Case report

Lumbar vertebral hemangioma mimicking lateral spinal canal stenosis: Case report and review of literature

Vasileios Syrimpeis, Vasileios Vitsas, Panagiotis Korolessis

Orthopaedics' Department, General Hospital of Patras 'O Agios Andreas', Patras, Greece

Context: Hemangiomas are the commonest benign tumors of the spine. Most occur in the thoracolumbar spine and the majority are asymptomatic. Rarely, hemangiomas cause symptoms through epidural expansion of the involved vertebra, resulting in spinal canal stenosis, spontaneous epidural hemorrhage, and pathological burst fracture.

Findings: We report a rare case of a 73-year-old woman, who had been treated for two months for degenerative neurogenic claudication. On admission, magnetic resonance imaging and computed tomographic scans revealed a hemangioma of the third lumbar vertebra protruding to the epidural space producing lateral spinal stenosis and ipsilateral nerve root compression. The patient underwent successful right hemilaminectomy for decompression of the nerve root, balloon kyphoplasty with poly-methyl methacrylate (PMMA) and pedicle screw segmental stabilization. Postoperative course was uneventful.

Conclusion: In the elderly, this rare presentation of spinal stenosis due to hemangiomas may be encountered. Decompression and vertebral augmentation by means balloon kyphoplasty with PMMA plus segmental pedicle screw fixation is recommended.

Keywords: Vertebra hemangioma, Spinal canal stenosis, Root compression, Balloon Kyphoplasty

Introduction

The most common localization of hemangiomas is the spine. They usually appear in the thoracic and lumbar spine and rarely cause pain. Hemangiomas cause symptoms via epidural expansion of the vertebra producing spinal canal stenosis, epidural hemorrhage, and fracture. Opinions vary regarding the ideal treatment of symptomatic vertebral hemangiomas, particularly in patients presenting with neurological impairment. After a search of the literature, we found only eight cases with vertebral hemangiomas complicated with neurological impairment.

We report a case of an elderly woman who developed lateral spinal stenosis caused by a lumbar hemangioma. A review of the literature regarding causes of neurological impairment and methods of surgical treatment was performed.

Case report

A 73-year-old woman presented with a 6-month history of persistent low back pain. For several weeks, she reported symptoms of intermittent neurogenic claudication after walking 20 m and radicular pain to the right leg. The patient had been treated for 2 months with physiotherapy and non-steroidal anti-inflammatory agents for spinal stenosis of L₄-L₅ by an orthopedist. Plain roentgenograms of the spine were first performed by the first evaluating physician and then a computed tomographic (CT) scan. The patient reported a prior history of arterial hypertension and coronary disease for which she was treated with acetylsalicylic acid. On admission, physical examination revealed hypesthesia corresponding to the L₃-L₄ dermatomes on the right leg without concomitant muscle weakness. Tendon reflexes were within normal limits. Plain roentgenograms of the spine showed a typical picture of a vertebral hemangioma involving almost the whole body of the third lumbar vertebra with dorsal expansion of the posterior vertebral body wall (Fig. 1).

Correspondence to: Vasileios Syrimpeis, Orthopaedics' Department, General Hospital of Patras 'O Agios Andreas', 26335 Patras, Greece. Email: siva@upatras.gr

Figure 1 Lateral radiogram of lumbar spine depicting expansion of the posterior cortex of the L₃ vertebral body in the spinal canal and loss of intervertebral disk height at L₅-S₁ level.

The CT scan confirmed the diagnosis of hemangioma of L₃ with an increase of the anteroposterior diameter of the vertebral body at this level (Fig. 2).

Magnetic resonance imaging (MRI) scan disclosed a significant compression of the dural sac associated with narrowing of the right lateral recess because of expansion of the tumor posterolaterally (Figs. 3 and 4).

A better estimation of the integrity of the posterior vertebral body cortex is illustrated in Fig. 5, where an axial MRI image shows erosion-expansion of the posterior vertebral cortex.

On the basis of clinical and imaging findings, a lateral decompression and kyphoplasty plus segmental pedicle fixation were performed. Through a midline dorsal incision, two pedicle screws were inserted in each of the intact L₂ and L₄ vertebrae. Following that, a right formal laminectomy was made and the lateral recess was decompressed and inspected.

