CASE REPORT

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Posterior Migration of Extruded Lumbar Disc Fragments

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HNP (Herniation of the necleus pulposus) generally occurs at ventral portion of lumbar thecal sac due to the anatomical position. We report two unusual cases of herniated dorsal portion of lumbar thecal sac causing diagnostic difficulties. Two patients with posteriorly migrated epidural disc fragments were evaluated with plain X-ray, and magnetic resonance imaging. These patients responded well to operation with complete relief of symptoms. Definite diagnosis of posteriorly located disc fragments is difficult because the radiological images of disc fragments may mimic those of other more common posterior epidural lesions.

KEY WORDS : Posterior migration · Sequestered disc.

Introduction

Herniation of the nucleus pulposus through the annulus fibrosus in the lumbar region is common. The sequestered disc fragment is reported to account for 28.6% of all disc herniation[3]. The directions of fragment migration canbe posterior, superior, inferior, or lateral but posterolateral direction is the most common. Due to anatomical barrier, the posterior migration of disc fragment is exceptionally rare.

The clinical presentation of this disease process has similarity to that of other disc herniation locations, but preoperative diagnosis can be difficult because it may mimic other more common epidural lesions. We report two cases of the patients with posterior epidural migration of the extruded disc fragments.

Case Report

Case 1

A 68-year-old man who had been suffering severe lower back pain and progressive radicular pain in left leg for 3 weeks. Two weeks of conservative treatment failed to relieve his symptoms. On past history, he underwent the subtotal gastrectomy due to stomach cancer 7 yrs ago. On physical examination, the abnormal findings were a diminished left knee jerk and a positive straight leg raising test.

Plain radiologic films of lumbar spine showed degenerative change with no loss of lordosis. Magnetic resonance imaging (MRI) revealed extra-dural mass compressing the thecal sac in the left posterior portion of L4-5 intervertebral disc space and focal high signal intensity of posterior margin of disc with rim enhancement after gadolinium injection (Fig 1).

A left-sided standard L4 hemilaminectomy was performed. After removal of the ligamentum flavum, a 3cm sized mass, embedded in rich vascularized fat tissue, was identified on the left dorsal aspect of thecal sac. Intraoperatively it was suspected as a posteriorly migrated disc fragment. Although it was compressing the left L5 root upward but want not connected with disc material within the intervertebral disc fragment.

The histopathological diagnosis was consistent with a degenerative intervertebral disc. Postoperatively, the leg pain was relieved and the patient was discharged on the tenth postoperative day without neurologic deficit.

Case 2

A 74-year-old women with a history of chronic low back pain and sciatica developed an acute foot drop in right side 3 days prior to admission.

There was no specific history. At admission, neurological examination revealed right sided L4 numbness and weakness of dorsiflexion of ankle motor grade 2/5. She exhibited a positive straight leg raising test at right leg. Rectal tone was normal and bulbocavenous reflex was intact. There was no sign of bo-

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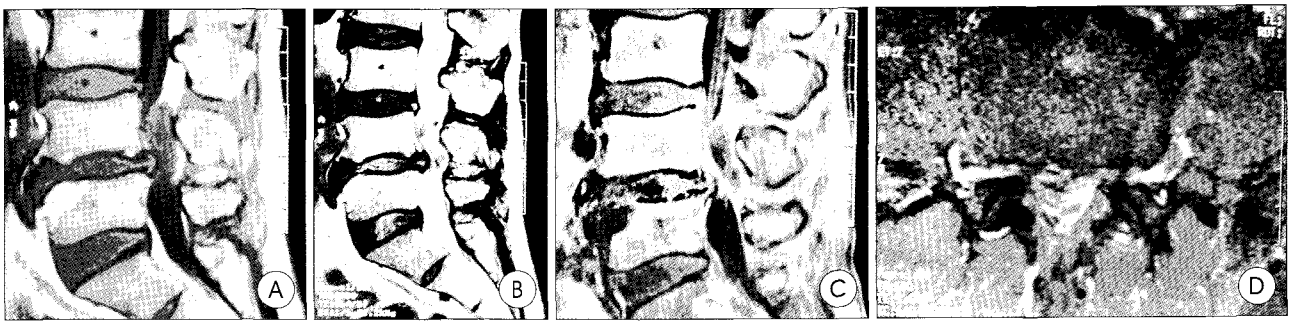

