The Neuropathology Post Mortem

......for non-neuropathologists

...........or should I retain the brain

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When to retain a brain

- Subject to consents & National Human Tissue Acts
- National & Religious variations in time to burial
- Brain examination useful months after death …if body cooled
- Perinatal - Paediatric - Adult autopsy scenarios differ
- Failure to retain brain may compromise autopsy & pathologist
- Alternatives to brain Retention

[51 full neuro autopsy]
Think before Discard!

- At least ... remove the calvarium & inspect!
- Swab
- Open venous sinuses
- Remove brain
- Describe brain
  - Avoid Templates
- Photograph
- Remove basal dura
- Examine neck & consider cord removal
- Call Neuropathology
Is the Brain Swollen -
Is the Brain Swollen - Is there Mid-line Shift?

Herniations
Sudden “Neuro” Death – Without Swelling

Subependymoma
Sudden “Neuro” Death – Without Swelling

Colloid Cyst – Third ventricle
Examination of Unfixed brain

Vertebro basilar System

ACA

MCA

Removal brain Stem
Mid-Sagital Upside Down Cut
Medial Surface Flat – serial sections

13.1; 13.2; 13.3 etc
Scenarios - Brain Retention Advised

- Epilepsy
- Dementia
- Stroke
- Neurological / Neurosurgical Disease + coma
- Trauma
- Neuromuscular Disease
- Infection
The Epilepsy Autopsy

• Epilepsy as the cause of death
• Cause of the patient’s epilepsy
• Effect of Epilepsy & Treatment [s] on patient’s brain
The Epilepsy Autopsy

- Epilepsy as the cause of death
  - SUDEP
  - Status Epilepticus & Epileptic Encephalopathy
  - Aspiration – Accidental – Asphyxiation
  - Investigational – drug withdrawal
  - Check
    - Drug compliance
    - History of pre-surgical monitoring
    - Basis for Diagnosis of Epilepsy
    - Family History
The Epilepsy Autopsy

• **Cause of the patient’s epilepsy**
  - Genetic
    • the epilepsy is the direct result of a known or inferred genetic defect (s). Seizures are the core symptom of the disorder
  - Structural-metabolic
    • distinct other structural or metabolic condition or disease present
  - Unknown
    • The nature of the underlying cause is as yet unknown & Maybe **NOT** Epilepsy
History 14yrs F

- Elective caesarean section
- Youngest of 4 children
- No family history of neurological disease
- Normal school progression until early teens
History -contd

• 2000
  – Regression & Difficulty with recall
  – Speech slurred
  – Difficulty with proverb interpretation
  – Coordination reduced
  – Difficulty getting out of chair
  – Multiple falls
History - contd

• Epilepsy developed - catamenial component
• Seizure semiology
  – Goes into a trance
  – Becomes rigid
• Increasingly unsteady; impaired finger-nose coordination
• Cardiac basis for events ??
  – “Reveal” device inserted
• Swallowing impaired
• Increasing abdominal girth
• SUDEP
Post Mortem

• “Reveal” device removed at autopsy
  – “shows sinus rhythm with sinus bradycardia but no rapid tachycardias and no prolonged or very slow rhythms to explain her recent sudden death”
Spleen
Summary

Lipid Accumulation

Tangle Formation

Classic Tangles

Hirano Body

Globose Tangles
Albert Niemann
1831 Erxleben
1917 Berlin

Arnold Pick
1854 Moravia
1924 Prague
Scenarios - Brain Retention Advised

- Epilepsy
- **Dementia**
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Dementia Pathology ≠ Dementia!

- Other medical conditions
- Other neurologic conditions
- **Pure Dementia** – AD – FTD – LBD – Mixed – Vascular – CTE – CJD
  - Confirmation of Clinical Basis for dementia diagnosis
  - Family history *i.e. one chance to get it right*
  - Neurologic & Psychiatric co-morbidities contributing to morbidity & death *e.g. Laryngeal Spasm in MSA*
  - Possibility of brain donation
  - Contribution of Neurodegeneration to Trauma
Weigh – Photograph & Seek advice from Neuropathologist
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The Stroke Autopsy

• All has changed
  – Expectations of stroke autopsy are high
• Brain retention virtually essential
• Do not commence autopsy until you have established objectives of autopsy
• Be prepared for the unexpected
You Must….

