

1 1994 4 97 6 ,

2 1998 5 18 1998 12 21 , MRI ,

1076 ( 12-1 )

1-2 , 2-3 )

41

MRI 1.5-T (Signa, General Electric Medical Systems, Milwaukee)

fast spin echo(FSE) T1 (550-650/14-16 mseconds [TR range/TE range]) FSE T2 (3500-4000/19, 76-100)

18-24 cm, matrix number 256 × 192, signal acquisition 3 , 4mm,

12-1 , 1-2

2-3 MRI (8).

MRI

가

(straight leg raising test) (femoral nerve stretching test)

conus medullaris sign

SAS soft ware t-test

1076 (

12-1 , 1-2 , 2-3 )

41 3.8%

20-72 44 , 26 15

20 5 , 30 12 , 40 8 , 50 11 , 60

5 30-50 가 31 (Table 1).

2-3 21 (51%) 가 , 1-2 14 (34%), 12-1 4 (10%) 1-2 2-3 가 2 (5%) (Table 2).

41 11 (Fig. 1)

1.0%(11/1076) , 41 27% 32 (P<0.05),

Table 1. Age and Sex Distribution of Lumbar Disc Herniation at High Level

Age	Sex		Total(%)
	Male	Female	
20-29	3	2	5 (12%)
30-39	11	1	12 (29%)
40-49	3	5	8 (20%)
50-59	6	5	11 (27%)
60-	3	2	5 (12%)
Total	26	15	41(100%)

Table 2. Associated Spinal Lesions in 41 cases of Lumbar Disc Herniation at High Level

Lesion	No(%)
Lower Lumbar disc	14 (34)
Apophyseal ring Fx.	8 (19)
Schmorl's node	6 (14)
Spondylolisthesis	6 (14)
Spondylolysis	3 (7)
Retrolisthesis	2 (5)
No Associated Lesion	11 (27)