During inspection, under magnification 5×, the posterior wall of the L₃ vertebra was cavernous and bled easily upon touching even with fine forceps. Bleeding was easily controlled with fibrin coagulants. The third right lumbar nerve root, which was edematous, was decompressed using magnification 5× loops. A

Figure 2 CT scan revealing the hemangioma occupying almost the whole vertebral body of L₃ with little posterior expansion and intact posterior vertebral body wall.

Figure 3 MRI scan revealing the hemangioma that expands posteriorly to the spinal canal producing spinal canal stenosis.

longitudinal rod was inserted in the tulip screws on the left side for protection and subsequently balloon kyphoplasty (Balex; Tae Yeon Medical Co., Ltd, South Korea) with poly-methyl methacrylate (PMMA) was performed through the right pedicle of the L₃ vertebra. A total of 7 ml of PMMA was easily injected into the vertebral body of L₃. Biopsy was performed through the pedicle

Figure 4 MRI scan delineating the hemangioma and the width reduce of the right vertebral foramen in L₃-L₄ level.

Figure 5 Axial MRI image showing erosion-expansion of the posterior vertebral body cortex.

immediately before cement injection. A pedicle screw was inserted into the right pedicle of the L₃ vertebra in the PMMA mass before cement hardening. Finally, bone allograft was applied posterolaterally. No cement leakage was observed intraoperatively in the images obtained with the image intensifier. Immediately postoperatively, the patient experienced relief from the radicular pain. The patient was mobilized from the first postoperative day and the postoperative radiographs and CT scan showed a stable construct with segmental lordosis (Figs. 6 and 7). One year postoperatively, the patient had no complaints.

Discussion

Vertebral hemangiomas are the most common hemangiomas, predominantly affecting the lumbar and thoracic spine.¹ Although most vertebral hemangiomas

Figure 6 Lumbar radiogram showing posterior instrumentation and balloon kyphoplasty with PMMA.

remain asymptomatic, thoracic hemangiomas produce symptoms more often than lumbar ones.² Rarely, hemangiomas cause symptoms through epidural expansion of the involved vertebra, causing spinal canal stenosis, spontaneous epidural hemorrhage and even rarely, pathological burst fracture. In this case, there was no epidural hematoma or burst fracture of the lumbar vertebra, but progressive expansion of the posterior vertebral body wall because of thinning and weakening of the posterior vertebral body wall resulted in right lateral spinal stenosis producing radiculopathy. The physician who initially treated this elderly woman diagnosed degenerative spinal stenosis and prescribed symptomatic treatment.

The neurological symptoms associated with vertebral hemangiomas range from radiculopathy to complete paralysis, depending on the cause and degree of root or cord compression. Because of the location of this hemangioma in the body of the L₃ vertebra, the predominant symptom was radiculitis due to L₃ root entrapment in the lateral recess.

From Perman in 1926³ until today, numerous radiological studies have described typical and atypical features on radiographs and CT scans, corresponding to asymptomatic or locally aggressive vertebral hemangiomas.^{4,5} Nowadays, MRI is the gold standard for investigation⁶ and vertebral angiogram is recommended when vascularity of the lesion needs to be assessed.⁷ In this case, no angiogram was performed since the injection of PMMA through the pedicle had been done, and thus no increased hemorrhage was anticipated.

Figure 7 Postoperative sagittal CT reconstruction image showing reconstruction of the L₃ vertebral body and sufficient sagittal alignment.

Hemangiomas of the spine must be distinguished from metastatic tumors, giant cell tumors of spine, and aneurysmal bone cysts. The radiological, MRI and CT scan images in our case were indicative of hemangioma and confirmed by frozen section.

