



Review Article

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## *Review on Diagnosis and Management of Cauda Equina*

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### ABSTRACT

Disorders of the cauda equina are etiologically and physically connected to the neuromuscular system in the spinal cord. A thorough history and neurological examination are necessary for clinical recognition of a cauda equina-affecting condition, and to make a rapid diagnosis, the selection and interpretation of relevant neuroimaging investigations, neurophysiologic testing, and laboratory tests are necessary. The diagnosis and treatment of Cauda Equina Syndrome (CES) are difficult. It could appear at any time or in any environment. It is most common between the ages of 31 and 50. Intervertebral disk herniation was the most frequent cause of conus medullaris and cauda equina lesions, followed by spinal fracture. The Medline, Pubmed, Embase, NCBI, and Cochrane databases were searched for studies of patients with non-alcoholic fatty liver disease. Incidence, etiology, and management options were analyzed. Most academic studies concur that CES is a rare ailment among people who suffer from back pain overall. It is obvious that not all patients with back pain will experience CES, hence not every patient has to be warned. Patients who might eventually develop CES should be "safety-netted" with attentive observation.

**Key words:** *Cauda equina, Intervertebral disc displacement, Red flags, Masqueraders*

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### INTRODUCTION

Disorders of the cauda equina are etiologically and physically connected to the neuromuscular system in the spinal cord. A thorough history and neurological examination are necessary for clinical recognition of a cauda equina-affecting condition, and to make a rapid diagnosis, the selection and interpretation of relevant neuroimaging investigations, neurophysiologic testing, and laboratory tests are necessary [1-4].

Cauda Equina Syndrome (CES) is hard to identify and treat illness. In order to effectively manage the patient, physicians must be able to quickly reason through their findings. It may manifest at any time or in any situation. The most frequent cause of CES, which mostly affects individuals between the ages of 31 and 50, is a lumbar

spinal disc herniation [5]. Compression of the cauda equina typically results from a disc prolapse, frequently at the L4–5 level. A space-occupying lesion, such as spinal stenosis, a tumor, a cyst, an infection, or bony invasion, might, nevertheless, enlarge the spinal canal and compel the compression of the cauda equina. However, in terms of scope, most academic studies concur that CES is a rare ailment among people who suffer from back pain overall. It is obvious that not all patients with back pain will experience CES, hence not every patient has to be warned. Patients who are believed to eventually have CES should be "safety-netted" with watchful waiting rather than being referred right away [6].

## MATERIALS AND METHODS

PubMed database was used for articles selection, and the following keys were used in the mesh (("Cauda Equina" [Mesh]) AND ("signs and symptoms" [Mesh]) OR ("Management" [Mesh])).

In regards to the inclusion criteria, the articles were selected based on the inclusion of one of the following topics: Cauda Equina

Cauda Equina features and management. Exclusion criteria were all other articles, which did not have one of these topics as their primary endpoint.

Around 90 publications were chosen as the most clinically relevant out of 1,202 articles indexed in the previous two decades, and their full texts were evaluated. A total of 31 of the 90 were included after a thorough examination. Additional research and publications were found using reference lists from the recognized and linked studies. Expert consensus recommendations and commentary were added where relevant to help practicing physicians assess Cauda Equina most simply and practically possible.

### *Epidemiology*

Incidence rates for cauda equina lesions were shown to be greater in men in an epidemiologic investigation of conus medullaris and cauda equina lesions in Slovenia, which found an average yearly incidence rate of 3.4 per million people [7]. Intervertebral disk herniation was the most frequent cause of conus medullaris and cauda equina lesions in this series, followed by a spinal fracture, iatrogenic etiology, malignancy, and "other." In this cohort, the annual incidence rate of disk herniation leading to cauda equina syndrome was 1.8 per million people. This is in line with earlier research, which claims that herniated lumbosacral disks cause cauda equina in 45% of instances [8]. Even though this disease has a low population incidence, ranging from 1:33,000 to 1:100,000 inhabitants, its sequelae continue to generate high public healthcare costs.

