



Case Report

# Cauda equina syndrome after L5-S1 posterior decompression surgery showing a “convexity sign” caused by engorgement of the ventral epidural venous plexus: A case series

Motohiro Takayama<sup>1</sup>, Yoshinori Maki<sup>2</sup>, Toshinari Kawasaki<sup>1</sup>

<sup>1</sup>Department of Neurosurgery, Otsu City hospital, Otsu, Shiga, <sup>2</sup>Department of Neurosurgery, Hikone Chuo Hospital, Hikone, Japan.

E-mail: \*Motohiro Takayama - gara1016@hotmail.com; Yoshinori Maki - passatempo19840816@gmail.com; Toshinari Kawasaki - toshi821@kuhp.kyoto-u.ac.jp



**\*Corresponding author:**

Motohiro Takayama,  
Department of Neurosurgery,  
Otsu City hospital, Otsu, Shiga,  
Japan.

gara1016@hotmail.com

Received : 08 February 2022

Accepted : 18 February 2022

Published : 04 March 2022

**DOI**

10.25259/SNI\_157\_2022

**Quick Response Code:**



## ABSTRACT

**Background:** Cauda equina syndrome (CES) following posterior lumbar decompression is rare. Here, we present four postoperative cases of L5S1 surgery resulting in CES attributed to engorged ventral epidural veins that decreased spontaneously in three cases, while the fourth warranted a laminoplasty.

**Case Description:** Four patients underwent posterior lumbar decompressions at the L5-S1 level, but developed postoperative symptoms/signs of CES. Interestingly, in all four cases, cauda equina compression was attributed to engorgement of the ventral epidural venous plexus documented on magnetic resonance images (MRI) by the “convexity sign.” Postoperatively, three patients’ CES compression decreased spontaneously, but one required a laminoplasty.

**Conclusion:** Postoperative CES occurred in four patients undergoing L5-S1 lumbar surgery. This deficit was attributed to marked engorgement of the ventral epidural plexus (i.e., yielding the “convexity sign” on MRI) that resolved spontaneously in three patients, but warranted a laminoplasty in the fourth.

**Keywords:** Cauda equina syndrome, Dysuria, Epidural venous plexus, L5-S1, Posterior lumbar decompression

## INTRODUCTION

Cauda equina syndrome (CES) is rarely seen in patients following lumbar surgery.<sup>[1,3,4]</sup> Here, we present four patients who, following L5S1 posterior decompressions, developed CES uniquely attributed to marked engorgement of the ventral epidural venous plexus documented on magnetic resonance images by the “convexity sign,” CES resolved spontaneously in three patients, but warranted a laminoplasty- decompression in the fourth.

## CASE PRESENTATION

Four patients, ranging in age from 54 to 70, underwent lumbar decompressive procedures (three patients), and/or lumbar fusions [Table 1]. Postoperatively, between 1 and 4 days, all

**Table 1:** Summary of four cases of CES attributed to ventral venous engorgement.

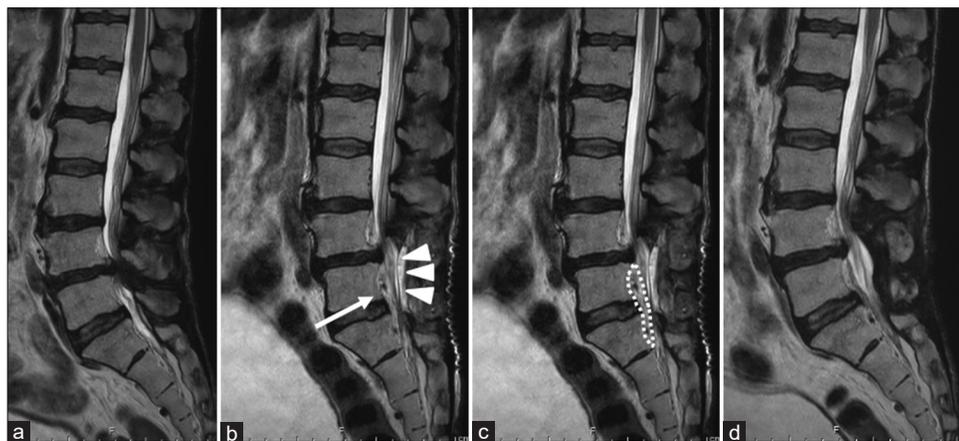
<b># Patients</b>	<b>4</b>
Average age	64.0 (years)
Range	54–79 (years)
Sex	
M	Two Patients
F	Two Patients
Lumbar pathology	
Disc disease	One Patient
Stenosis	Two Patients
DS/instability	One Patient
Surgery/levels	
HLAM	Case 4 (L5-S1)
LAM/Fus	Case 1 (L5-S1)
MLAM	Cases 2, 3 (L4-S1)
Time to onset CES	
Case 1	1 day
Case 2	4 days
Cases 3, 4	2 days
MR Findings	MR “Convexity Sign” –Engorged
Patients 1–4	Ventral Epidural Venous Plexus at L5-S1
Treatment	
No surgery (time)	Cases 1–3 (1–2 weeks postoperative)/spontaneous Reg.
Laminoplasty (time)	Case 4 (15 days later) surgery
Outcome	
Neuro intact	Case 4
Residual deficit	
Sensory/Urinary DysFx	Case 1–3
CES: Cauda equina syndrome, M: Male, F: Female, HLAM: Hemilaminectomy, LAM: Laminectomy, MLAM: Multilevel laminectomy, FUS: Fusion, DS: Degenerative spondylolisthesis, Neuro: Neurologically, Postop: Postoperatively, DysFx: Dysfunction, Reg.: Regression of ventral compression	

