



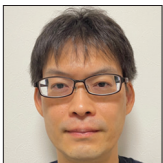
Case Report

Case of lumbar ligamentum flavum hematoma with epidural hematoma resulting in cauda equina compression

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ABSTRACT

Background: Lumbar ligamentum flavum hematomas (LFHs) are rare. However, when they occur and contribute to epidural cauda equina compression, timely surgical intervention is frequently warranted.

Case Description: A 69-year-old female presented with the left lower extremity sciatica and gait disturbance of 2 weeks' duration that ultimately evolved into a paraparesis/cauda equina syndrome. When the lumbar MRI revealed left-sided L4-L5 epidural compression attributed to a hemorrhage into the hypertrophied ligamentum flavum (HLF), she successfully underwent a bilateral fenestration/decompressive procedure. Pathologically, neovascularization and rupture of the ventral layers of the degenerated and thickened HLF contributed to the LFH.

Conclusion: Arterial neovascularization (i.e., arterial feeding vessels from paramuscular/prelaminar lumbar branches) contributed to a left-sided L4-L5 LFH that resulted in epidural cauda equina compression in a 69-year-old female. Following surgical focal fenestration/decompression, the patient's symptoms/signs resolved.

Keywords: Cauda equina syndrome, Decompressive surgery, Degenerative lumbar spine, Hypertrophied ligamentum flavum hematoma, Lumbar canal stenosis, Neovascularization, Prelaminar artery

INTRODUCTION

Lumbar ligamentum flavum hematomas (LFHs) are rare; we were only able to identify 28 such cases in the literature [Table 1].^[4] Patients typically exhibit focal hematomas within hypertrophied ligamentum flavum (HLF) that is likely due to neovascularization (i.e., arterial ingrowth from paramuscular/prelaminar lumbar branches). Here, a 69-year-old female with a subacute epidural LFH developed a progressive cauda equina syndrome that resolved following surgical L4-L5 fenestration/decompression.

CASE REPORT

A 69-year-old female presented with 2 weeks of progressive left lower extremity sciatica and paraparesis/partial cauda equina syndrome. The lumbar MR showed a left-sided L4-L5 epidural

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Table 1: Reported Twenty-eight cases of lumbar ligamentum flavum hematoma.^[4]

Authors	Age (year)	Sex	Level	Journal (year)
Sweasey <i>et al.</i>	43	M	L4-5	J Neurosurg 76 (3): 534-537, 1992
	60	M	L2-3	
Baker and Hanson	58	F	L5-S1	Spine 19 (9): 1092-1094, 1994
Cruz-Conde <i>et al.</i>	57	M	L4-5	Spine 20 (13): 1506-1509, 1995
Mahallati <i>et al.</i>	30	M	L3-4	AJNR Am J Neuroradiol 20 (6): 1166-1168, 1999
Minamide <i>et al.</i>	76	M	L3-4	J Orthop Sci 4 (5): 376-379, 1999
Hirakawa <i>et al.</i>	50	M	L4-5	Spine 25 (9): 1182-1184, 2000
Yuceer <i>et al.</i>	67	M	L2-3	Surg Neurol 53 (6): 598-600, 2000
Chi <i>et al.</i>	64	M	L3-4	Kaohsing J Med Sci 20 (1): 41-44, 2004
Mizuno <i>et al.</i> ^[6]	45	F	L4-5	
Yamaguchi <i>et al.</i> ^[10]	62	M	L4-5	
Albanece <i>et al.</i>	70	F	L1-2	J Neurosurg Sci 50 (2): 59-61, 2006
Keynan <i>et al.</i>	75	F	L3-4	Skeletal Radiol 35 (9): 687-9, 2006
Shimada <i>et al.</i>	83	F	L2-4	Tohoku J Exp Med 210 (1): 83-89, 2006
Spuk <i>et al.</i>	64	F	L4-5	Clin Orthop Relat Res 443: 337-41, 2006
	62	M	L3-4	
Gazzeri <i>et al.</i> ^[2]	59	F	L3-4	
Kotil and Bilge	74	M	L4-5	J Clin Neurosci 14 (10): 994-7, 2007
	80	M	L4-5	
Kono <i>et al.</i>	64	M	L4-5	Spine 33 (6): E573-E575, 2008
Miyakoshi <i>et al.</i> ^[7]	71	M	L3-5	
Takahashi <i>et al.</i>	53	F	L3-4	J Orthop Surg (Hong Kong) 17 (2): 212-5, 2009
	61	M	L5-S1	
Ohba <i>et al.</i>	52	M	L5-S1	Orthopedics 34 (7): e324-327, 2011
Ghent <i>et al.</i> ^[3]	62	M	L3-4	
Liu <i>et al.</i>	76	M	L4-5	Am J Emerg Med 34 (10): 2058 e3-e6, 2016
Ozdemir <i>et al.</i>	63	M	L2-3	J Craniovertebr Junction Spine 7 (1): 7-12, 2016
Ishimoto <i>et al.</i> ^[4]	71	F	L4-5	

