Medical Negligence. Causation in Spinal Decompression Surgery.

Stewarts Expert Witness Training
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Neurological recovery after paraplegia

• paraplegia = complete motor and sensory loss

• incomplete lesions will usually improve

spinal injury – if only sacral sensation preserved, 75% will walk

Paraplegia. Clinical outcome = causation

• but-for test (balance of probabilities)

• traumatic spinal cord injury

• spinal epidural haematoma

• spinal epidural abscess

• cauda equina syndrome

Paraplegia. Clinical outcome = causation

• often said “it’s all over”

i.e. no neurological recovery

• incorrect

• determinants of recovery

pathology

speed of onset

urgency of decompression

Spinal cord injury

- acute traumatic spinal cord injury
- UK = 1000 new patients p/a
- 40,000 long term disability

Spinal cord injury

Frankel A	Complete motor and sensory paraplegia
Frankel B	Preserved sensation but no voluntary motor activity
Frankel C	Preserved sensation. Preserved motor but insufficient to walk
Frankel D	Preservation of some sensation. Preservation of motor power, usually sufficient to walk (the Frankel D range is the widest range; poor Frankel Ds do not walk, good Frankel Ds can be close to normal)
Frankel E	No neurological deficit with normal function

- Frankel A 10-20% improve

  none walk
- complete SCI is permanent

Spinal epidural haematoma

Spinal epidural haematoma

- world literature = 1000 cases
- spontaneous
- post-operative (inc epidurals)
- traumatic
- spinal fracture – ankylosing spondylitis

Spinal epidural haematoma

The two factors that are of the greatest importance in determining outcome in patients with spontaneous SEH are the degree of neurological deficit at the time of treatment and the timing of treatment; for many patients those two factors are interlinked.

Mukerji N, Todd N. Spinal epidural haematoma; factors influencing outcome. Br J Neurosurg. 2013 Dec;27(6):712-7.

Spinal epidural haematoma

- recovery incomplete cord lesion
  = 4.6 x more likely than complete

SEH. Recovery from paraplegia

• timing of surgery from first symptoms
• very limited data n=9

Outcome in Treated Frankel A SEH Patients

Final Outcome (Frankel Grade)	Time to Surgery
A (no recovery)	5 hours, 24-48 hours
B	18 hours
C	
D	11 hours, 11.5 hours, 31 hours
E	2 hours 30 minutes, 9 hours, 15 hours

• treatment in 12 hours
⇒ improvement to D or E (walking)
= 4/5 (80%)
more likely D

SEH. Recovery from paraplegia

• timing in groups n=28
• surgery within 12 hours
• recovery to D or E 64% (18/28)
D = 11, E = 7
• recovery can occur up to 48 hours after paraplegia

SEH. Poor outcomes

- delayed diagnosis
- risk factors
  - anticoagulation
  - recent surgery including epidurals
  - no local MRI (obstetrics)
- failure to correct clotting
- failure to operate if paraplegic

Spinal infection

- spondylodiscitis
- spinal epidural abscess

Spinal infection

Aetiology

- spontaneous (bacteraemia)
- spinal surgery
- epidural catheter
- 1-2/10,000 hospital admissions
- incidence rising

Spinal infection

Diagnosis

- classical clinical triad
  - spinal pain (severe)
  - pyrexia
  - neurological deficit
- risk factors
- CRP, WCC

Causation in pyogenic spinal infection causing paraplegia

Final / Initial	A	B	C	D	E
A	11	6	6	4	3

848 cases (all Frankel grades), treated at all times.