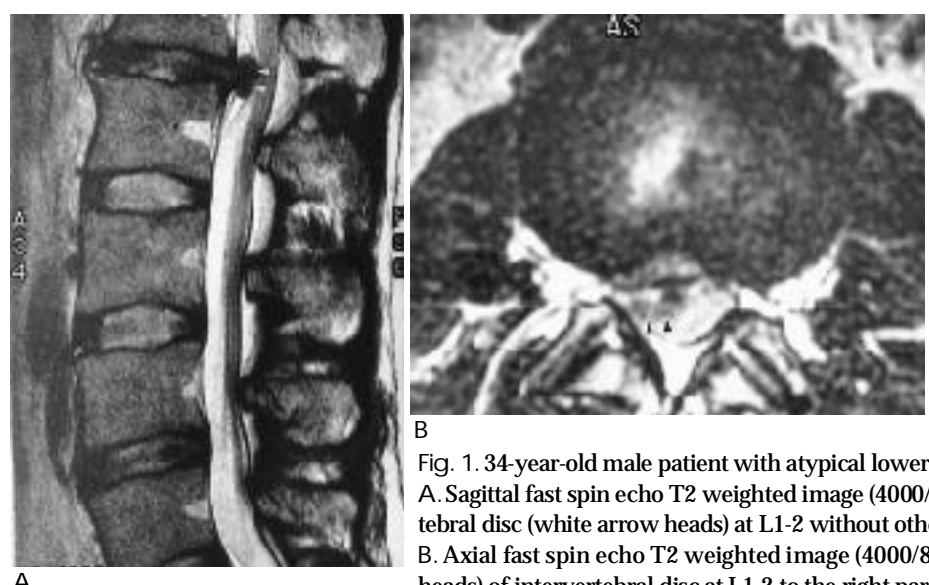
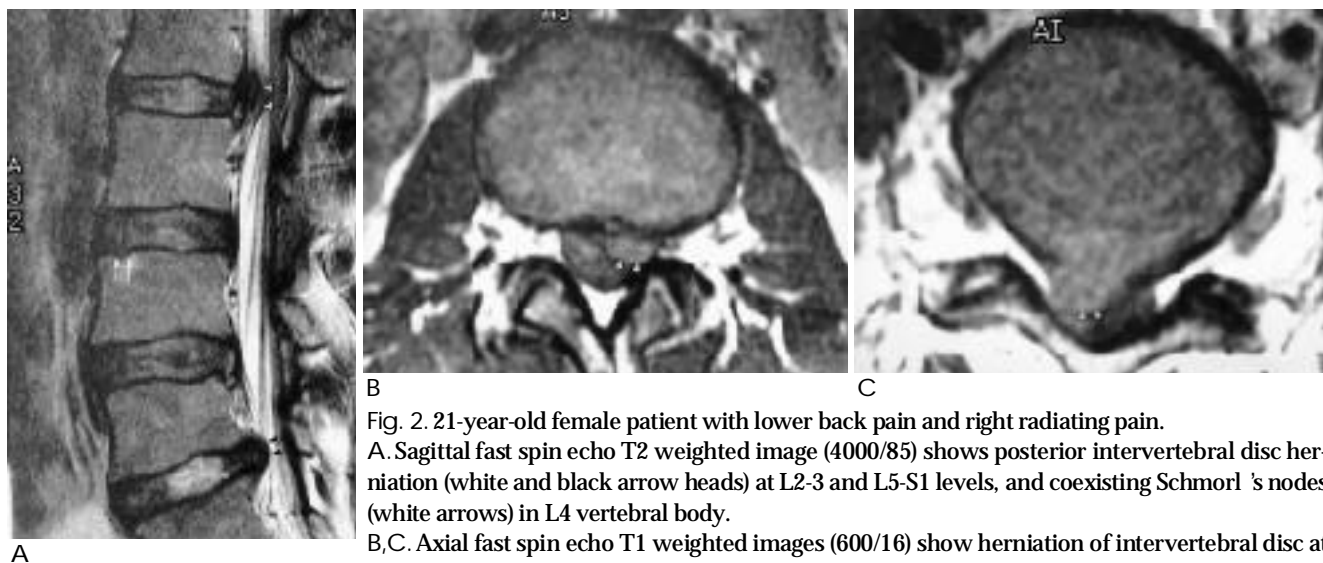
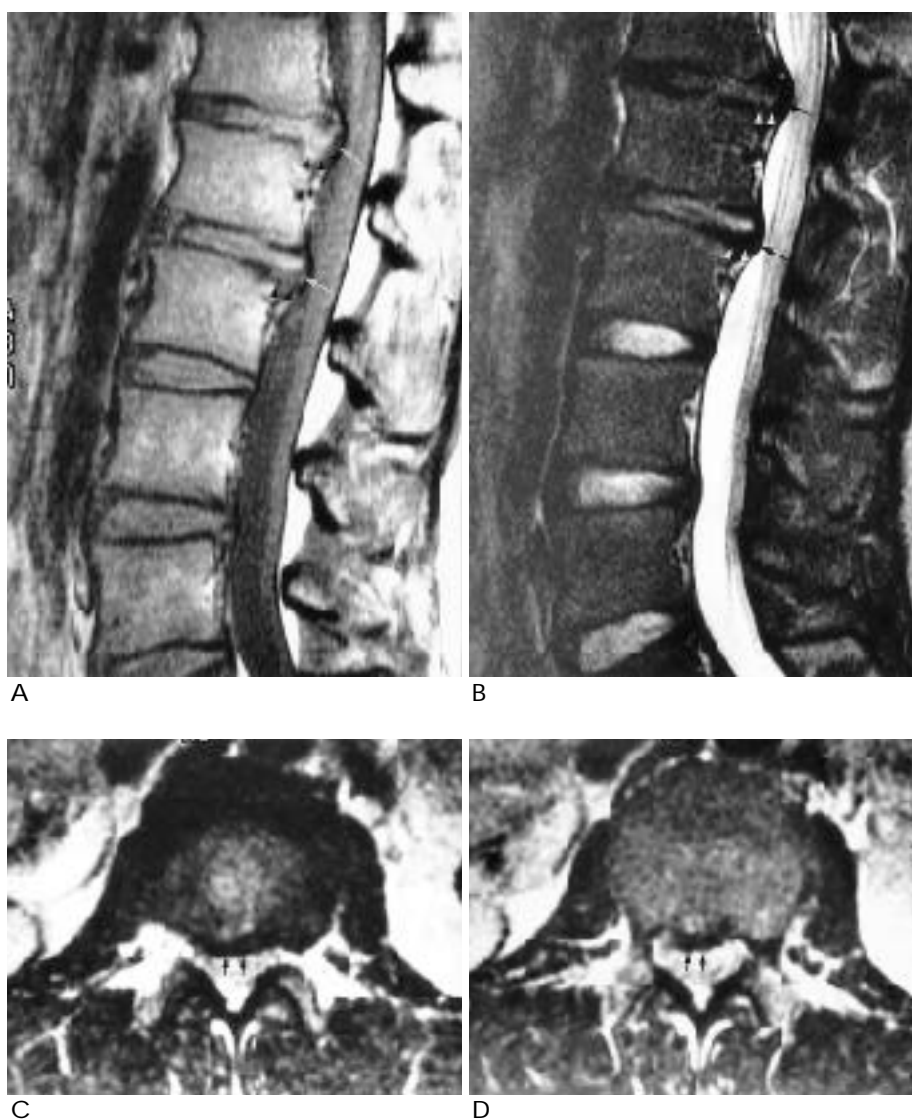


Fig. 1. 34-year-old male patient with atypical lower back pain.  
A. Sagittal fast spin echo T2 weighted image (4000/85) shows posterior protruded intervertebral disc (white arrow heads) at L1-2 without other spinal lesion.  
B. Axial fast spin echo T2 weighted image (4000/85) shows focal herniation (black arrow heads) of intervertebral disc at L1-2 to the right paramedian side.



