Mind and Brain: Role of the Forensic Psychiatrist

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It wasn’t me; it was my brain

• Mind/Body
• Problem, e.g.: why did a person commit an offence that is difficult to explain/with no apparent motive?
• Why did a person decide to initiate civil litigation for reasons that seem bizarre?
• Basic clinical approach and what available scans and other investigations can we utilise?
Anatomy of the brain
Anatomy of the brain - 2
Anatomy of the brain-section post mortem
Anatomy of the brain-histology
Scans: X-rays

- Röntgen (1895) – cathode rays driven against object (glass tube) X-rays
- 1897 British army surgeons used to identify closed fractures, embedded fragments
- CAT/CT Computerised (axial) tomography Hounsfield (1970)
- MRI -1980s
Scanned projection radiographs
CT scan head
CT brain scan
MRI scans

- Nuclear magnetic resonance—induction of magnetisation in tissue placed in a magnetic field depends on the presence of hydrogen ions that can respond to the forces that act on them.
- Patient placed in a strong, uniform, static magnetic field.
- Additional gradient magnetic fields used to locate the origin of the MR signal.
- RF transmitter excites resonance.
- A receiver detects the emitted signal.
- Computer reconstructs the image.
MRI scan
scanner
To examine neural activity

- r CBF: Measuring cerebral blood flow, a series of images while the person is engaged in mental activity
- Individual persons show differences in patterns of cerebral activity on a specific task
- Persons with schizophrenia likely to show major differences compared to normal controls performing the same task
- Also there are differences in brain shapes and cerebral perfusion between individuals
- Used to study differences in cerebral activity associated with symptom expression in schizophrenia
PET scans - dementia

normal

Mild dementia

Moderate dementia

Severe dementia

PET scan
PET scans
Problems/drawbacks

- Patient consent
- Possible reaction to contrast
- Need to be completely immobile (claustrophobia ➔ sedation) and takes time
- MRI: cardiac pacemaker, surgical implants, foreign bodies (sometimes unknown)
- Artifacts common
- Interpretation may be complex/difficult
- Cost? MRI, PET expensive but now less so
- Pregnancy generally regarded as contraindication
- CT radiation
- MRI no risk of radiation and no known complications from the magnetic field
Which type of scan is best?

• Is MRI better?
• Better for demonstrating differences between soft tissues. Most brain pathology causes swelling in tissue and this is shown on MRI
• Reduces risk from radiation
• Not good for showing bone, calcified tissue
• CT better for bone, recent subarachnoid haemorrhage
• PET for activity of tissue - used in oncology
EEG – electroencephalogram (1960s)
Causes of brain dysfunction: Metabolic

- Glucose metabolism required for brain function
- Disturbances of metabolism cause cognitive/emotional change
- Endocrine: e.g. diabetes, thyroid disorders
- Effects of medication: prescribed tranquilisers, other
- Drugs: stimulants, sedatives, alcohol, marijuana, heroin, other
- Other metabolic changes
What did we do before we had X-rays, scans, and special investigations?

1. Take the history
2. Careful and detailed observations
3. Physical examination
4. Mental state examination
5. Psychometric assessment
6. Ancillary investigations
Present state of knowledge and use of scans and investigations

• Use of scans to confirm clinical assessment and diagnosis
• Scans used in research – mainly when condition has been diagnosed clinically, for study of continuing condition
• Rely on clinical assessment with careful history taking, observation and ancillary assessments such as psychometric testing to determine diagnosis and degree of severity
Commonly seen disorders in criminal and civil contexts

- Schizophrenia
- Substance abuse/toxic disorders
- Brain injury
- Intellectual handicap
- Dementia
- Metabolic disturbances, e.g. diabetes
- Epilepsy
- other
Organic vs. “functional” disorders

- **Organic disorders**: physical appearance might be dishevelled, unkempt
- Might be disorientated, disorganised
- Mental state “confusion”/ fluctuating
- Could be hallucinating, visual hallucinations/disturbances
- Possibly delusional, but delusions usually not clearly formulated “I don’t know what’s going on”

- **“Functional”**
- Brain not functioning normally but non clearly demonstrated pathology, e.g. schizophrenia
- Hallucinations often auditory
- Delusions formulated, often of persecution, paranoid
- Often present well, especially in early stages of disorder
Case examples

- **Organic**: Dementia patients: trespass, loitering, sex offending, stealing.
- Frontal lobe brain injury: Difficult to understand why the person did not take appropriate action:
- 49 yo grandmother charged in relation to manslaughter of her grandson.
- She had been a qualified, experienced enrolled nurse. 13yo grandson complained of severe headache, told her he had taken mother’s (her daughter) methadone. She took his pulse temp, as he became worse, bathed him in cool water, changed his pyjamas, later went to the neighbour to ask for aspirin. Neighbour went to see the boy, called ambulance. The boy died. Police thought the grandmother was covering for her daughter. Gm had suffered a stroke previously and suffered frontal lobe brain damage which explained her inability to take the correct action.
- Charges were later dropped.
Case examples: JKS
Mixed, complex presentation

- 49 yo man, unmarried, previously schoolteacher killed 10 mo baby. He was a boarder in house with another boarder, the baby’s mother and grandfather. Mother and grandfather went out shopping together and left 3 young children in care of JKS who had recently been discharged from psychiatric hospital. He said he was overcome by urge to kill the baby and hit baby on head with walking stick, tried to suffocate with pillow, then cut neck with knife, meat cleaver. JKS had locked the back door, the two older children could not open. Mother returned and broke in.

- JKS had suffered polio as child, walked with severe limp. He had been taken to hospital in July 2006 when he was unwell. He was treated for diabetes, hypertension and urinary tract infection. He was transferred to a psychiatric hospital, discharged December. Diagnosis in hospital: psychotic depression.

- A psychiatrist saw him in Feb 2008, diagnosed mental illness, schizophrenia. I saw him in July 2008, diagnosed psychotic depression aggravated by medical (organic) condition. His condition deteriorated and he was diagnosed with dementia.

- He was found not guilty on the ground of mental illness
Case example: Sentencing reports: man with disturbed personality, problems since childhood, various diagnoses over years

- 32yo man charged with murder of his three young children (drowning)
- Long history of difficulties at school and home, sexual assault as child
- Had been diagnosed with schizophrenia, treated with anti-psychotics, later diagnosis changed
- Suffered severe depression, at times suicidal
- Repeated admissions to psychiatric hospitals
- Generally agreed diagnosis severe personality disorder
- Had threatened to suicide and take children two years previously, doctor arranged hospital admission
- Said he planned to suicide after killing children, took drugs prior to give him courage to kill. He was in bath (trying to drown) when police arrived.
- Judge took all this into account but long sentence.
New developments

• This is a rapidly progressing field and refinements of the techniques are occurring all the time

• Later developments will use a combination of scans to better understand the anatomy and functioning of the brain, e.g. MRI and PET combined in one scanner
Conclusion

• We are not yet at a stage where we can rely on scans and special investigations to replace careful history taking, observations and examination to determine diagnosis and management.

• Can the brain understand the mind?
References

• Case JKS:
  https://www.caselaw.nsw.gov.au/decision/54a0036a3004262463c91fc2
  Case 2: R v Fraser [2004] NSW SC 53


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