CASE REPORT

Misdiagnosis of posterior sequestered lumbar disc herniation: report of three cases and review of the literature

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Abstract

Introduction Posterior migration of sequestered disc is an extremely rare event that mimics more common spinal lesions as spinal tumors, making difficult its preoperative diagnosis and appropriate management. We retrospectively reviewed all lumbar disc herniations treated by surgery at our institution from 2006 to 2016 to identify cases with posterior sequestered disc fragments and possible misdiagnosis for other spinal lesions. Complementarily, a literature review of misdiagnosed cases of posterior migrated discs was undertaken.

Case report Three posterior sequestered lumbar disc cases (one intradural), were found among the 1153 reviewed surgeries. Two of them, presenting with progressive neurological deficit, were respectively misdiagnosed as pseudotumoral lesion and meningioma/neurogenic tumor on MRI. After intraoperative diagnosis and emergent resection, histology confirmed intervertebral disc tissue. The remaining case had an accurate preoperative diagnosis and after an initial conservative management finally underwent surgery because of refractory pain. Full recovery was achieved months after surgical treatment in all cases.

Discussion Non-tumoral lesions are the most frequent misdiagnosis of posterior sequestered lumbar disc described in the literature. Early surgical treatment is the standard management due to high incidence of cauda equine syndrome (CES); however, spontaneous regression of posterior sequestered lumbar disc herniations has been recently reported. In conclusion low incidence and similar clinical and radiological features with other more common posterior spinal lesions like hematomas, synovial cyst or abscess turns posterior sequestered disc herniations a diagnosis challenge. Despite high incidence of CES, an initial conservative management should be evaluated in selected patients without neurological deficit and well-controlled pain.

Introduction

Sequestered disc is defined as a displacement of disc material that breaks through the annulus fibrosus and the posterior longitudinal ligament and lose continuity with

the disc of origin. Free fragments can migrate anywhere within the epidural space or even be located inside the dura mater. However anatomical barriers limit their migration, especially to the posterior epidural and/or intradural spaces where isolated disc fragments are exceptionally found. In the other hand, a wide variety of space-occupying spinal lesions located in the posterior epidural space share similar clinical course and radiological appearance to the unusual posteriorly sequestered discs making their diagnosis difficult and their management uncertain.

In this report, we present three cases of unusual posteriorly sequestered lumbar disc herniations and in addition we review the literature on misdiagnosed sequestered lumbar disc fragments.

A retrospective analysis was performed on patients undergoing surgery for lumbar disc herniations between

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2006 and 2016 at our department. Cases with atypical sequestered disc fragment migration on preoperative MRI were individually analyzed. Variables regarding age, sex, symptoms, neurological and radiological findings, disc level, initial and final diagnosis, treatment technique and outcome were reviewed and compared to previous literature on this entity.

Case presentation

A total of 1153 patients underwent lumbar disc herniation surgery. Three of them (0.26%) showed atypical sequestered lumbar disc herniation at preoperative magnetic resonance imaging (MRI).

Case 1

A 45-year-old man with a four-week history of increasing low back pain following a heavy exercise with progressive bilateral leg weakness, more intense on his left side. At hospital admission he could not walk and complained of urinary incontinence. Physical examination revealed bilateral radiculopathy with positive straight-leg raising test sign, 3/5 strength on plantar flexion of both feet and hypoesthesia below both knees. Ankle jerks were hypoactive.

MRI demonstrated a left extradural posterolateral lesion, isointense on T1 and hyperintense on T2-weighted images, severely compressing the thecal sac at the L4–L5 level. After gadolinium injection, a rim enhancement appeared and suggested a pseudotumoral lesion.

An emergent L4–L5 bilateral laminectomy was performed. After removal of the ligamentum flavum a posterior epidural mass with fibroelastic consistency was identified. The lesion was removed and radicular decompression was achieved.

Histopathology was consistent with a degenerated intervertebral disc. The patient was completely relieved of his back pain and gradually recovered full strength.