The treatment of vertebral hemangiomas depends on the severity of symptoms (pain, neurological deficits, and hemorrhagic tendency) and the general clinical condition of the patient. Radiotherapy has been used for a long time,⁸ although the dose–response relationship is unclear.^{9,10} Radiotherapy has been noted to be beneficial after surgical treatment,¹¹ but repeated irradiation for recurrence may induce malignancy.¹² Transarterial selective embolization as a standalone and/or as an adjunctive (preoperative) option seems to reduce hemorrhage and to prevent recurrence.^{13–17} Percutaneous injection of ethanol under CT guidance directly into the lesion^{18,19} was initially considered a safe approach; however, neurological and cardiovascular complications have been reported.^{20,21}

Acrylic cement vertebroplasty is proved to provide hemostasis and sufficient stabilization either percutaneously before surgery or intraoperatively.^{22–25} Cement vertebroplasty combined with ethanol injection has also been used.²⁶ In this case, the unilateral balloon kyphoplasty released a sufficient amount of PMAA to

fill the vertebral body cavity. In addition, the use of the pedicle screw stabilized the vertebral body of L₃ weakened by the tumor. Destabilization of the segment following laminectomy allowed for early mobilization of the patient without external support.

Surgical intervention is indicated for vertebral hemangiomas with neurological impairment initially treated with any of the minimally invasive modalities mentioned above.²⁷ Laminectomy for lumbar spine decompression and vertebrectomy in the thoracic spine with instrumentation is proposed.

Literature search yielded articles describing a total of 38 patients with symptomatic vertebral hemangiomas located either in the cervical or thoracic and lumbar spine.^{1,2,13,22–24,26,28–32} It is noteworthy that there was no single approach to the treatment of symptomatic hemangiomas. Furthermore, among the 38 patients with symptomatic hemangiomas, only in eight patients (Table 1) (aside from this case) was neurological impairment reported (five cases spinal cord compression, two spinal nerve root compression, and one cauda equine syndrome). All eight patients were operatively treated: two patients were treated with posterior instrumentation plus vertebroplasty (lumbar spine), four patients were treated with posterior decompression and vertebroplasty (thoracolumbar junction), one patient with anterolateral

Table 1 Literature review of symptomatic hemangiomas operatively treated

Source	Location of hemangioma	Symptoms	Treatment	Number of patients
Vinay <i>et al.</i> ²	L1	Pathological fracture, epidural hemorrhage, spinal cord compression	Posterior instrumentation, cement vertebroplasty	1
Ahn <i>et al.</i> ²⁸	L4	Severe neurogenic claudication, early cauda equina syndrome	Posterior decompression, bilateral transpedicular vertebroplasty, postoperative radiation	1
Cotten <i>et al.</i> ²⁴	T4, 2 in T8, L5	Spinal cord compression in 3 cases. Intermittent spinal claudication in 1 case	Arterial embolization, percutaneous injections of methyl methacrylate and of N-butylcyanoacrylate, decompressive laminectomy and epidural hemangioma excision	4
Feuerman <i>et al.</i> ³⁰	Thoracic	Myelopathy	Resection by anterolateral transthoracic approach without preoperative embolization	1
Inoue <i>et al.</i> ³¹	L2	Low back pain and a slight sensory disturbance in the right thigh. Spinal cord compression	Embolisation using coils. Total spondylectomy with anterior reconstruction with a glass ceramic spacer and posterior instrumentation	1
Our case	L3	Neurogenic claudication	Right hemilaminectomy, balloon Kyphoplasty with PMMA and pedicle screw segmental stabilization	1

decompression (thoracic spine) and the remaining patient with 360° anterior decompression and posterior stabilization (thoracic spine).

In this case, detection of the pathology (hemangioma) was delayed because of the similarity of the symptoms to degenerative lumbar spinal stenosis. However, the diagnosis of expanding hemangioma was made before permanent neurological impairment could occur.

Because of the significant destruction and expansion of the posterior vertebral body wall associated with lateral stenosis, wide decompression was indicated to avoid further neurological deterioration. Posterior wide laminectomy plus facetectomy on the left, in combination with the weakened vertebral body structure, induced instability and required additional posterior instrumentation and fusion additionally to vertebroplasty.