**Fig. 2.** 21-year-old female patient with lower back pain and right radiating pain.  
**A.** Sagittal fast spin echo T2 weighted image (4000/85) shows posterior intervertebral disc herniation (white and black arrow heads) at L2-3 and L5-S1 levels, and coexisting Schmorl's nodes (white arrows) in L4 vertebral body.  
**B,C.** Axial fast spin echo T1 weighted images (600/16) show herniation of intervertebral disc at L2-3 (B), focal central to left (white arrow heads) side and herniation of intervertebral disc at L5-S1 (C) to the right paramedial side (white arrow heads). Those were confirmed by operation.



**Fig. 3.** 27-year-old female with atypical lower back pain.  
**A,B.** Sagittal fast spin echo T1 weighted (600/16) (A) and T2 weighted images (4000/85) (B) show posterior intervertebral disc herniation (white and black arrows) at both L1-2 and L2-3, and coexisting apophyseal ring fracture (white and black arrow heads) in postero-superior margin of the both L2 and L3 vertebral end-plates.  
**C,D.** Axial fast spin echo T2 weighted images (4000/85) show herniation of intervertebral disc at L1-2 (C), to the right paramedial side and herniation of intervertebral disc at L2-3 (D), to the central posterior side. There is posterior displaced bony segment (black arrows) of low signal intensity

2-3 9 (82%) 가 , 1-2 5 -1 97% (9).  
 12-1 1 (9%) . 12-1 1-2 , 2-3  
 (Fig. 2) 14 가 1%  
 (34%) 가 , 8 (19%, Fig. 3) (1,2), Love (10) 88  
 , Schmorl 's node(Fig. 1) (Fig. 4)가 6 1-2 2 2-3 1 ,  
 (14%) , 3 (7%), 가 2 Decker Shapiro(11) 279 2-3  
 (5%) (Table 2). 2 , Spangfort (9) 2,504 2.1%  
 (n=41) , Kortelainen (5) 403  
 가 20 (49%) ,  
 11 6 (55%) 0.7% . Hsu (7) 379 MRI  
 가 50 25 42 (11.1%) 12 3  
 14 (56%) . 6  
 (n=41) (1.6%) . 3 MRI  
 28 (68%) ,  
 2983  
 11 1076 ( 12 - 1  
 가 2 (18%) (P<0.05). ) 가 41 3.8% ,  
 11 (1.0%)(Fig. 1) .  
 2 (18%) Hsu (7)  
 , conus medullaris sign Hsu (7)  
 36 (88%) Hsu (7)  
 24 (67%)  
 , 5 (12%)  
 4 (80%) 51.5 ,  
 40.7 ,  
 (7,9),  
 44 ,  
 4-5

