

A8 Neuropathological cases

A8.1 GENERAL

The following is a summary of the main points which should be noted in autopsies involving neurological, neuro-surgical, psychiatric and epilepsy deaths. Further details are given in the British Neuropathological Society's *Guidelines for good practice in neuropathology*. This contains minimum datasets for neuropathological examination in the following areas:

- Alzheimer's disease
- non-Alzheimer dementias
- neuropathological cases with a significant risk of infection
- perinatal neuropathology
- stroke
- CNS trauma.

Pathologists should consider whether cases need referral to Regional Centres of Neuropathology.

Disorders of skeletal muscle and peripheral nerve disorders may require complex histochemistry of snap frozen tissues and electron microscopy.

Surgeons or interventional radiologists should be invited to observe or participate in dissection, where appropriate.

A8.1.1 External examination

CSF should be taken from the cisterna magna before starting in selected cases, e.g. suspected bacterial meningitis.

A8.1.2 Histology of related tissues

Additional organs may include the pituitary, sensory and autonomic ganglia, middle ear and orbital contents.

A8.1.3 Dissection of the neck

The extracranial carotid arteries should be removed *en bloc* from the mastoid process to the level of the upper sternum and examined as multiple transverse sections. Vertebral arteries should be examined *in situ*, or as part of *en bloc* removal of the cervical spine.

A8.1.4 Examination of skull and brain

- Careful examination of scalp for haemorrhage or bruising.
- Care should be taken not to induce fractures during removal of the calvarium. An estimate of its thickness should be made.
- Special techniques may be needed for examination of the posterior fossa or upper spinal cord, e.g. cutting a wedge from the occiput combined with laminectomy.
- Hydrocephalus may require *in situ* examination with removal of the upper vertebral column and sectioning through the facial bones.

Careful reconstruction is essential if a satisfactory cosmetic result is to be obtained.

A8.1.5 Preliminary inspection of the brain

- The brain should not be sliced before fixation. Careful macroscopic examination will often provide information for a preliminary cause of death.
- Fresh samples should be taken for microbiology, virology or neurochemistry as needed. Direct smears or aspiration cytology may assist tumour diagnosis.
- Dissection of the Circle of Willis and arteries prior to fixation is recommended for the identification of aneurysms

- Suspension of the brain in 10% formal saline for 3–4 weeks is essential, with weekly changes of fixative. The spinal cord should be suspended vertically if possible.

A8.1.6 Dissection

- While coronal sectioning of the cerebral hemispheres is traditional, midline sagittal or axial planes may help correlation with CT scan or magnetic resonance images. The brain stem is usually sectioned coronally and the cerebellum sagittally, but both may be sectioned axially.
- Routine blocks should normally include dura, frontal, temporal, parietal, occipital, basal ganglia, thalamic nuclei, hippocampi, mammillary bodies, corpus callosum, cerebral white matter, cerebellum (including dentate nucleus), mid-brain, pons and medulla. In cases in which the pathology is limited to a particular part of the brain, histological sampling may be more restricted.

A8.2 DEATHS IN EPILEPSY

These deaths are almost always performed for a Coroner or Procurator Fiscal.

A8.2.1 Autopsy examination

During the autopsy examination, in addition to a complete macroscopic examination, the following should be documented including an appropriate statement when absent:

- evidence of trauma and asphyxia
- indirect evidence pointing to seizure activity around the time of death, such as tongue bite marks
- full examination of heart and lungs with histology, thereby excluding a primary cardiorespiratory cause for disease
- blood and urine levels of anti-epileptic drugs, ethanol and recreational drugs.

The brain should be examined after fixation, including systematic examination by histology, to establish or exclude any anatomic cause for disease.

A8.2.2 Terms for certification of death in epilepsy

- a. ‘Sudden unexpected death in epilepsy’ (SUDEP)
The death is sudden, unexpected, with or without evidence of seizure. Exclude trauma, drowning, toxicological causes and evident morbid anatomical causes. The term ‘Sudden unexpected death in epilepsy’, qualified according to clinical history as ‘witnessed’ or ‘unwitnessed’, may be suggested to the Coroner where evidence indicates no other explanation.
- b. ‘Status epilepticus’
This must be clinically documented. Status epilepticus is a specific clinical entity and cannot be assumed from a post-mortem examination in the absence of good clinical documentation.
- c. ‘Epilepsy-related deaths’
Epilepsy may be the underlying cause of:
 - trauma (head injury)
 - drowning
 - asphyxia
 - aspiration pneumonitis
 - airways obstruction from foreign body.

There must be evidence from the clinical history that there was seizure activity at the time of death.