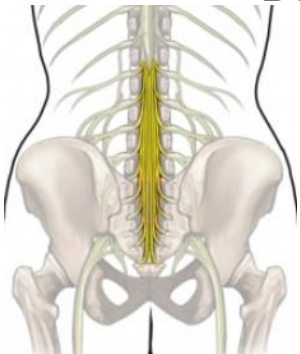


Orthopaedic Emergencies

3. Cauda Equina Syndrome

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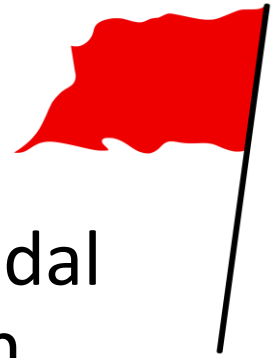


Module Overview

- Lecture 1: Introduction
- Lecture 2: Compartment Syndrome
- Lecture 3: Cauda Equina Syndrome
 - Definitions
 - Anatomy
 - Pathology
 - Diagnosis
 - Presentation
 - Examination
 - Differential diagnosis
 - Imaging
 - Management
 - Summary

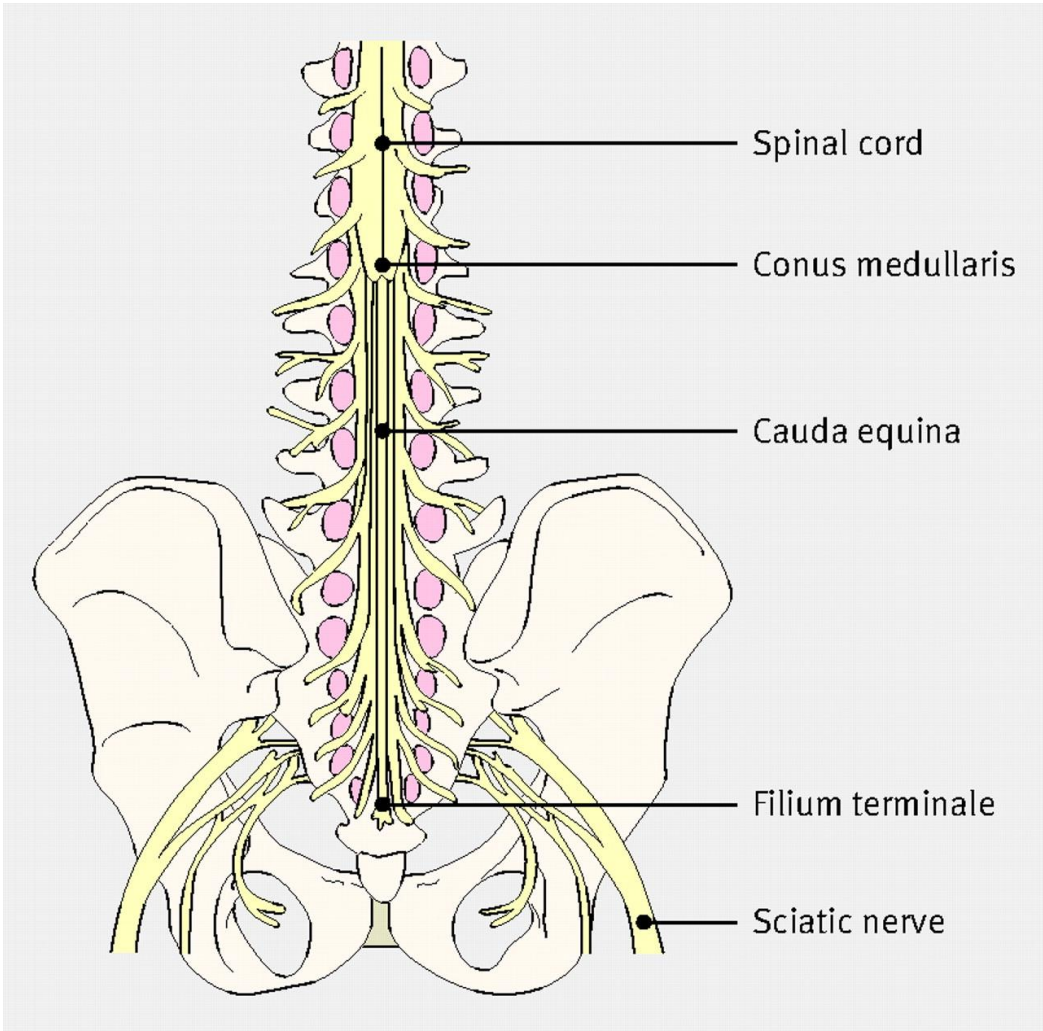


Definitions



- Cauda equina: formed of nerve roots caudal to the level of the spinal cord termination (lumbar and sacral nerve roots; L1-S5)
- Cauda equina syndrome: collection of symptoms due to compression of the lumbosacral nerve roots causing lower motor neuron lesions
 - **ORTHOPAEDIC EMERGENCY**

Fig 1 Anatomy of the lower lumbar and sacral spine showing the cauda equina.



Lavy C et al. BMJ 2009;338:bmj.b936



Pathology

- Rare; predominantly in adults but may occur in any age
- Caused by a space- occupying lesion within the lumbosacral canal
- Occurs in around 1-6% of herniated lumbar discs (L5/S1> L4/5); **disc herniation is the most common** cause of CES
- Congenitally narrow spinal canal or acquired spinal stenosis may predispose to cauda equina syndrome.
- Less common causes: spinal stenosis, tumours, trauma, spinal epidural haematoma, epidural abscess



Clinical Diagnosis

- Variable presentation; may be sudden onset with rapid progression over hours or days (most) or slowly evolving +/- pain
- Must have
 - Dysfunction of bladder, bowel or sexual function
 - Sensory changes in saddle or perianal area
- Other Symptoms:
 - Back pain (most common)
 - Unilateral or bilateral leg pain
 - Sensory disturbance in the lower limbs
 - Lower limb weakness
 - Reduction or loss of reflexes in the lower limbs
 - Unilateral or bilateral symptoms



Clinical Presentation

