patient was admitted to hospital following suspected drug use and died later, grab the admission blood samples in laboratories for analysis before they are

discarded. Due to the rapid half-life of many drugs, post-mortem samples may be uninformative.

Request as standard: alcohol and illicit drug screen; plus specified other drugs as indicated from the history.

Certain opiates, e.g. fentanyl and buprenorphine (used like methadone as a substitute), are not always included in standard opiate screening and need to be specified.

If the ketoalcoholic death syndrome is suspected (chronic alcoholic, sudden unexplained death), measurement of beta-hydroxybutyrate level in the blood and vitreous provides supporting evidence.

Additional samples according to case:

- hair – for storage in case of subsequent review
- liver, kidney – if cadaver decomposed and fluids not available
- faecal material surrounding a drug capsule in the gut if suspected that rupture may have caused death.

2. Consider measuring carbon monoxide haemoglobin %.

3. If microbiology relevant:
   - peripheral blood in blood culture bottles for bacteraemia
   - lung, spleen, meninges for sepsis.

4. If serology relevant:
   - whole or spun-down blood for serology (HBV, HCV, HIV, etc.)
   - whole or spun-down blood for mast cell tryptase (allergic reaction to drugs).

The clinicopathological summary

1. Document:
   - the presence or absence of gross natural causes of death
   - the relevant organ histopathologies

- the results of toxicology, microbiology and serology, with the laboratory reference numbers; bind those laboratory reports with the autopsy report sheets. Seek advice from toxicology clinician or scientist, if in doubt about their significance.

2. Decide whether the putative drugs:
   - caused the death directly
   - or contributed to the death
   - or are irrelevant to the cause of death
   - or if the cause of death is still unascertained.

Specimen cause of death opinions/statements

1a. Cardio-respiratory failure
1b. Opiate overdose (heroin injection)

1a. Acute heart failure
1b. Myocardial fibrosis
1c. Chronic cocaine abuse
2. Cirrhosis (HCV infection)

1a. Aspiration pneumonia
1b. Methadone overdose

1a. Pulmonary valve rupture
1b. Infective endocarditis (staphylococcus)
1c. Intravenous drug use
2. HIV disease

References

Karch SB. *Karch's Pathology of Drug Abuse (3rd edition).* Florida: CRC Press LLC, 2002.

Tomashefski JR, Felob JA. The pulmonary pathology of drug and substance abuse. *Current Diagnostic Pathology* 2004,10:413-426.

Thomsen JL, Felby S, Theilade P, Nielsen E. Alcoholic ketoacidosis as a cause of death in forensic cases. *Forensic Science International* 1995,75:163–171.

The RCPath Working Party on the Autopsy

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