Multi Shades of Grey

Cauda Equina Syndrome

Authors: Laura Finucane, Sue Greenhalgh, Chris Mercer
Multi shades of grey
Cauda Equina Syndrome

What time did you see Mrs X. as time scales are unclear?

How long had the patient had pain down both legs as some of the documentation is illegible?

This patient should have been sent for an urgent MRI and surgical opinion that day. Please comment

Your notes suggest you gave ‘advice’. What advice exactly did you give to Mrs X’
Multi shades of grey
Cauda Equina Syndrome

<table>
<thead>
<tr>
<th>Pantone Cool Gray 1</th>
<th>Pantone Cool Gray 2</th>
<th>Pantone 434</th>
<th>Pantone Warm Gray 1</th>
<th>Pantone 420</th>
<th>Pantone 427</th>
<th>Pantone 435</th>
<th>Pantone Cool Gray 3</th>
<th>Pantone Warm Gray 3</th>
<th>Pantone 7542</th>
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<td>Pantone Warm Gray 6</td>
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<td>Pantone 430</td>
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<td>Pantone 444</td>
<td>Pantone Cool Gray 9</td>
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<tr>
<td>Pantone 425</td>
<td>Pantone Cool Gray 10</td>
<td>Pantone Cool Gray 11</td>
<td>Pantone 432</td>
<td>Pantone 445</td>
<td>Pantone 439</td>
<td>Pantone 446</td>
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MULTI-SHADES OF GREY

• Rare

• Devastating consequences

• Serious medico legal implications

• Patients self report symptoms of bladder and bowel dysfunction that are NOT related to CES
How much black and white is there?
Definition

‘A patient presenting with acute 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 a CES.’
(BASS 2015)
Anatomy
Haven't I suffered enough? Where will it all end?

“Well, here we are, my little chickadee.”
Catastrophic Pain
Catastrophic Pain
# Cauda Equina Syndrome Groups

*(Todd & Dickson, 2016)*

<table>
<thead>
<tr>
<th>CESS suspected</th>
<th>Bilateral radicular pain (progressing unilateral)</th>
</tr>
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<tbody>
<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>
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</table>

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

• MDU 2016 (Taylor)
  – 150 claims from 2005-16
  – 92% against GPs 70% defended
  – 8 million paid out 12% of claims over 500K
• NHSLA 2016
  – 293 claims for CES 2010-15
  – 70% 31-50 y/o
  – 25 million paid out
• Fairbank 2014
  – 30-40 cases per year go to litigation
  – Average compensation 336,000
  – 1000 operations per annum for CES

- 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)

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- 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
What can we learn from our patients?

Dermatomes S3,4,5
Dermatomes S3,4,5
Themes

- 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

• ‘…. The woman who was doing the MRI said oh gosh. I was all screaming and hyperventilating and she said are you ok, are you claustrophobic? I said I’m in bloody agony-Strong pain, pain in whole pelvis, real agony’

• ‘I don’t think his questions weren’t clear, I think that it was impossible to concentrate on anything other than pain management’.
Common Symptoms / Varying Chronology

‘......It was like you could not tell where your feet were in space’ ‘I was sort of losing control... my legs weren’t working properly like they were made of rubber.’ ‘it was as if I had been riding a horse for a week or something and obviously that was to do with the saddle numbness.

‘The first thing to go was my bladder function’
'I had no comprehension that this could have permanently affected my mobility and my life...through all of this and through all the pain, and through all the people that; the ambulances, the GP I’d seen at night, it was only when the Consultant said to me just before the surgery you’re within the forty eight hour window so your prospects are quite good. I didn’t appreciate there was anything but all they had to do was take this pain away’

N.B Importance of safety netting those at risk
Contact with Health Professionals

_Usually already under health professionals care_

They really do need to listen to you and they need to listen to your individual circumstances.