Fig. 1. On L4-5 level, 2.5×1.7×1.0cm sized extra-dural mass is seen. It is compressing the thecal sac in the left posterior portion. On sagittal T1 WI, it is seen as iso signal intensity (A) and on sagittal T2 WI ,it is showing as focal high signal intensity of posterior migration of posterior margin of disc (B) and rim enhancement on postcontrast image on sagittal (C) and axial image (D).

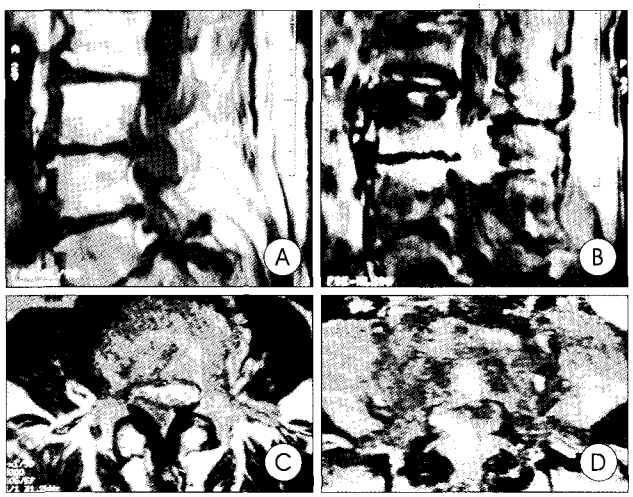

Fig. 2. On L3-4 level, 3.0×1.3×0.8cm sized extra-dural mass is shown compressing. The thecal sac in right posterior portion (C). Magnetic resonance image demonstrates iso signal intensity on sagittal T1 WI (A), bright signal intensity on T2 (C) and rim enhancement on postcontrast image on sagittal (B) and axial image(D).

wel and bladder retention.

The MRI revealed an epidural mass measuring 2.3cm in diameter compressing the thecal sac dorsally in the segment L3-4 intervertebral disc space. The lesion was isosignal intensity on T1-weighted images and showed rim enhancement after administration of gadolinium (Fig. 2).

A right sided L3 partial hemilaminectomy revealed a 2.3cm sized mass that was wrapped in highly vascularized epidural fat. Rupture at the posterior longitudinal ligment (PLL) and anulus was detected. It was removal totally. Histopathological evaluation demonstrated it as disc material.

The patients was discharged on eighth postoperative day with partial improvement of motor strength.

Discussion

Herniaton of the nucleus pulposus through the annulus fibrosus in the lumbar region is a frequent event. Brock, et al. reported, sequestered disc fragments account for 28.6% of all disc herniation[3]. Free fragments generally are known to migrate within the spinal canal superior, inferior, and lateral directions[5,7,13]. The most common path of disc migration is posterolateral direction to the anterior epidural space, which most commonly presents a radiculopathy5,[1,4] but posterior migration is exceptionally rare[1,3,4,10,15]. Lombardi first described this condition in 1973[10]. Since then, there has been only a few reports (Table 1), to our knowledge, there were only three cases reported in korea until 2004[7].

