Multi Shades of Grey

Cauda Equina Syndrome

Authors: Laura Finucane, Sue Greenhalgh, Chris Mercer

Cauda Equina Syndrome; first contact to MRI

- Rare-early diagnosis critical
- Clinical diagnosis confirmed with MRI
- Guidelines low bar to MR scan same day
- High litigation profile
British Association of Spinal Surgeons (BASS)
definition in Standards of Care, (Germon et al, 2015)

A patient presenting with acute (*de-novo* or as an exacerbation of pre-existing symptoms) back pain and/or leg pain *WITH a suggestion of a disturbance of their bladder or bowel function and/or saddle sensory disturbance should be suspected of having or developing a cauda equina syndrome.* Most of these patients will not have critical compression. However, in the absence of reliably predictive symptoms and signs, there should be a low threshold for investigation with an EMERGENCY MRI scan. The reasons for not requesting a scan should be clearly documented.

*Subjective history key to early diagnosis*

Anatomy
Catastrophic Pain
# Cauda Equina Syndrome Groups

(Todd & Dickson, 2016)

<table>
<thead>
<tr>
<th>Group</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CESS suspected</td>
<td>Bilateral radicular pain (progressing unilateral)</td>
</tr>
<tr>
<td>CESI incomplete</td>
<td>Urinary difficulties of neurogenic origin, altered urinary sensation, loss of desire to void, poor urinary stream, need to strain to micturate</td>
</tr>
<tr>
<td>CESR retention</td>
<td>Painless urinary retention and overflow incontinence</td>
</tr>
<tr>
<td>CESC complete</td>
<td>Loss of all CE function, absent perineal sensation, patulous anus, paralysed insensate bladder and bowel</td>
</tr>
</tbody>
</table>

*The probability of a CES patient deteriorating, with what speed and to what level is not predictable*

---

**Quraishi et al (2012)**

**European Spine Journal**

- NHSLA data for all spinal disease 2002-10
  - 235 cases-144 trauma/acute
  - Missed fractures 41%
  - Missed CES 24%
  - Missed infection 12%
  - Cord damage 20%

- NHSLA data for all spinal disease 2002-10
  - 235 cases-144 trauma/acute
  - Missed fractures 41% 75000
  - Missed CES 24% 268,000
  - Missed infection 12% 433,000
  - Cord damage 20% 367,000

**Daniels et al (2012)**

- Review of 15 US court cases for CES and features of successful litigation
- Timing to surgery >48 hours
- Bladder and bowel symptoms at presentation
- Sexual dysfunction at presentation
- Time to appointment
- Time to imaging
- Setting for appointment
Daniels et al (2012)

- Review of 15 US court cases for CES and features of successful litigation
- Timing to surgery > 48 hours
- Bladder and bowel symptoms at presentation
- Sexual dysfunction at presentation
- Time to appointment
- Time to imaging
- Setting for appointment

A Qualitative Investigation into Patients Experience of Cauda Equina Syndrome
Physiotherapy Research Foundation (PRF) Grant

Aim
To identify how CES symptoms may be effectively shared between patients and clinician

Objectives
Drawing upon patient experience of signs and symptoms associated with CES including changes in bladder, bowel and sexual function
- what symptoms patients actually suffer
- patients own reasoning of these symptoms
- the patient experience of divulging this information
### 7 themes emerged

- Catastrophic Pain
- Impact on Life
- Common Symptoms / Varying Chronology
- Sense of change / Seriousness
- Contact with Health Professionals
- Carers Experience
- Suggestions to aid early diagnosis

### Catastrophic Pain

- ‘I don’t think his questions weren’t clear, I think that it was impossible to concentrate on anything other than pain management’.
- ‘……I was walking in the woods not riding my bike’

*Focus the patient on important questions and use patient language*
Suggestions to aid early diagnosis

Safety netting is key
Low threshold to MR Scan with high number of negative scans
Available in 28 different languages

Cauda Equina Syndrome Warning Signs
- Loss of feeling in and around your inner thighs or genitals
- Nummerness in or around your lower back passage or buttocks
- Altered feeling when using toilet paper to wipe yourself
- Increasing difficulty when you try to urinate
- Increasing difficulty when you try to stop or control your flow of urine
- Loss of sensation when you pass urine
- Leaking urine or recent need to use pads
- Not knowing when your bladder is either full or empty
- Inability to stop a bowel movement or leaking
- Loss of sensation when you pass a bowel motion
- Change in ability to achieve an erection or ejaculation
- Loss of sensation in genitals during sexual intercourse