“If I had been told numbness around back passage or genitals...everyone I saw who was medically trained called it saddle numbness”

No clear safety net advice
Suggestions to aid early diagnosis

Cauda Equina Syndrome Warning Signs

- Loss of feeling/pins and needles between your inner thighs or genitals
- Numbness in or around your 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 ejaculate
- Loss of sensation in genitals during sexual intercourse

Any combination seek help immediately

Safety netting is key
Pain is easier to communicate!
Safety Netting
Safety Netting
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)
# 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, meatal stenosis, paraphimosis, penile constricting bands, phimosis, prostate cancer</td>
<td>Organ prolapse (cystocele, rectocele, uterine prolapse); pelvis 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>
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<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; periurethral 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; Guillian-Barre Syndrome, herpes zoster virus; Lyme disease; pernicious anaemia; poliomyelitis; radical pelvis surgery; spinal cord trauma; tabes dorsalis</td>
</tr>
<tr>
<td>Brain</td>
<td>Cerebrovascular disease; concussion; neoplasm or tumour; normal pressure hydrocephalus; Parkinson’s disease, Shy-Drager Syndrome</td>
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<tr>
<td>Spinal cord</td>
<td>Dysraphic lesions; invertebral disc disease; meningomyelocele; multiple sclerosis; spina bifida occulta; spinal cord hematoma or abscess; spinal cord trauma; spinal stenosis; spinovascular disease; transverse myelitis tumours or masses of conus medullaris or cauda equina</td>
</tr>
</tbody>
</table>
Multiple Shades of Grey; medication

• Many medications can cause or exacerbate urinary retention, incontinence and sexual dysfunction.
Multi Shades of Grey; medication

• Cholinergic and anticholinergic drugs have an influence on the parasympathetic nervous system;

*Cholinergic; voiding of urine*

*Anticholinergic; retention of urine*

(MTUI et al 2016)
Medications that cause urinary retention

• NSAIDS (x2 more likely in men)
• Opioids
• Calcium channel blockers
• Alpha-adrenergic antagonists
• Sedative-hypnotics
• Antipsychotics
• Antiparkinsonian agents
# Pharmacology causes of Sexual Dysfunction

<table>
<thead>
<tr>
<th>Class</th>
<th>Drug</th>
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<tbody>
<tr>
<td><strong>Hypnotics</strong></td>
<td>Benzodiazepines</td>
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<tr>
<td><strong>Antihypertensive</strong></td>
<td>Beta blockers</td>
</tr>
<tr>
<td><strong>Antidepressants</strong></td>
<td>Tricyclic antidepressants; Selective serotonin reuptake inhibitors e.g fluoxetine; Monoamine oxidase inhibitors; Viloxazine and L-tryptophan; Nefazodone; Venlafaxine; Reboxetine; Mirtazepine; Trazodone; Duloxetine</td>
</tr>
<tr>
<td><strong>Diuretics</strong></td>
<td>Bendroflurazide,</td>
</tr>
<tr>
<td><strong>Anti-epileptics</strong></td>
<td>Carbamazepine; Phenytoin; Sodium valproate</td>
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<tr>
<td><strong>Antipsychotics</strong></td>
<td>Thioridazine; aliphatic phenothiazines e.g chlorpromazine, sulprides atypical antipsychotic risperidone</td>
</tr>
<tr>
<td><strong>Prostate medications</strong></td>
<td>Finasteride (BPH); Anti androgens e.g. cyproterone acetate, flutamide (Prostate Cancer); Gonadotrophin releasing hormone analogues e.g goserelin, leuprolerin (Prostate Cancer)</td>
</tr>
<tr>
<td><strong>Anti-parkinsonian drugs</strong></td>
<td>L-dopa</td>
</tr>
<tr>
<td><strong>Recreational drugs</strong></td>
<td>Psychostimulants, Amphetamine, Ecstasy, Crystal methamphetamine, Alcohol, Anabolic steroids, cannabis, Opiates (Heroin, Methadone, Buprenorphine), Poppers, Tobacco</td>
</tr>
</tbody>
</table>
Multi Shades of Grey; medication

- Amphetamines,
- decongestants,
- over the counter cold remedies (esp in men with enlarged prostate)
- Recreational drugs e.g Ecstasy
Multi Shades of Grey; medication