began to exhibit the following CES symptoms and signs; pain, perineal sensory loss, and dysuria. Postoperative MR studies revealed the “convexity sign” defined as a space ventral to the dural sac, similar to a convex lens, attributed to engorgement of the ventral epidural plexus. This resulted in marked ventral compression of the cauda equina [Figures 1-4 and Table 1].

## DISCUSSION

We describe four cases of CES following posterior lumbar decompression surgery at the L5-S1 level. TCES in all cases was attributed to engorgement of the ventral epidural venous plexus diagnosed on MR by the “convexity sign.” We previously and again here reported a postoperative CES case attributed to an engorged ventral venous plexus (i.e., Case 4 in this study); this case was successfully treated with a laminoplasty that included coagulation of the engorged ventral venous plexus.<sup>[2]</sup> However, in three cases, because of prior laminectomies, secondary laminoplasty was not a therapeutic option; fortunately CES resolved spontaneously.

CES following lumbar discectomy was described by McLaren and Bailey, and they elucidated that insufficient bony removal could result in postoperative CES.<sup>[3]</sup> Nerve root ischemia due to postoperative venous congestion was hypothesized as a cause of postoperative CES. Additional decompression surgery within 48 h was recommended to resolve postoperative CES.<sup>[1]</sup> Adequate resolution of preoperative spinal stenosis lesion, better selection of surgical instruments, and avoidance of dura tear and postoperative hematoma are also mandatory to prevent postoperative CES.<sup>[4]</sup>



**Figure 1:** Magnetic resonance images of Case 1 (a) spondylolisthesis was present at the L5-S1 level, and the dural sac terminated at S1. (b and c) The postoperative MR showed the dorsal shift of the thecal sac (white arrow heads) attributed to the ventrally engorged epidural venous plexus (a white arrow and dotted line; i.e., the “convexity sign”). (d) Seven years postoperatively, the ventrally engorged epidural venous plexus could still be seen.



**Figure 2:** Magnetic resonance images of Case 2 (a) lumbar spinal canal stenosis was observed at the L4-L5 level. (b and c) The postoperative MR revealed ventral dural sac compression (white arrow heads) attributed to the engorged ventral epidural venous plexus (a white arrow and dotted line; that is, the “convexity sign.”) (d) Six months later, the MR demonstrated a reduction in ventral compression, but not full resolution.



**Figure 3:** Magnetic resonance images of case 3 (a) lumbar spinal canal stenosis was observed at the L4-L5 level, and the dural sac terminated at S1. (b and c). Two years later, the follow-up MR still showed residual ventral epidural venous compression (white arrow heads/white arrow and dotted line).



**Figure 4:** Magnetic resonance images of Case 4 (a) the dural sac terminated at S1 level. (b and c) Postoperative MR images revealed ventral compression of dural sac (white arrow heads) due to the engorged ventral epidural venous plexus (a white arrow and dotted line). (d) After laminoplasty and coagulation of the ventral epidural venous plexus, the dural sac ventral compression was relieved.

## CONCLUSION

Neurosurgeons should be aware that postoperative CES may develop due to marked engorgement of the ventral epidural venous plexus after posterior decompression surgery at the L5-S1 level.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Henriques T, Olerud C, Petrén-Mallmin M, Ahl T. Cauda equina syndrome as a postoperative complication in five patients operated for lumbar disc herniation. *Spine (Phila Pa 1976)* 2001;26:293-7.
2. Maki Y, Takayama M, Hayashi H, Yokoyama Y, Agawa Y. Cauda equina syndrome due to dural sac shift with engorgement of the epidural venous plexus: Rare complication after lumbar microdiscectomy. *World Neurosurg* 2017;104:1048.e15-8.
3. McLaren AC, Bailey SI. Cauda equina syndrome: A complication of lumbar discectomy. *Clin Orthop Relat Res* 1986;204:143-9.
4. Podnar S. Cauda equina lesions as a complication of spinal surgery. *Eur Spine J* 2010;19:451-7.

**How to cite this article:** Takayama M, Maki Y, Kawasaki T. Cauda equina syndrome after L5-S1 posterior decompression surgery showing a “convexity sign” caused by engorgement of the ventral epidural venous plexus: A case series. *Surg Neurol Int* 2022;13:82.