Any combination seeks help immediately

Safety Netting
National Pathway of Care for Low Back and Radicular Pain (2017)

- ‘Emergency referral to secondary care to access urgent investigations and spinal/neuro surgeon opinion same day’
- Diagnosis requires both clinical symptoms and imaging to be concordant

Multi Shades of Grey

Significantly more patients are referred on for further investigation compared with those having a radiologically confirmed diagnosis of CES (90% negative 10% positive for CES)

Bladder and bowel dysfunction, saddle anaesthesia and sexual dysfunction are all multifactorial in their causes e.g. Comorbidities, medication, pain

(Woods et al, 2015)
Red Flags in Referral; 35/42 mention red flags

Number of Red Flags Mentioned in Referral

<table>
<thead>
<tr>
<th>Frequency</th>
<th>3 red flags</th>
<th>2 red flags</th>
<th>1 red flag</th>
<th>0 red flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>17</td>
<td>13</td>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>

Same day triage
4th Oct 2017-4th Jan 2018

Which Red Flags? 30/42 mention bladder, bowel, saddle

Bladder Bowel Saddle Sexual Dysf

| Frequency | 37          | 5           | 8           | n           |
Which Red Flags? 30 mention bladder, bowel, saddle

Patients self report symptoms of bladder, bowel, saddle numbness and sexual dysfunction that are NOT related to CES

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Bladder</th>
<th>Bowel</th>
<th>Saddle</th>
<th>Sexual Dysf</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>5</td>
<td>8</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

13 mentioned DRE and sensation testing-3 reported as abnormal

Time to implement a national referral pathway for suspected cauda equina syndrome: review and outcome of 250 referrals (Hussain et al, 2018)

Vast majority referred for sCES do not have tCES

MRI at the right time and location on the pathway is key

MRI early stage in local hospital

National policy for providing 24/7 MRI in DGH ‘long overdue’
Cauda Equina Syndrome Groups (Todd & Dickson, 2016)

- **CESS** suspected
  - Bilateral radicular pain (progressing unilateral)

- **CESI** incomplete
  - Urinary difficulties of neurogenic origin, altered urinary sensation, loss of desire to void, poor urinary stream, need to strain to micturate

- **CESR** retention
  - Painless urinary retention and overflow incontinence

- **CESC** complete
  - Loss of all CE function, absent perineal sensation, patulous anus, paralysed insensate bladder and bowel

*The probability of a CES patient deteriorating, with what speed and to what level is not predictable*

### Medication Masqueraders

<table>
<thead>
<tr>
<th>Opioid Salts</th>
<th>Tramadol, Codeine, Codeine</th>
<th>Constipation, reduced gastric motility, reduced bladder sensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticonvulsants</td>
<td>Gabapentin, Pregabalin</td>
<td>Urinary incontinence</td>
</tr>
<tr>
<td>Antidepressants</td>
<td>Amitriptyline, Nortriptyline</td>
<td>Retention, sexual dysfunction, reduced awareness of need to pass urine</td>
</tr>
<tr>
<td>NSAIDS</td>
<td>Naproxen, Ibuprofen</td>
<td>Retention twice as likely in men than women</td>
</tr>
</tbody>
</table>
# Multi Shades of Grey

## Urinary symptoms

<table>
<thead>
<tr>
<th>Cause</th>
<th>Men</th>
<th>Women</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstructive</td>
<td>Benign prostatic hyperplasia, mental stenosis, parapenitis, penile constricting bands, phimosis, prostate cancer</td>
<td>Uterine prolapse (cystocele, rectocele, uterine prolapse); pelvic mass (gynaecological malignancy, uterine fibroid, ovarian cyst); retroverted impacted gravid uterus</td>
<td>Aneurysmal dilation; bladder calculi; bladder neoplasm; faecal impaction; gastrointestinal or retroperitoneal malignancy/mass; urethral strictures, foreign bodies, stones, edema</td>
</tr>
<tr>
<td>Infectious or inflammatory</td>
<td>Balanitis; prostatic abscess, prostatitis</td>
<td>Acute vulvovaginitis; vaginal lichen planus; vaginal lichen sclerosis; vaginal pemphigus</td>
<td>Bilharziasis; cystitis; echinococcosis; Guillain-Barre syndrome; herpes simplex virus; Lyme disease; perirectal abscess; transverse myelitis; tubercular cystitis; urethritis; varicella zoster virus</td>
</tr>
<tr>
<td>Other</td>
<td>Penile trauma, fracture, laceration</td>
<td>Postpartum complication; urethral sphincter dysfunction (Fowler's syndrome)</td>
<td>Disruption of posterior urethra and bladder neck in pelvic trauma; postoperative complication; psychogenic</td>
</tr>
</tbody>
</table>