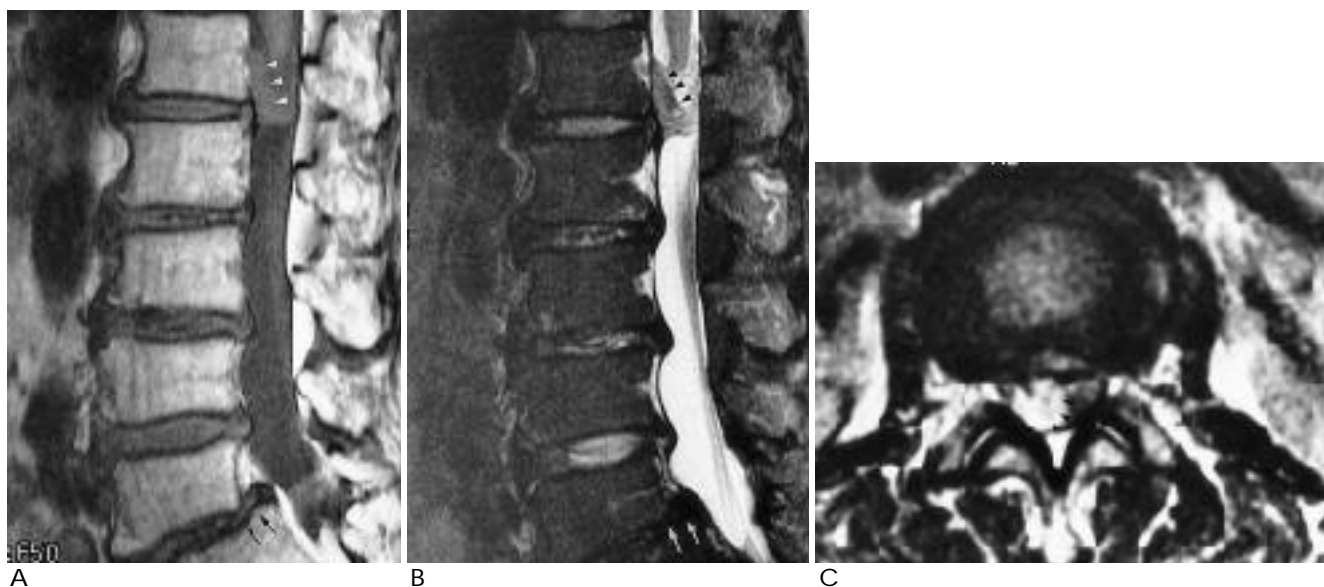


Fig. 4. 53-year-old female with back pain and radiating pain.  
 A, B. Sagittal fast spin echo T1 weighted (600/16)(A) and T2 weighted images (4000/85)(B) show posterior intervertebral disc herniation (white and black arrow heads) at L1-2 level, and coexisting spondylolisthesis (arrows) in L5 on S1 level.  
 C. Axial fast spin echo T2 weighted image (4000/85) shows transligamentous herniation of the intervertebral disc and hematoma(black arrow heads) at L1-2 level, to the right paramedial side, which was confirmed at operation.

32  
 2 (18%)  
 2-3 21 (51%) 가  
 1-2 14 (34%), 12-1 11  
 4 (10%) , 2 (18%)  
 , conus medullaris sign  
 Hsu (7) , MRI  
 (end-plate defect) Scheuermann , limbus  
 가 , 50 Saal (12)  
 67% , 41 36  
 24 (67%) , 5  
 4 (80%)  
 (stress) , 가 5  
 (stress) 41 36  
 MRI  
 (n=41) (Fig. 3), 가 1076  
 2) 14 (34%) 가 (Fig. 4),  
 Schmorl's node(Fig. 2), (Table 2),  
 (biomechanical) 가  
 가  
 50  
 Schmorl's node  
 가 node,  
 (n=41) 20 (49%) , 50  
 25 14 (56%)  
 Hsu (7)  
 가 67%  
 가  
 (2,3,4,6). Fontanesi (4) 1-2-3  
 . Kortelainen (5)  
 2-3  
 94% ,  
 30  
 , Hsu (7)  
 6  
 (n=41) 28 (68%) 11

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## Lumbar Disc Herniation at High Levels : MRI and Clinical Findings<sup>1</sup>

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**Purpose :** To assess the frequency, location, associated MR findings, and clinical symptoms of the high level lumbar disc herniation(HLDH).

**Materials and Methods :** A total of 1076 patients with lumbar disc herniation were retrospectively reviewed. MR images of 41 of these with HLDH(T12-L1, L1-2, L2-3) were analysed in terms of frequency, location, and associated MR findings, and correlated with clinical symptoms of HLDH.

**Results :** The prevalence of HLDH was 3.8%(41/1076). HLDH was located at T12-L1 level in four patients(10%), at L1-2 level in 14(34%), at L2-3 level in 21(51%), and at both L1-2 and L2-3 levels in two. The age of patients ranged from 20 to 72 years (mean, 44), and there were 26 men and 16 women. In 11(27%), whose mean age was 32 years, isolated disc herniation was limited to these high lumbar segments. The remaining 30 patients had HLDH associated with variable involvement of the lower lumbar segments. Associated lesions were as follow : lower level disc herniation(14 patients, 34%); apophyseal ring fracture(8 patients, 19%); Schmorl's node and spondylolisthesis (each 6 patients, each 14%); spondylolysis(3 patients, 7%); and retrolisthesis(2 patients, 5%). In 20 patients(49%) with HLDH(n= 41), there was a previous history of trauma.

**Conclusion :** Patients with HLDH showed a relatively high incidence of associated coexisting abnormalities such as lower lumbar disc herniation, apophyseal ring fracture, Schmorl's node, spondylolysis, and retrolisthesis. In about half of all patients with HLDH there was a previous history of trauma. The mean age of patients with isolated HLDH was lower; clinical symptoms of the condition were relatively nonspecific and their incidence was low.

**Index words :** Spine, intervertebral disks  
Spine, MR

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