Case 2

A 33 year-old male with a prior personal history of intermittent lumbagos caused by a L5–S1 listhesis, developed progressive back pain with radiating pain over his left leg for the last 5 months. He did not complain of leg weakness, bladder or bowel dysfunction.

On examination, he had a positive straight-leg raising test and no significant decline in muscle strength. Sensory exam and deep tendon reflexes were also preserved.

MRI revealed a hypointense T1 and hyperintense T2-weighted images lesion at the left posterior epidural L4–L5 space suggestive of disc fragment. Furthermore, a spondylolytic spondilolisthesis at the same level was disclosed.

After a period of conservative treatment, patient finally underwent surgery. An L4–L5 microdiscectomy and transforaminal interbody fusion (TLIF) with L4–S1 pedicle screw fixation was performed. Below the ligamentum flavum, a sequestered posteriorly migrated disc fragment was observed and removed. Patient's back and leg pain improved progressively in the postoperative period.

Fig. 1 Case 1. Preoperative axial (a) T1-weighted MR image demonstrating an isointense left posterolateral epidural lesion showing rim enhancement (b) after gadolinium contrast. Sagittal (c) and coronal (d) T2-weighted images revealing completely occupation of spine canal at L4–L5 level by the hyperintense lesion

Fig. 2 Case 2. Axial T1-weighted (a) and T2-weighted (b) MR image showing a left posterolateral epidural disc fragment. Sagittal T2-weighted image (c) showing sequestered disk fragment and a listhesis at L4-L5 level

Case 3

A 64 year-old male was admitted to the hospital with severe lumbar pain of acute onset, left sciatica, and progressive knee weakness for 3 months.

The physical examination revealed decreased sensation to light touch in the distal left lower extremity involving L5 dermatome. Strength in his lower extremities was preserved and deep tendon reflexes were decreased.

Electromyography evidenced acute denervation with chronic changes in left L5 root territory. MRI showed a large intradural lesion from midline to dorsal left radicular foramen at L3–L4 with no relation to disc space, suggesting a lumbar meningioma or other neurogenic tumor.

During surgery, a thinned dorsal duramater was observed (Figs. 1 and 2). After dural opening, a non-vascularized, strongly attached to duramater lesion was found, and en-bloc resection was achieved. No anterior dural defect was identified. Histological examination revealed herniated disc tissue (Fig. 3e). Patient experienced almost full recovery over the following 6 months, with minimal distal sensitive lost.

Discussion

First cases of intradural and posterior migrated lumbar disc fragments were described by Lombardi in 1973 [1] and by Dandy in 1942 [2] respectively, when myelography was the gold standard for radiologic preoperative diagnosis. Since then, the advances in radiological methods like MRI with constant improvement in imaging techniques, and the

Fig. 3 Case 3. Preoperative axial (a) and sagittal (b) T2-weighted MR images showing a left posterolateral epidural lesion at L3-L4. Post-operative axial (c) and sagittal (d) T2-weighted MR images demonstrate complete resection of the lesion. Photomicrograph of this tissue specimen stained with hematoxylin-eosin at 20× magnification (e) showing cartilaginous tissue surrounded by fibrosis and lymphohistiocytic infiltrate

development in research through cases reported in the literature have tried to facilitate their diagnosis and treatment. However, nowadays it is still not uncommon a preoperative misdiagnosis of this entity.

Epidemiology

One of the most important reasons for unusual sequestered disc herniations misdiagnosis is their extremely rare incidence in clinical practice. Although sequestered disc fragments accounts for 28.6% of all disc herniations [3], migration to the posterior epidural space or into the dural sac is rare, with an incidence rate about 0.27–1.04% [4, 5]. The natural barriers, made up of nerve root, sagittal midline septum, lateral membrane, epidural fat tissue, venous plexus, lateral Hoffman's ligaments, hinder disc fragment migration to the posterior epidural space [6–9], and duramater to the intradural space [10].