# Multiple Shades of Grey

## Saddle sensory changes

<table>
<thead>
<tr>
<th>Lesion type</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomic or peripheral nervous system</td>
<td>Autonomic neuropathy; Guillain-Barre Syndrome; herpes zoster virus; Lyme disease; pernicious anaemia; polymyelitis; radical pelvis surgery; spinal cord trauma; tubo-ovarian</td>
</tr>
<tr>
<td>Brain</td>
<td>Cerebrovascular disease; concussion; neoplasm or tumour; normal pressure hydrocephalus; Parkinson's disease; Shy-Drager Syndrome</td>
</tr>
<tr>
<td>Spinal cord</td>
<td>Dystrophic lesions; vertebral disc disease; meningomyelitis; multiple sclerosis; spinobifida occulta; spinal cord hamartoma or abscess; spinal cord trauma; spinal metastasis; spinovascular disease; transverse myelitis tumours or masses of conus medullaris or cauda equina</td>
</tr>
</tbody>
</table>
Objective Assessment

- If CES is suspected a careful objective neurological examination should be carried out to evaluate segmental neurological deficit

  Decision to refer on made Competency?

- Sensation of the perineum to pin prick and light touch
- Anal tone and anal “wink” reflex should be tested

Digital rectal examination

- Seen as essential facet of clinical assessment
- Accuracy limited yet identified as essential procedure. Validity? Reproducibility?
- No evidence clinicians ability to perform DRE is better than chance
- Test with lowest predictive value for CES was anal tone. Almost half of non-compression group had reduced anal tone (Angus et al, 2018)

Not helpful in decision for Urgent MRI same day
Saddle Sensation; Light touch and pin prick?

- Sensitivity of the following tests is relatively poor;
  - Perianal sensation
  - Altered urinary and perineal sensation
  - Loss or diminution of the bulbocavernosus reflex (Bell et al, 2007; Fairbank et al, 2011 Delitto et al, 2012).

- Peri-anal sensation not different btn groups with and without radiologically confirmed CES. Subjective report helpful (Angus et al, 2018).

Residual Bladder Volume

- >500ml retention correlates with +ve MRI in CES (bilateral, retention)

  Stokes et al 2016 ....
Key Messages

- Same day timely action-clear pathways
- Subjective history is key-use patient language
- Safety Netting
- Clear detailed documentation
- On-going CPD

An evidence informed clinical reasoning framework for clinicians in the face of serious pathology in the spine
Finucane, Selfe, Mercer, Greenhalgh, Downie, Verhagen, Poole, Henschke, Boissonault, Beniuck

Phase 1 - Systematic reviews
- CES, malignancy, #, Infection

Phase 2 - Consensus stage

Phase 3 - drafting of framework

Phase 4 - Expert Review

Phase 5 - FRAMEWORK DEVELOPMENT
Framework example

- Data from patients history
- Planning Physical Exam
- Data Physical Exam
- Evaluation of patient’s presentation
- Best decision regarding management
- Interpret history using evidence informed knowledge
- Interpret PE using evidence informed knowledge

Cauda Equina Syndrome; A surgical Emergency

Available on the UKSSB Website

https://www.youtube.com/watch?v=8rRgsQgoK30
References

Angus M, Hamal O, Siddique I, Yasin N, McCreary R. 2018 Can we accurately predict the likelihood of cauda equina syndrome in the emergency department. Poster BritSpine


Smith S (2007) Drugs that cause sexual dysfunction. Psychiatry. 6(3), 212-214


Thank you for listening

CES daily challenge; From first contact to MRI