- 3 types:
- Type 1
 - acutely as the first symptom of lumbar disc herniation
- Type 2
 - end point of long history of chronic back pain +/- sciatica
- Type 3
 - insidiously in a more chronic way with slow progression to numbness and urinary symptoms



Clinical Categories

- Complete cauda equina with retention
 - With established urinary retention
- Incomplete cauda equina
 - Reduced urinary sensation, loss of desire to void or poor stream; no established retention or overflow.

Clinical Examination

- Inspection
 - Lower extremity muscle atrophy with insidious presentation, such as stenosis
- Palpation
 - Lower back pain/ tenderness- not distinguishing
 - Bladder palpation for retention
- Neurovascular Examination
 - Bilateral lower extremity weakness/ sensory disturbance
 - Decreased/ absent lower extremity reflexes
- Rectal/ genital examination
 - Reduced/ absent sensation to pin prick in perianal region (S2-S4), perineum and posterior thigh
 - Reduced rectal tone/ voluntary contracture on PR
 - Diminished or absent anal wink test



Clinical Examination

Nerve level	Motor innervation	Sensory innervation	Reflexes
L2	Hip flexors, thigh adductors	Upper thigh	
L3	Quadriceps, knee extensors	Anterolateral thigh	
L4	Knee extensors and foot dorsiflexors	Anteromedial calf	Patella, knee
L5	Foot and toe dorsiflexors (EHL)	Lateral calf and foot dorsum	
S1,2	Foot and toe plantar flexors	Foot: lateral side and sole	Ankle
S2,3,4,5	Sphincters	Perianal and saddle	Bulbocavernosus

Differential Diagnosis

- Conus medullaris syndrome
 - Tapered lower end of the spinal cord; T12-L2 generally
 - Incomplete spinal cord injury
 - Typically produces sudden bilateral symptoms
 - May be pain free
 - Combination of upper and lower motor neuron symptoms
- Any causes of cauda equina syndrome without bladder/ bowel symptoms
 - Lumbar disc herniation
 - Tumour
 - Infection