- Examine the entire cardiovascular system
- Not leave autopsy room until cause of subarachnoid haemorrhage determined
- Not omit the venous sinuses
- Remember that 25% of all strokes are located in white matter
- Consider Stroke Mimics
- Sudden death from stroke
  - Haemorrhage
    - SAH or Parenchymal
  - Vertebrobasilar occlusion [with critical stroke – pons / medulla]
  - Trauma
  - Stroke associated Cardiac Dysrhythmia
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ICH → SAH Extension
Stroke Mimics – e.g. Pituitary Apoplexy

- Easily Missed
- Easily mistaken for Subarachnoid Haemorrhage
Stroke Mimics — e.g. Haemorrhage into Tumour

- Easily Missed
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Stroke Mimics — e.g Haemorrhage into Tumour

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Don’t forget the Venous Sinuses !!!!
Don’t forget the cerebellum

Lethal Gastroenteritis !!
Stroke Pathology
Stroke Intracerebral Haemorrhage
Stroke Intracerebral Haemorrhage
Stroke - Infarction

ASC0
Large Artery - Atherosclerotic Disease

- Arterial Dissection
- Most emboli originate at the carotid bifurcation
- Ulcerated Plaque
- 70% stenosis +
- Aortic Arch
Arterial dissection

Fibromuscular Dysplasia
Cardioembolic

- Mural Thrombus
- Patent Foramen Ovale
- Valvular heart Disease
- Prosthetic Valve
- Endocarditis
- Atrial Myxoma
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Unexplained Non-Traumatic Non-Structural Coma

- **Post-anoxic**
  - Blocking Map essential
- **Stroke**
  - Critically location e.g Basis Pontis
- **Poisoning**
  - Pink & Blue Brains
- **Infection**
  - Easily Missed
- **Metabolic**
  - Glucose – Ammonia – Urea – Core temperature
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Meningitis & Encephalitis Easily Missed
Obtain CSF before opening head
Meningitis NOT Easily Missed

Open The Sinuses
Unexplained Non-Traumatic Non-Structural Coma

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The Empty Sella

- Unexplained Coma
- Hypothermia
- Addisonian Crisis
Metabolic Disorders - 3 organelles

- Mitochondria
- Lysosomes
- Peroxisomes
- Other
  - Metal metabolism: Wilson’s, NBIA
  - Porphyria, urea cycle defect, organic aciduria, aminoacidopathy
  - Defect in neurotransmitter metabolism (5HT, DA)
Metabolic Disorders

- Complex multisystem disorders
- Frequently involve CNS & PNS
- May onset in adulthood
- Inheritance variable or sporadic
- May present with sudden death
  - eg. after minor illness trigger
Metabolic Autopsy

- **Minimise** PM delay
- **Exclude** other cause of death
  - *eg.* Myocarditis / meningitis, poisoning, non accidental injury
- **Facilitate** enzyme studies
  - *eg.* Skin for fibroblasts, muscle biopsy
- **Visualise** organelles
  - *EM*
- **Store** DNA (whole blood)
  - *for germline testing*
- **Work** with & complement clinical investigations
- **Liaise** with Geneticists & Biochemists
- **Communicate** with family
  - *pathologist may be only person in possession of all the facts*
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The Blocked Shunt
The Blocked Shunt
Traumatic Death with Little to See

Pontomedullary Transection
Traumatic Death with Little to See

Fat Embolus
Summary

• If in any doubt - call neuropathology
• Do **NOT** hesitate to retain brain
• Use a Standard blocking brain map
• Think Brain in ALL autopsies
Thank You
Thank You

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