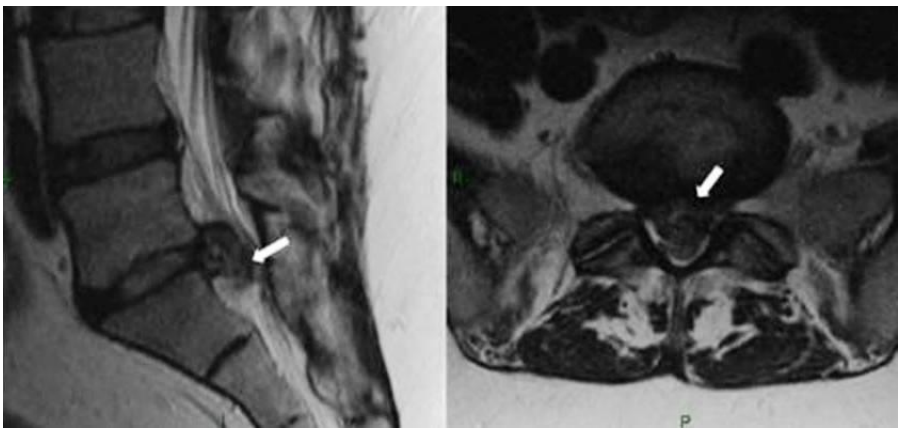
Frankel A = 30

improvement = 19 (63%)
improvement to walking (Frankel D or E) = 7 (23%)

Spinal infection. Poor outcomes

- delayed diagnosis
- wrong antibiotics/dose/route
  - specific antibiotic or broad-spectrum
  - high dose
  - intravenous 2/52, oral 6-8/52
- inadequate duration of treatment
- failure to drain an abscess

Cauda equina syndrome



Cauda equina syndrome

- no universally agreed definition
- mild cauda equina irritation to severe permanent injury
- change in bladder function
- ↓ perineal sensation (subjective/objective)
- ↓ anal tone/squeeze
- context = low back pain +/- leg pain

Cauda equina syndrome. Causation

Typically this is recovery from an incomplete lesion

- CESI = incomplete CES
- CESR = neurogenic urinary retention
  not CES complete
- CESC = complete loss of all CES function

Neurological recovery in CESI

- treated in 48 hours
  normal bladder/bowel
  Srikandarajah 2015
- > 48 hours
  usually social normal bladder

Neurological recovery in CESR

• no benefit to more urgent surgery NOT no benefit to surgery

• 48-93% improve to socially normal bladder

• classically CESR = painless retention
+ overflow incontinence

• less common because of bladder catheter + ultrasound

• bladder distention > 1000 mls with incontinence
not = 400 mls + no desire to void

• ***Hewes***

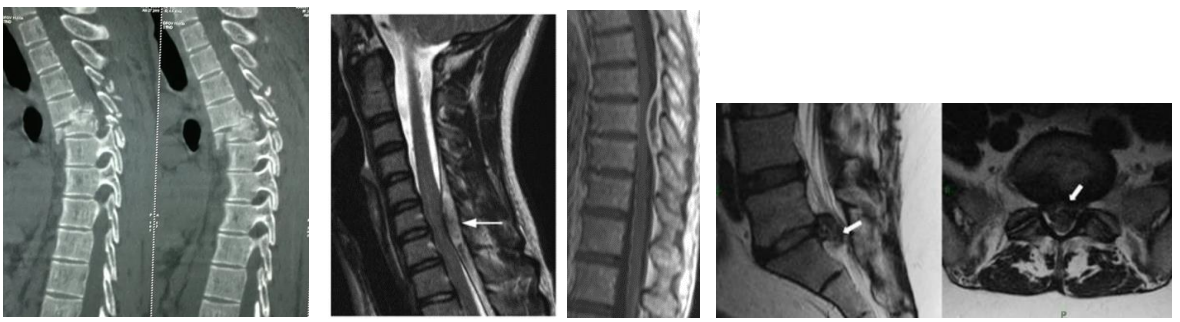
Hewes. **Defining CESR in the modern era**

• ***Hewes***. 50 year old man
• 0100 PUd
• 0500 genital numbness
• 1203 U/S = 621 mls urine
• 1445 catheter = 625 mls urine
• never incontinent ⇒ never classical CESR
• found: 621 mls painless retention = classical CESR
• patient nil by mouth and no drip:
incontinence might be 12/24 hours after bladder distention
continuing harm
• smaller volume bladder distention without incontinence
is not the same as classical CESR

Causation in spinal cord compression

- pathology
  - recovery - SCI < SEA < SEH
- speed of onset
  - rapid < slow
- speed of treatment
  - delayed < urgent
- paraplegia is not a bar to recovery
  - apply the 3 tests above
  - define extent of recovery
  - define probability of recovery

Causation in spinal cord compression



Thank you for your attention. Any questions?

Nick Todd 28.07.21