- **Opioid Salts**: constipation, retention, reduced gastric motility, reduced bladder sensation
  (e.g. Tramadol, Codeine)

- **Anticonvulsants** (Cholinergic); urinary incontinence
  (e.g. Gabapentin, Pregabalin)

- **Antidepressants** (Anticholinergic); retention, sexual dysfunction (e.g. Amitriptyline, Nortriptyline)
  *Antidepressants can decrease awareness of needing to pass urine*

- **NSAIDS**: Retention
Physical Assessment

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

• Sensation of the perineum to pin prick and light touch

• Anal tone and anal “wink” reflex should be tested

• Residual bladder volume using ultrasound
Perineal sensation

Cauda Equina Syndrome: A Comprehensive Review
Alex Gittelman, MD, Shuriz Hishmeh, MD, Brian N. Morelli, MD, Samuel A. Joseph, Jr., MD, Andrew Casden, MD, Paul Kuttik, MD, Michael Neuwirth, MD, and Mark Stephen, MD

- 76% CES pts have SA
- 93% of 75 had SA
Digital rectal examination

- 57 patients-23% c/f CES on MRI
- DRE 51% accurate in those with +ve MRI

- 75 patients with CES
- Anal tone Saddle sensation
- Tudose et al 2017 (Br J Neurosurg Conf)
- Variable use, variable recording, variable interpretation in 173 patients
Residual Bladder Volume

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

- >400ml per void
- >200ml post void

- Stokes et al 2016 ....
### Multi shades of grey (between 49 and 51)

**Cauda Equina Syndrome** (thanks to Pantone paints!)

<table>
<thead>
<tr>
<th>Urinary Tract Infection</th>
<th>Gabapentin</th>
<th>Prostate cancer</th>
<th>Cocodamol</th>
<th>Pudendal nerve</th>
<th>Prolapse</th>
<th>Pain inhibition</th>
<th>Anxiety</th>
<th>Diabetes</th>
<th>Parkinsons</th>
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<tr>
<td>Polio</td>
<td>Neuropathy</td>
<td>Pernicious anaemia</td>
<td>Balanitis</td>
<td>Urethral stricture</td>
<td>Multiple Sclerosis</td>
<td>Lyme disease</td>
<td>Constipation</td>
<td>Bladder calculi</td>
<td>Retro-peritoneal malignancy</td>
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<tr>
<td>Guillain-Barré</td>
<td>Fibroid</td>
<td>Pelvic mass</td>
<td>Transverse myelitis</td>
<td>Ovarian cyst</td>
<td>Amphetamines</td>
<td>Tramadol</td>
<td>Herpes zoster</td>
<td>Cholinergic medication</td>
<td>Anti-cholinergic medication</td>
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<tr>
<td>Tabes dorsalis</td>
<td>NSAIDs</td>
<td>Diverticulitis</td>
<td>Renal calculus</td>
<td>Benign Prostate hypertrophy</td>
<td>Pelvic fracture</td>
<td>Post partum trauma</td>
<td>Ischaemia</td>
<td>Peripheral Vascular Disease</td>
<td>Retroverted uterus</td>
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<tr>
<td>Decongestant medication</td>
<td>Central sensitisation</td>
<td>Bilharziasis</td>
<td>Ca bladder</td>
<td>Vulvovaginitis</td>
<td>Psychogenic</td>
<td>Intra-Pelvic adhesions</td>
<td>Alcoholism</td>
<td>Smoking</td>
<td>Rectocele</td>
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- Central sensitisation
- Bilharziasis
- Ca bladder
- Vulvovaginitis
- Psychogenic
- Intra-Pelvic adhesions
- Alcoholism
- Smoking
- Rectocele
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
Framework example

1. Data from patients history
2. Planning Physical Exam
3. Data Physical Exam
4. Evaluation of patient’s presentation
5. Best decision regarding management

Interpret history using evidence informed knowledge

Interpret PE using evidence informed knowledge
We can make a huge difference
Cauda Equina a surgical emergency

https://www.youtube.com/watch?v=8rRq5QqoK3o