Surgeons should be aware of possible cement leakage through the posterior vertebral wall and potential neurological complications. In a case previously reported,²⁹ the authors had to perform wide decompression because of posterior cement leakage during augmentation of a lumbar vertebra for symptomatic hemangioma. No leakage occurred in this patient, which supports the general belief that balloon kyphoplasty is safer than vertebroplasty in terms of risk for cement leakage. The combination of segmental pedicle screw fixation and vertebral body augmentation, the so-called ‘hybrid fixation’ has been successfully used in unstable A3 vertebral fractures.³³

Conclusions

In the elderly, physicians should be aware of rare causes of acquired spinal stenosis due to posterolateral expansion of the weakened wall of a vertebral body. Early

detection of such pathology by MRI and CT scan, and the combination of posterior decompression, vertebral augmentation, and posterior segmental pedicle screw fixation, in patients with neurological symptoms and instability, minimizes further neurological deterioration and allows early and safe mobilization.

The use of transpedicular augmentation of the vertebral body reduces co-morbidity-related complications in the elderly. We recommend this technique in similar cases with unstable pathologic fractures of the spine.

References

- Bandiera S, Gasbarrini A, De Iure F, Cappuccio M, Picci P, Boriani S. Symptomatic vertebral hemangioma: the treatment of 23 cases and a review of the literature. *Chir Organi Mov* 2012; 87(1):1–15.
- Vinay S, Khan SK, Braybrooke JR. Lumbar vertebral haemangioma causing pathological fracture, epidural haemorrhage, and cord compression: a case report and review of literature. *J Spinal Cord Med* 2011;34(3):335–9.
- Perman E. On haemangiomata in the spinal column. *Acta Chir Scand* 1926;61:91–105.
- Laredo JD, Reizine D, Bard M, Merland JJ. Vertebral hemangiomas: radiologic evaluation. *Radiology* 1986;161(1):183–9.
- Cross JJ, Antoun NM, Laing RJ, Xuereb J. Imaging of compressive vertebral haemangiomas. *Eur Radiol* 2000;10(6):997–1002.
- Friedman DP. Symptomatic vertebral hemangiomas: MR findings. *AJR Am J Roentgenol* 1996;167(2):359–64.
- Puvaneswary M, Cuganesan R, Barbarawi M, Spittaler P. Vertebral haemangioma causing cord compression: MRI findings. *Australas Radiol* 2003;47(2):190–3.
- Nattrass FJ, Ramage D. Haemangioma of vertebra: a cause of compression of the cord. *J Neurol Psychopathol* 1932;12(47): 231–7.
- Rades D, Bajrovic A, Alberti W, Rudat V. Is there a dose-effect relationship for the treatment of symptomatic vertebral hemangioma? *Int J Radiat Oncol Biol Phys* 2003;55(1):178–81.
- Miszczuk L, Ficek K, Trela K, Spindel J. The efficacy of radiotherapy for vertebral hemangiomas. *Neoplasma* 2001;48(1):82–4.
- Bremnes RM, Hauge HN, Sagsveen R. Radiotherapy in the treatment of symptomatic vertebral hemangiomas: technical case report. *Neurosurgery* 1996;39(5):1054–8.
- Obana Y, Tanji K, Furuta I, Yamazumi T, Hashimoto S, Kikuchi H, *et al.* A case of malignant transformation in thoracic vertebral