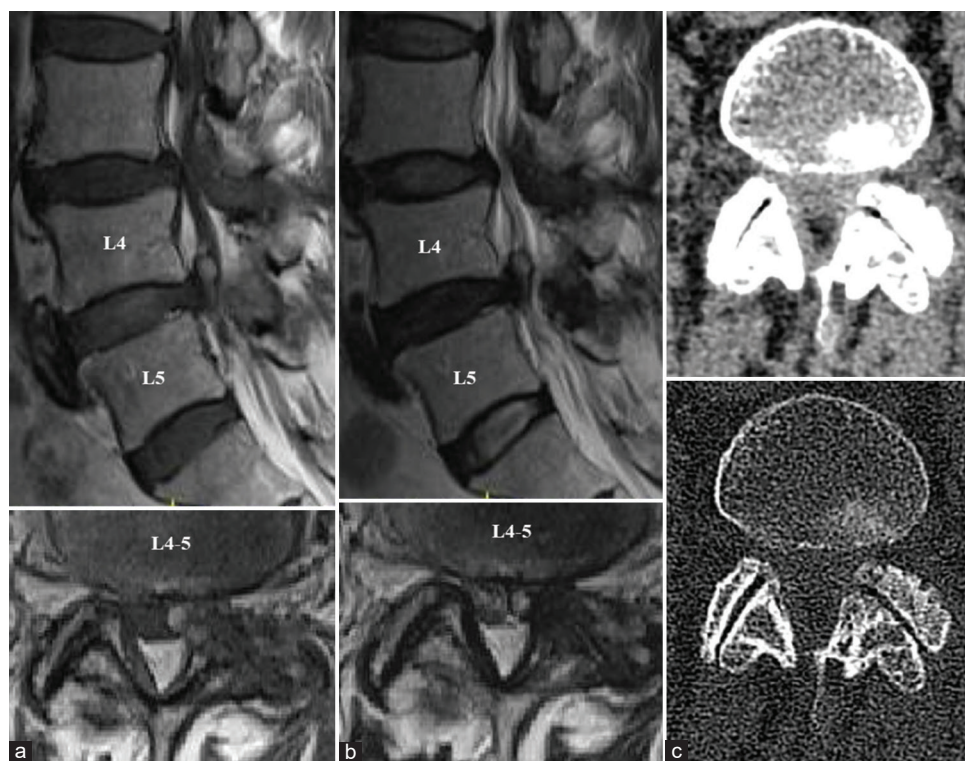


Figure 1: (a) Lumbar MRI T1WI showed high-intensity left-sided L4-L5 epidural mass/ligamentum flavum hematoma (LFH). (b) Lumbar MRI T2WI showed low-intensity LFH and high-intensity epidural mass on the left at L4-5. (c) CT at L4-5 showed thickened degenerated facet joints and lumbar canal stenosis.

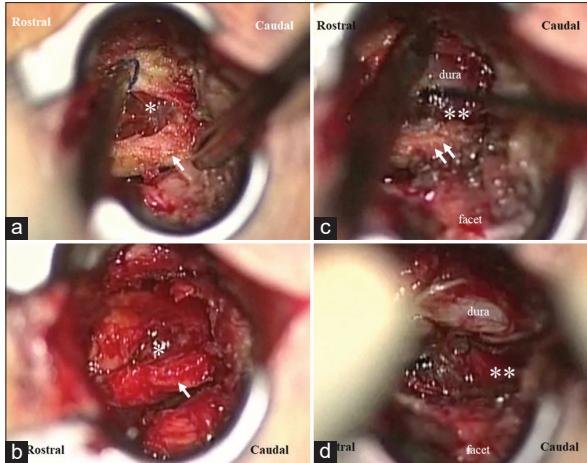


Figure 2: Midline fenestration at L4-5 level: intraoperative findings. (a) A left-sided L4-L5 hematoma (asterisk) within hypertrophied ligamentum flavum (HLF) (arrow). (b) Hematoma (asterisk) in dorsal layer of left HLF (arrow); image after removed of the right HLF. (c) Epidural hematoma (double asterisks) on the ventral side of HLF (double arrows). (d) Resection of the left HLF revealed an epidural hematoma (double asterisks).