Etiopathogenesis

The etiopathogenesis of these atypical herniations is still unclear. Age incidence, in the series of posteriorly sequestered disc, is reported to be older than the overall population with simple disc herniations [5, 11, 12], and regarding their anatomical disc origin, L3–L4 or L4–L5 are the most frequently affected intervertebral spaces [5, 12, 13]. It has been reported some risk factors like insufficiency of ligaments and other structures that attach fragments to the anterior epidural space and larger spinal canals with wide space

Table 1 Summary of reported cases of posterior sequestered lumbar disc fragment misdiagnosis as spinal lesions

Author [ref.]	Age/sex	Level	Symptoms	Preoperative diagnosis	T1WI	T2WI	CE
Sakas et al. [24]	70/M	L4-L5	RP, LBP	Synovial cyst	–	–	–
Saruhashi et al. [30]	44/F	L5-S1	RP	Dumbbell tumor	Iso	Hetero	Rim
Eysel and Herbsthofer [31]	45/M	L3-L4	CES	Tumor, hematoma	Hypo	–	Rim
	37/F	L4-L5	RP	Tumor	–	–	–
	41/M	L3-L4	LBP	Tumor	–	–	–
El Asri et al. [32]	42/M	L5-S1	RP	Abscess, hematoma	–	–	–
	36/M	L5-S1	CES	Tumor	–	–	–
Derineck et al. [18]	60/F	L1-L2	RP	Epidural abscess	Iso	Hyper	Rim
Carvi y Nievas and Hoellerhage [17]	83/M	L3-L4	RP, LBP	Synovial cyst	Hypo	Hypo	No
	45/M	L4-L5	RP, LBP	Neoplasm	Iso/hypo	Hyper	No
	58/F	T12-L1 ^a	RP	Meningioma	Iso/hypo	Hypo	Rim
	67/M	L4-L5	RP, LBP	Synovial cyst, neoplasm	Iso/hypo	Hyper	Diffuse
	60/F	L5-S1	CES	Epidural metastasis	Iso/hypo	Hyper	Diffuse
	59/F	L2-L4	RP	Hematoma	Iso/hypo	Hyper	No
	71/F	L1-L2 ^a	CES	Meningioma	Iso/hypo	Hyper	Diffuse
Ekşi et al. [33]	50/M	L3-L4	LBP	Tumor	Hypo	Hypo	Rim
Teufack et al. [34]	73/M	L4-L5	RP, LBP	Hematoma, abscess	Hyper	Iso	Rim
Demirc and Er [35]	53/M	L2-L3 ^a	LBP	Tumor	Hypo	Hypo	Rim
Akhaddar et al. [5]	60/F	L2-L3	CES	Abscess, neoplasm	Hypo	Hyper	Rim
Gonçalves et al. [36]	51/M	L2-L3	LBP	Hematoma, empyema, NST, meningioma	Hypo	Hyper	–
Rahimizadeh et al. [37]	53/M	L3-L4	CES	Synovial cyst, ligamentum flavum	Iso	Hetero	–
Yoo et al. [38]	32/M	L2-L3	LBP RP	Synovial cyst	–	Hyper	–
Park [39]	43/M	L2-L3 ^a	RP, LBP	Multiple Schwannomas	–	–	Rim
Ajayi [40]	65/F	L4-L5	RP, LBP	NST, meningioma, abscess	Hypo	Hyper	Rim
Li et al. [11]	48/M	L5-S1	LBP	Tumor	Iso	Iso	Rim
Diyora et al. [41]	44/M	L4-L5	CES	Tumor, arachnoiditis	Iso	Hyper	Rim
Zarrabian et al. [27]	48/M	L4-L5	LBP, RP	Epidural abscess	Iso	Hyper	Rim
	77/M	L3-L4	LBP, RP	Epidural hematoma	Iso	Hyper	–
	69/M	L2-L3	LBP, RP	Synovial cyst	Iso	Hyper	–
	61/M	L3-L4	LBP	Epidural hematoma	Iso	Hypo	–
	60/M	L4-L5	RP	Epidural abscess	Iso	Hypo	Rim
Kil et al. [42]	57/M	L2-L3	LBP	Hematoma, neoplasm.	Iso	Hyper	–
Takano et al. [43]	78/M	L3-L4	LBP	Neoplasm, hematoma, abscess	Hypo	Iso	Rim
Present study	45/M	L4-L5	CES	Pseudotumor	Iso	Hyper	Rim
	64/M	L3-L4 ^a	RP, LBP	Meningioma, NST	Iso	Hypo	Rim