- hemangioma following repetitive irradiation and extraction. *Pathol Int* 1996;46(1):71–8.
- 13 Hekster RE, Endtz LJ. Spinal-cord compression caused by vertebral haemangioma relieved by percutaneous catheter embolisation: 15 years later. *Neuroradiology* 1987;29(1):101.
- 14 Hurley MC, Gross BA, Surdell D, Shaibani A, Muro K, Mitchell CM, *et al.* Preoperative Onyx embolization of aggressive vertebral hemangiomas. *AJNR Am J Neuroradiol* 2008;29(6):1095–7.
- 15 Raco A, Ciappetta P, Artico M, Salvati M, Guidetti G, Guglielmi G. Vertebral hemangiomas with cord compression: the role of embolization in five cases. *Surg Neurol* 1990;34(3):164–8.
- 16 Smith TP, Koci T, Mehringer CM, Tsai FY, Fraser KW, Dowd CF, *et al.* Transarterial embolization of vertebral hemangioma. *J Vasc Interv Radiol* 1993;4(5):681–5.
- 17 Jayakumar PN, Vasudev MK, Srikanth SG. Symptomatic vertebral haemangioma: endovascular treatment of 12 patients. *Spinal cord* 1997;35(9):624–8.
- 18 Doppman JL, Oldfield EH, Heiss JD. Symptomatic vertebral hemangiomas: treatment by means of direct intralesional injection of ethanol. *Radiology* 2000;214(2):341–8.
- 19 Goyal M, Mishra NK, Sharma A, Gaikwad SB, Mohanty BK, Sharma S. Alcohol ablation of symptomatic vertebral hemangiomas. *AJNR Am J Neuroradiol* 1999;20(6):1091–6.
- 20 Sharma D, Jain V, Rath GP. Asystole during percutaneous ethanol injection of symptomatic vertebral haemangioma. *Anaesth Intensive Care* 2006;34(5):656–8.
- 21 Niemeyer T, McClellan J, Webb J, Jaspan T, Ramli N. Brown-Sequard syndrome after management of vertebral hemangioma with intralesional alcohol. A case report. *Spine* 1999;24(17):1845–7.
- 22 Nicola N, Lins E. Vertebral hemangioma late results of retrograde embolization-stabilization with methyl methacrylate in two cases. *Surg Neurol* 1993;40(6):491–4.
- 23 Guarnieri G, Ambrosanio G, Vassallo P, Pezzullo MG, Galasso R, Lavanga A, *et al.* Vertebroplasty as treatment of aggressive and symptomatic vertebral hemangiomas: up to 4 years of follow-up. *Neuroradiology* 2009;51(7):471–6.
- 24 Cotten A, Deramond H, Cortet B, Lejeune JP, Leclerc X, Chastanet P, *et al.* Preoperative percutaneous injection of methyl methacrylate and N-butyl cyanoacrylate in vertebral hemangiomas. *AJNR Am J Neuroradiol* 1996;17(1):137–42.
- 25 Ide C, Gangi A, Rimmelin A, Beaujeux R, Maitrot D, Buchheit F, *et al.* Vertebral haemangiomas with spinal cord compression: the place of preoperative percutaneous vertebroplasty with methyl methacrylate. *Neuroradiology* 1996;38(6):585–9.
- 26 Chen L, Zhang C, Tang T. Cement vertebroplasty combined with ethanol injection in the treatment of vertebral hemangioma. *Chin Med J (Engl)* 2007;120(13):1136–9.
- 27 Acosta FL, Dowd CF, Chin C, Tihan T, Ames CP, Weinstein PR. Current treatment strategies and outcomes in the management of symptomatic vertebral hemangiomas. *Neurosurgery* 2006;58(2):287–95.
- 28 Ahn H, Jhaveri S, Yee A, Finkelstein J. Lumbar vertebral hemangioma causing cauda equina syndrome: a case report. *Spine* 2005;30(21):662–4.
- 29 Evangelopoulos DS, Kontovazenitis P, Kokkinis K, Glynos M, Korres DS, Sapkas G. Cement leakage in a symptomatic vertebral hemangioma: a case report and review of the literature. *Cases J* 2009;2(5):7148.
- 30 Feuerman T, Dwan PS, Young RF. Vertebrectomy for treatment of vertebral hemangioma without preoperative embolization. Case report. *J Neurosurg* 1986;65(3):404–6.
- 31 Inoue T, Miyamoto K, Kodama H, Hosoe H, Shimizu K. Total spondylectomy of a symptomatic hemangioma of the lumbar spine. *J Clin Neurosci* 2007;14(8):806–9.
- 32 Is M, Gezen F, Alper M, Yildiz HK, Akyuz F. Epidural extension of a lumbar vertebral haemangioma. *J Clin Neurosci* 2006;13(6):687–90.
- 33 Korovessis P, Repantis T, Petsinis G, Iliopoulos P, Hadjipavlou A. Direct reduction of thoracolumbar burst fractures by means of balloon kyphoplasty with calcium phosphate and stabilization with pedicle-screw instrumentation and fusion. *Spine* 2008;33(21):100–8.