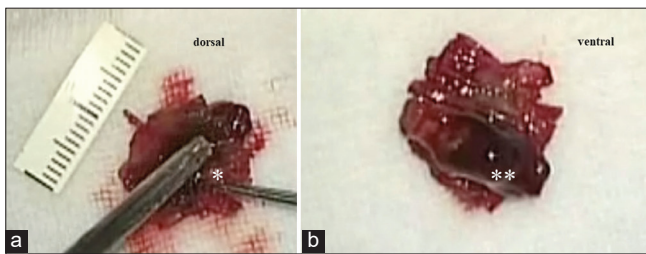


Figure 3: *En bloc* resection of the left ligamentum flavum hematoma. (a) Dorsal hematoma (asterisk) seen within the layers of the hypertrophied ligamentum flavum (HLF). (b) Epidural hematoma (double asterisks) on ventral side of HLF.

hematoma and LFH within the left HLF [Figures 1a and b]. In addition, the CT demonstrated bilateral degenerated/thickened facet joints [Figure 1c]. She underwent a bilateral L4-L5 lumbar fenestration/decompression on the 15th day following the original onset of symptoms [Figure 2a]. At surgery, the dorsal surface of the left ligamentum flavum was dark brown and hematoma was observed within the multiple layers of the HLF [Figures 2b-d]. Postoperatively, the patient's symptoms/signs improved. The LFH pathology revealed neovascularization (i.e., arterial feeding vessels from paramuscular/prelaminar lumbar branches) and an epidural hematoma within the ventral layers of the HLF [Figure 3].

DISCUSSION

The histopathology of LFH has largely been attributed to ligamentum flavum degeneration with neovascularization.^[3,6,10] Miyakoshi *et al.* reported a patient who presented with a two-level LFH.^[7] Other cases of LFH have been associated with facet synovial and ganglion cysts.^[1,2,8] In Kaneko *et al.*'s report, five patients with LFH were successfully treated with endoscopic spine surgery; pathological evaluations revealed granulation tissue in all cases, but no evidence of synovial cysts.^[5]

Etiology of LFH

Mechanical stress and angiogenesis both contribute to the development/progression of HLF and LFH [Figure 4a]. The resultant hemorrhages are typically attributed to arterial neovascularization arising from the dorsal muscular branches of the multifidus muscles, the posterior vertebral canal artery (prelaminar artery), or collapse/degeneration/hypertrophy of new small blood vessels within the HLF^[9] [Figure 4b]. Here, the LFH originated from the left-sided HLF [Figure 4c].

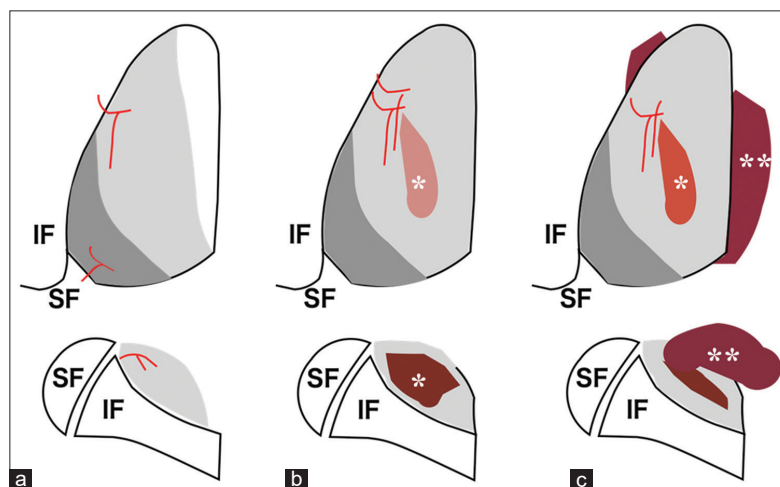


Figure 4: Illustration of lumbar ligamentum flavum hematoma (LFH) causing cauda equina compression. (a) LFH with neovascularization/angiogenesis. (b) LFH (asterisk) due to collapse of new blood vessels. (c) Lumbar LFH (single asterisk) extending into epidural space (double asterisks).-

CONCLUSION

Hemorrhage into the lumbar left-sided HLF due to neovascularization resulted in L4-5 epidural compression that successfully resolved following a fenestration/decompressive procedure.

Declaration of patient consent

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

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Nil.

Conflicts of interest

There are no conflicts of interest.

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