LBP low back pain, *RP* radicular pain, *CES* cauda equina syndrome, *NST* nerve sheath tumor, *T1WI* T1 weighted image, *T2WI* T2 weighted image, *CE* contrast enhancement, – not reported, *Hetero* heterogeneous, *Hypo* hypointense, *Hyper* hyperintense, *Iso* isointensive

^aIntradural cases

among nerve roots, thecal sac and intervertebral discs, that may facilitate sequestered fragment shifts to the posterior epidural space [6, 14]. However, dense adhesions of ventral dura mater to posterior longitudinal ligament congenitally formed or caused by some local inflammatory processes

turn difficult lateral migration of disc fragments, facilitating penetration into ventral dura mater, usually thinner than dorsal one. Other predisposing anatomic factors to intradural migration as congenital narrowing of the spinal canal, fineness of the dura mater and previous surgeries have been

described in the literature as well [15, 16]. It should be noted that in our intradural case the fragment was attached to a thin dorsal dura and no ventral tear was found. We speculated that the fragment first migrated to the posterior epidural space and then tore the dorsal surface of the dura to penetrate inside it. No previous surgery/spinal trauma or narrow spinal canal appeared in this case. Patients with posterolateral intradural sequestered discs without predisposing conditions had been reported before [17].

Clinical presentation

There are no specific clinical features that could distinguish patients with atypical disc herniations from those with tumors. Clinical presentation may be similar to anterior epidural lumbar disc herniations whose typical symptoms include low back pain and radiculopathy. However, there is a higher incidence of cauda equine syndrome (CES) in posterior sequestered lumbar disc herniations [5, 18]. Our review shows about 30% of cases suffered CES and 54% of them radicular pain, being the most common symptom (Table 1) probably due to the more frequent posterolateral fragment position.

Diagnostic imaging

MRI is the standard imaging method for evaluating spinal pathologies. Migrated disc fragments usually appear hyperintense in 80% of cases on T2-weighted images, and hypointense on T1-weighted images, as compared with the disc origin [6, 19, 20]. Rim enhancement after gadolinium injection is usually shown around the extruded fragment and is related to the presence of inflammatory response and neovascularization [21–23]. Although these findings are present in most of cases, only in a few of them MRI alone would allow to determine the exact diagnosis, especially when there are associated changes in the disc space and adjacent endplates. Common misdiagnosis of these posteriorly migrated discs derive from their low incidence compared to the other more usual spinal lesions presenting with a similar radiological appearance [18, 24–27]. Hematomas, abscesses and synovial cysts followed by neoplasms like schwannoma and meningioma are the specific lesions most frequently misdiagnosis with posterior sequestered disc herniation (Table 1).

We only obtained one definite radiological diagnosis of posterolateral epidural fragment disc in a case with typical radiological characteristics and previous history of lumbar discopathy.

Treatment

Early surgical treatment has been proposed as the management of choice to prevent further severe neurological

deficits [5, 14, 28]. Several case reports and series support it reporting the most common patient's complete recovery without complications after surgery. However, a more recent study describes a case series of patients with posterior epidural lumbar disk herniation treated successfully with conservative therapy showing spontaneous regression of herniated disk with relief of symptoms [29]. One of our patients was first managed conservatively without new neurological deficit. The other two patients underwent early surgery due to neurological symptoms with severe radicular compression, and showed full recovery on follow-up after surgery, which may imply the superiority of the early surgical treatment in this set of patients.

Conclusions

Low incidence and absence of characteristic clinical and radiological features make diagnosis of posteriorly sequestered lumbar disk migration utterly difficult. Synovial cysts, hematomas and abscesses are the most frequent lesions which should be considered to make a differential diagnosis. Initial conservative treatment may be an option in cases of minimal neurological deficit and appropriate pain control, while the early surgical treatment is the most common recommendation to optimize results.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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