### *Symptoms & signs and risk factors*

#### *Pain*

Patients with cauda equina syndrome frequently report low back pain and radicular pain. Compressive causes, such as disk herniation, are more likely than infiltrative conditions to cause low back pain, and low back pain in cauda equina syndrome may worsen in the supine position due to increased pressure on affected nerve roots [9]. While radicular lower limb pain is common in cauda equina syndrome, it is quite dynamic and can be unilateral or bilateral, depending on the levels (L2 through S3) involved. While bilateral radicular symptoms may indicate a larger lesion, it is important to note that unilateral radicular pain is more common in cauda equina syndrome [10]. A central disk herniation may only impact the lower sacral roots, leaving the more lateral lumbar roots undisturbed and the lower limbs pain-free (or other neurologic deficits).

#### *Bladder*

Bladder impairment is a key clinical characteristic of cauda equina syndrome and, by definition, should be present in the majority of patients. Symptoms of urine impairment can be highly variable, and when moderate or slow in onset, patients may not recognize them or attribute them to other sources. Symptoms of bladder impairment include decreased urethral feeling while voiding, urine retention, and incontinence. Urine incontinence in cauda equina syndrome is caused by urinary retention and is clinically seen as overflow incontinence. When bladder dysfunction causes urine retention without overflow incontinence, patients may not recognize or report urinary symptoms. Urodynamic studies may be effective in demonstrating urine retention in patients with cauda equina syndrome, especially when there is no history of overflow incontinence [11].

#### *Bowel*

Compared to urinary dysfunction, gastrointestinal problems may be more common in cauda equina syndrome. Compared to other clinical aspects, disturbances in bowel function have less information in the literature, and there is no universal agreement on the symptoms that make up gastrointestinal dysfunction [1]. Constipation, incontinence, and a feeling of rectal fullness are examples of symptoms. Patients may not identify bowel impairment when cauda equina syndrome manifests more fulminant because they are unable to recognize acute fullness of the rectum [12].

#### *Sexual dysfunction*

In patients with probable cauda equina syndrome, sexual dysfunction should be investigated. Erectile dysfunction, urinating during sexual activity, priapism, and dyspareunia are possible symptoms. Sexual dysfunction is the least well-researched clinical symptom of cauda equina syndrome, according to the literature [1]. However, a study of patients who underwent surgery for cauda equina syndrome found that 25 of 26 patients with this symptom's documentation experienced sexual dysfunction [13].

#### *Sensory loss*

It has been suggested that the most prevalent sensory abnormalities in cauda equina syndrome involve the buttocks, posterior thighs, and perineal region [13] and that 75% of patients experience loss of sensation in the perineal and saddle region [14]. It is crucial to inquire about numbness in the perineal area because patients might not voluntarily mention it. The lower limbs, saddle area, and perineum should all be subjected to mild touch and pinprick testing as part of the sensory assessment. Depending on the location and degree of the compressive or infiltrative process, the perineal sensory loss may be slight, spotty, or unilateral, although it frequently gets worse and the confluence with progression.

#### *Weakness*

Any distribution of weakness may be unilateral or bilateral (L2 through S2). It is crucial to understand, however, that patients with cauda equina syndrome may not exhibit weakness, particularly when there is a midline central disk herniation that primarily impacts the lower sacral or coccygeal nerve roots. The muscles that are innervated by the lower lumbosacral nerve roots (L5 through S2) are more likely to be affected when weakness is present [9].

#### *Reflexes*

The localization of a disease process to the cauda equina depends on a comprehensive assessment of upper and lower extremity reflexes. At the knees and ankles, there may be a reduction in deep tendon reflexes. When combined with extensor plantar responses, the presence of brisk knee reflexes and diminished or nonexistent ankle reflexes raises the possibility of myeloneuropathy or localization to the lower spinal cord.

When evaluating a suspected case of cauda equina syndrome, additional reflexes may be useful as diagnostic indicators. Applying a cotton-tipped applicator to the skin around the anus and watching for a constriction of the external anal sphincter as a response constitutes the anal wink reflex. Applying pressure to the glans penis and observing for an external anal sphincter contraction as a result is known as the bulbocavernosus reflex. These reflexes allow one to gauge the health of the lower sacral nerve roots.