Some anatomical barriers were attributed to the rarity of these lesions. The structure that are thought to prevent posterior migration of disc fragments are the sagittal midline septum, peridural or lateral membrane, the neve root, the dura, epidural vascular structures, and epidural fat. Free disc fragments typically tend to migrate laterally owing to anatomical properties of the anterior epidural space formed by the PLL posteriorly and the vertebral body anteriorly. A sagittal midline septum (septum posticum) separates this space into two compartments and limits sideward migration[2,5]. A lateral membrane (peridural membrane) is another band that is attached to the PLL medially and to the wall of the spinal canal laterally. This anatomical structure limits posterolateral migration[1,5]. Other important ligaments are the midline and lateral dural ligaments of Hoffmann, which connect the anterior dural surface to the PLL and posterior vertebral periosteum[5]. These structural properties of the PLL and ligaments attribute for the lateral or posterolateral path of migration[2,16]. A disc fragment may migrate within the spinal canal in a caudal, cranial, or lateral direction and may extraforaminally and intradurally. If any one of these barriers become weak or disfunctional, the posterior migration of disc fragment may take place[2,5,13].

Kim et al. (2004)[7] has suggested following patholocic process for posterior migration of disc. First, the narrow epidural space, due to the adhesion between the nerve root and PLL, does not allow further ipsilateral epidural expansion of the previously protruded disc, which migrated posteriorly through the anatomical barriers. Second, the previous disc herniation must be combined with a large force or other contributing factors to the force[8,15].

Most patients with posterior extradural migration of sequestered disc fragment present with severe radiculopathy, but may occasionally present with cauda equina syndrome[3-5].

The differential diagnosis should include all epidural disease entities such as synovial cysts, ligamentum cysts, perineural cysts, pigmented villonodular synovitis, cystic neurinomas, tumors, and abscess. (Table 2) On MR image, sequestered disc fragments are usually hypointense on T1 weighted images, and 80% are hyperintense on T2 weighted and most typical finding of MRI appears as ring-like peripheral contrast enhancement, which indicates the wrapping of lesion by richly vascularized epidural fat[2,5,10,13,14]. This could explain the presence

Table 1. Literature review of patients with posterior epidural migration

	Lichtor T[11] (1989)	Bonaroti EA et al.[2] (1998)	Robe P et al.[14] (1999)		Neugroschl C et al.[5](1999)	Neugroschl C et al.[13] (1999)		Dosoglu M. et al.[5](2001)
	Case 1	Case 1	Case 1	Case 2	Case 1	Case 2	Case 3	Case 1
Age/Sex	61/M	51/M	68/M	41/F	57/M	64/M	47/M	47/M
Duration	acute	2 days	acute	7 yrs	15 days	2 weeks	1 day	6 weeks
Pain	LBP	LBP	acute lumbago	acute lumbago	both thigh	bilateral sciatica	bilateral T7-8 dermatome	LBP
Sensory	both L3 radicular pain	below L3 paresthesia	both thigh and calf	both posterior thigh	Lt L3 to L5 paresthesia	decreased Rt ankle	paresthesia of the perineum, both legs	below L3 paresthesia
Motor	intact	bilateral leg weakness 3/5	intact	severe paresis of both PF, DF	left leg weakness	Rt leg weakness	bilateral leg weakness 4/5	bilateral leg weakness 4/5
DTR diminish	both KJ, AK	both KJ	Lt KJ	AJ	(-)	Rt KJ, AJ	(-)	(-)
Sphincter dysfunction	(-)	(+)	(-)	(-)	(-)	(-)	(-)	(+)
Laseque sign	both 45° (+)	(-)	Lt 60°	(-)	(-)	Rt 45°	(-)	(-)
Level	L2-3	L2-4 (Rt)	L3-4 (Rt)	L3-4 (Lt)	L2-3 (Lt)	L2-3 (Lt)	T7-8 (Lt)	L3-4 (Lt)
MRI fingdings								
T1 weighted	not checked	isointense	isointense	isointense	hypointense	isointense	isointense	isointense
T2 weighted		hypointense	hyperintense	hyperintense	hyperintense	hyperintense	hyperintense	hyperintense
Contrast enhancement		enhancement	enhancement	enhancement	enhancement	enhancement	enhancement	enhancement