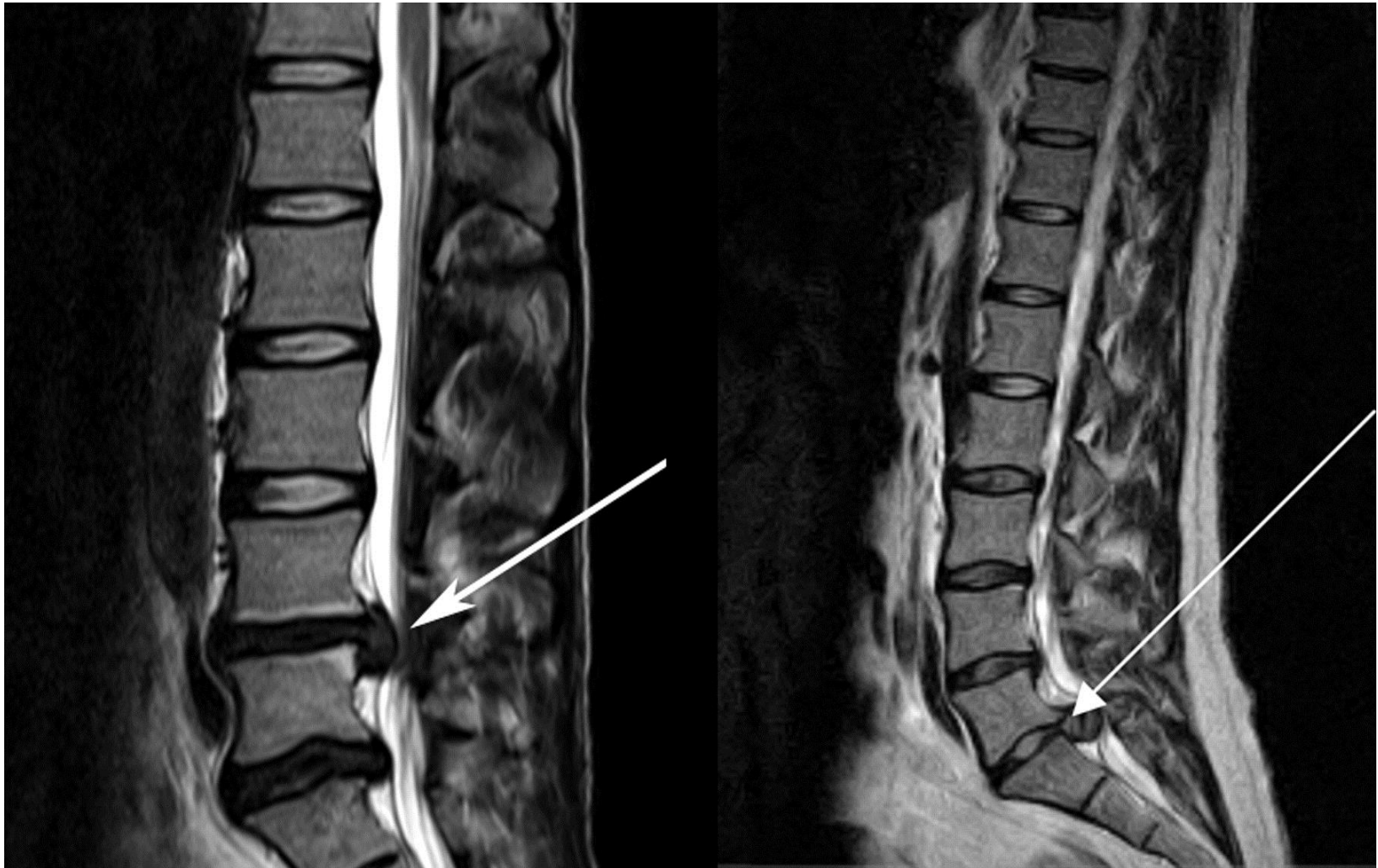


Diagnostic Imaging

- Diagnosis is predominantly based on history and clinical examination with appropriate imaging
- MRI preferred investigation to confirm diagnosis/ determine compression level and underlying cause
- Myelography/ CT sometimes used
- Urodynamic studies/ pre and post void bladder scanning