#### *Rectal tone*

Additional details regarding the integrity of the cauda equina may be obtained by a digital rectal examination to evaluate rectal tone. It has been shown that diminished rectal tone does not correspond with bladder dysfunction but rather with sensory loss in the saddle area [9]. However, rectal tone findings did not correlate with the existence of cauda equina syndrome in a retrospective investigation of MRI-confirmed cases [13]. This finding may, at least in part, be explained by a 2015 research using digital rectal examination in detecting rectal tone, which suggests limited physician accuracy in determining lowered tone on an artificial anal canal by sphygmomanometry [14].

#### *Diagnosis*

To determine whether any dermatomal sensory loss, myotomal weakness, or reflex alteration is present, a thorough neurological assessment should be carried out. Upper motor neuron tests such as the plantar (Babinski) response, clonus testing, muscle tone testing, joint position sense, and gait should also be included in the

examination if there are any suspicions that a higher lesion or central nervous system lesion is the source of the symptoms. According to current UK recommendations, a digital rectal examination (DRE) is necessary to assess the loss of anal sphincter tone [15]. Although this is a well-established test for individuals with suspected CES, there is still some discussion over whether it should even be included in the assessment due to the insufficient evidence supporting its usage. The evidence indicates that the physical tests have limited sensitivity and specificity and that there is no direct relationship between a finding of diminished anal tone and the existence of cauda equina compression on an MRI scan [16].

In the emergency room, the ultrasonography measurement of post-voiding residual bladder capacity is frequently utilized to detect CES. Again, despite its widespread use, there is not enough evidence to prove its validity in CES assessment, as writers have stated that a variety of residual volumes (100/200/500ml) may be necessary to determine any degree of bladder retention [17].

### *Treatment*

Surgical decompression is recommended when neuroimaging reveals a possibly treatable etiology and clinical signs point to cauda equina syndrome. The timing of surgical decompression in cases of cauda equina syndrome is still debatable and contentious, and it could have important medical and legal ramifications [18]. Although cauda equina syndrome was initially identified as a clinical entity in 1934, it wasn't until 1959 that immediate surgical decompression for the disease became a significant indicator of a good outcome. Many years later, a sizable meta-analysis revealed that acute cauda equina syndrome patients who underwent decompressive surgery more than 48 hours after symptom onset were unlikely to make a substantial recovery [19]. Surgery within 24 hours after the presentation was suggested by a later reanalysis of these results and another later independent meta-analysis. Recent research has questioned whether there is a specific temporal window for surgical decompression.

Evidence suggests that the cauda equina syndrome's classification into complete and incomplete forms has significant prognostic significance. Patients with incomplete cauda equina syndromes who decompress early have a better prognosis than those with complete syndromes with stable impairments [20]. A 2017 study of 75 patients found that after decompressive surgery, there were persisting abnormalities, including bladder dysfunction in 48% of cases, bowel dysfunction in 42%, sexual dysfunction in 53% of cases, radicular discomfort in 48% of cases, and saddle sensory loss in 57% of cases [9]. The following principles are clear despite the need for prospective clinical studies: (1) it can be difficult to diagnose cauda equina syndrome, so urgent neuroimaging should be performed in suspected cases; (2) urgent surgical decompression is likely to improve outcomes, especially in cases of incomplete cauda equina syndrome; and (3) there is a high likelihood of persistent neurologic deficits even in cases of appropriately treated cases.

## **CONCLUSION**

Diskogenic and non-diskogenic disorders of the cauda equina can all lead to cauda equina syndrome, a neurologic emergency that frequently requires emergency neurosurgery. The clinician must be aware of the anatomy of the cauda equina, any symptoms that would indicate that the cauda equina is compromised, as well as the value and restrictions of imaging, electrodiagnostic, and laboratory tests in making a diagnosis of cauda equina syndrome.

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