

## Cauda equina syndrome

The cauda equina is formed by nerve roots caudal to the level of spinal cord termination. Cauda equina syndrome (CES) is caused by compression of the nerves, causing one or more of the following: bladder and/or bowel dysfunction, reduced sensation in the saddle (perineal) area, and sexual dysfunction, with possible neurological deficit in the lower limb (motor/sensory loss, reflex change) <sup>[1]</sup>.

### Important information

CES is a medical emergency and requires immediate referral for investigation. Early diagnosis is essential. Early surgical decompression is crucial for a favourable outcome in most patients with CES <sup>[2]</sup>.

## Epidemiology <sup>[3]</sup>

- The incidence is variable and dependent on aetiology. The prevalence is estimated to be between 1 and 3 per 100,00 population.
- CES is reported in approximately 0.04% of all patients presenting with low back pain.
- CES occurs in approximately 2% of cases of herniated lumbar discs <sup>[4]</sup>.
- A congenitally narrow spinal canal or acquired spinal stenosis arising from a combination of degenerative changes of the disc and the segmental posterior joints may predispose to CES <sup>[5]</sup>.

## Aetiology

- Herniation of a lumbar disc; the most common cause of CES is compression arising from large central lumbar disc herniation at the L4/L5 and L5/S1 level <sup>[5]</sup>.

- Tumours: metastases, lymphomas, spinal tumours.
- Trauma.
- Infection, including epidural abscess [6].
- Congenital – eg, congenital spinal stenosis, kyphoscoliosis and spina bifida.
- Spondylolisthesis.
- Late-stage ankylosing spondylitis.
- Postoperative haematoma.
- Following spinal manipulation [7].
- Inferior vena cava thrombosis.
- Sarcoidosis.

## Presentation [8] [9]

See also the separate [Examination of the Spine](#) article.

Clinical diagnosis of CES is not easy [5]. Most cases are of sudden onset and progress rapidly within hours or days. However, CES can evolve slowly and patients do not always complain of pain. About 50–70% of patients have urinary retention on presentation; 30–50% have an incomplete syndrome [10].

- Low back pain, with pain in the legs and unilateral or bilateral lower limb motor and/or sensory abnormality.
- Lower limb motor weakness and sensory deficits: usually asymmetrical weakness with loss of reflexes dependent on the affected nerve root (increased lower limb reflexes and other upper motor neuron signs such as extensor plantar responses may indicate spinal cord involvement and exclude the diagnosis of CES). See also the separate [Neurological Examination of the Lower Limbs](#) article.
- Bowel and/or bladder dysfunction with saddle and perineal anaesthesia.

- Urinary dysfunction may include retention, difficulty starting or stopping a stream of urine, overflow incontinence and decreased bladder and urethral sensation.
- Bowel disturbances may include faecal incontinence and constipation. Rectal examination may reveal loss of anal tone and sensation.
- Sexual dysfunction.

Bilateral leg symptoms in the form of radicular pain, numbness or weakness are indicative of partial or impending CES if not part of the syndrome itself<sup>[3]</sup>.

## Investigations

The diagnosis of CES is primarily based on a thorough history and clinical examination, assisted by appropriate radiological investigation<sup>[2]</sup>. The only way to exclude the diagnosis of CES is with an emergency MRI scan. About 40% of requested scans show no evidence of cauda equina compression<sup>[11]</sup>.

- Further investigations are focused on localising the site of compression and the underlying cause.
- MRI scan is the preferred investigation to confirm the diagnosis and determine the level of the compression and any underlying cause<sup>[5]</sup>.
- Myelography and CT are also sometimes used.
- Urodynamic studies: may be required to monitor recovery of bladder function following decompression surgery.

## Differential diagnosis

- Conus medullaris syndrome (the conus medullaris is located above the cauda equina at T12-L2; nerve root pain is less prominent and the main features are urinary retention and constipation)<sup>[12]</sup>.
- Mechanical [back pain](#) or prolapsed lumbar disc.
- Fracture of lumbar vertebrae due to trauma.
- Spinal tumour.

- Spinal cord compression.
- Peripheral neuropathy.

## Management

Patients should be referred immediately for a neurosurgical consultation. Urgent surgical spinal decompression is indicated for most patients to prevent permanent neurological damage<sup>[2]</sup>.

- Immobilise the spine if CES is due to trauma.
- Surgery is indicated to remove blood, bone fragments, tumour, herniated disc or abnormal bone growth.
- Lesion debulking is required for space-occupying lesions - eg, tumours, abscess.
- If surgery cannot be performed, radiotherapy may relieve cord compression caused by malignant disease.
- Other treatment options may be useful in certain patients, depending on the underlying cause of the CES:
  - Anti-inflammatory agents, including steroids, can be effective in patients with inflammatory causes - eg, ankylosing spondylitis.
  - Infection causes should be treated with appropriate antibiotic therapy.
  - Patients with spinal neoplasms should be evaluated for chemotherapy and radiation therapy.
- Postoperative care includes addressing lifestyle issues (eg, obesity), and also physiotherapy and occupational therapy, depending on residual lower limb dysfunction.

## Complications

Complications are increasingly likely if diagnosis and appropriate management are delayed, and include residual:

- Paralysis.

- Sensory abnormalities.
- Bladder, bowel and sexual dysfunction.

## Prognosis<sup>[13]</sup> [14]

- Prognosis is dependent on the aetiology and the time taken before effective treatment is provided.
- Inadequate or delayed diagnosis and effective treatment often lead to long-term bladder, bowel and sexual dysfunction.
- Late diagnosis and delay in treatment increase the risk of a permanent neurological deficit.
- Patients with bilateral sciatica or complete perianal anaesthesia have a less favourable prognosis than patients with unilateral pain.

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## Further reading

- [Low back pain and sciatica in over 16s: assessment and management](#); NICE Guidelines (November 2016 – last updated December 2020)

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