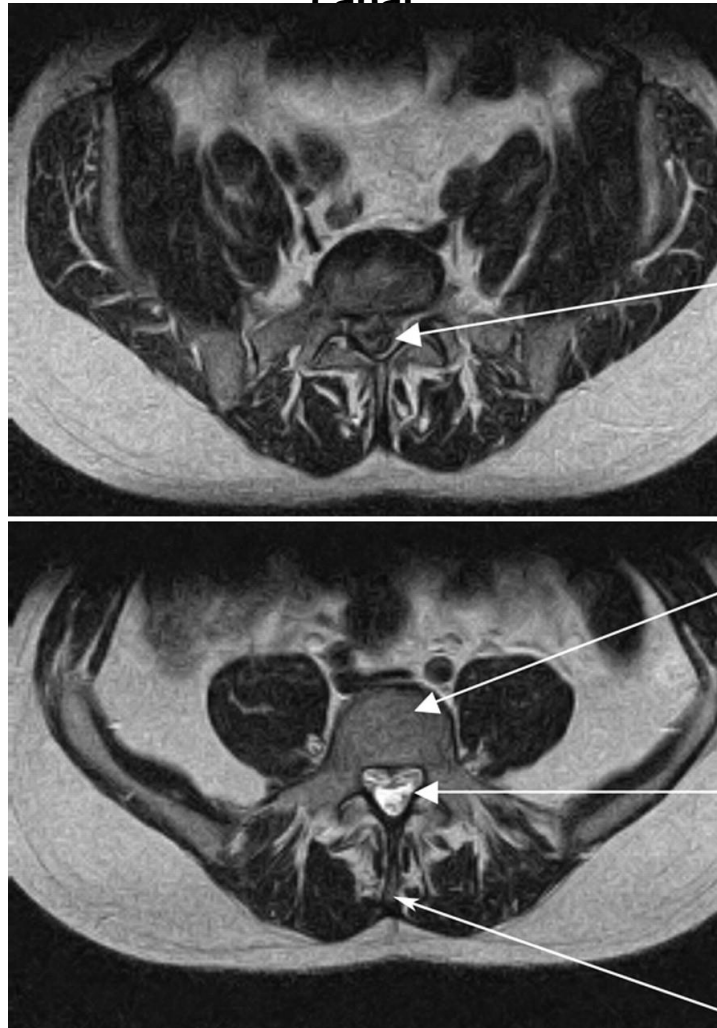


Fig 2 Left: MRI scan showing compression of the cauda equina (arrow) due to a large posterior disc herniation at L4/5.



Lavy C et al. BMJ 2009;338:bmj.b936

Fig 3 Top: Axial cross sectional MRI view at the level of L5/S1 of a patient with cauda equina syndrome showing a large irregular disc herniation (arrow) occupying most of the vertebral canal



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Management

- Patients should be referred for urgent spinal consultation with urgent spinal decompression indicated for most patients to prevent permanent neurological damage
- Current recommendation management is surgical decompression if reversible cause **as soon as possible**
- RT may relieve cord compression caused by malignant disease



Summary

- Rare but devastating if symptoms persist
- Most common cause: compression from a large central lumbar disc herniation (L5/S1 > L4/5)
- Symptoms:
 - Bladder and/ or bowel and/or sexual dysfunction
 - Saddle anaesthesia/ paraesthesia
 - Potential neurological deficit of the lower limb
- Investigation of choice: MRI
- Management for reversible causes: surgery; no consensus over urgency; generally < 48 hours considered optimal

Thank you!

Presentation available on
<https://www.bon.ac.uk>