	Eysel P et al.[6](2001)			Kuzeyli K et al.[10](2003)			Kim GH et al.[8] (2004)	Present case	
	Case 1	Case 2	Case 3	Case 1	Case 2	Case 3	Case 1	Case 1	case 2
Age/Sex	45/M	37/F	41/M	49/M	62/F	47/F	44/M	68/M	74/F
Duration	8 weeks	7 weeks	11 weeks	15 days	25 days	4 month	1 year	3 weeks	3 days
Pain	LBP	LBP	LBP	acute lumbago	Cauda equina	Cauda equina	Rt leg radiating pain	LBP	LBP, sciatica
Sensory	bilateral sciatica	bilateral sciatica	bilateral sciatica	Lt L5 paresthesia	saddle anesthesia	below L3 paresthesia	Rt L5 numbness	Lt L5 paresthesia	Rt L5 numbness
Motor	(-)	(-)	(-)	Lt foot DF 2/5	paraparesis 3/5	paraparesis 3/5	2/5 DF and both PF 4/5	intact	Rt ankle DF 2/5
DTR diminish	PT	(-)	(-)	Lt KJ, AJ	(-)	Lt KJ, bilateral AJ	(-)	Lt KJ	(-)
Sphincter dysfunction	(-)	(-)	(-)	(-)	(+)	(+)	(+)	(-)	(-)
Laseque sign	(-)	(-)	(-)	Lt 40°	(-)	(-)	both (+)	Lt 60°	Rt 60°
Level	L3-4 (Lt)	L4-5	L3-4	L4-5 (Lt)	L4-5 (Rt)	L1-2 (Lt)	L4-5 (Lt)	L4-5 (Lt)	L3-4 (Rt)
MRI fingdings									
T1 weighted		not checked	not checked	isointense	isointense	isointense	not checked	isointense	isointense
T2 weighted				hyperintense	hyperintense	hyperintense		hyperintense	hyperintense
Contrast enhancement	enhancement			enhancement	enhancement	enhancement		enhancement	enhancement

* M : male, * F : female, * DTR : deep tendon reflex, * Rt : right, * Lt : left, * KJ : knee jerk reflex, * AJ : ankle jerk reflex, * PT : patella tendon reflex, * PF : plantar flexor, * DF : dorsiflexor, * LBP : low back pain

Table 2. Differential diagnosis of posterior epidural lesions[3,6,12,15]

Type	Disease
Metabolic disorder	Gout
Infection	Epidural abscess
	Cysticercosis
	Echinococcosis
Tumor	Chordoma
	Lipoma
	Lymphoma
	Cystic neurinoma
	Elastofibroma
	Metastasis
Degenerative disease	Sacral cysts
	Ligamentum cysts
	Synovial cysts of the facet joint
	Osteophyte of the facet
	Pigmanted villonodular synovitis
	Unilateral flaval ligament hypertrophy
	Migrated disc fragment
Trauma	Hematoma
Iatrogenic disorder	Postoperative fibrosis

of an inflammatory response with granulation tissue and neovascularization around the extruded disc[2,10,14]. Both of our cases showed this ring-like peripheral contrast enhancement.

The common arthrosynovial cysts typically communicate with the synovia of a degenerative adjacent articulation, which usually demonstrate ring-like enhancement[4,14], and sometimes associated with calcification.

Extradural mass may show variable signal intensities as in schwannoma and meningioma. Kim, et al.[9] suggested that some typical clinical characteristcs, such as no progression with acute neurologic deficit, severe pain and short symptom duration, could imply the sequestered disc rather than an extradural tumor. Also, round mass located in posterior to the dural sac would be a differential point of a sequestered disc from an extradural tumor.

Epidural abscess is typically well-defined mass with isointense T1 weighted imaging and hyperintense on T2 weighted imaging with diffuse homogenous or peripheral contrast enhancement[2,5,13]. This lesion usually show associated changes in the disc space, adjacent endplates and clinical findings consistent with infection.

Conclusion

Posterior migration of disc fragment is rarely seen due to the anatomical barriers and preoperative diagnosis other more common posteriorly located lesion. However, careful consideration based on detailed clinical manitestations and radiological findings should provide relevant information for the preoperative diagnosis and therapeutic plan.

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