



T1

⋮
1

: (MRI) T1
 (ST1WI) T2 (ST2WI)
 : MRI 142 , 159
 . MRI ST1WI
 , ST2WI
 : 159 134
 MRI ST1WI 134 75 (56%)
 , ST2WI 134 63 (47%)
 25 MRI ST1WI 가
 22 (88%) , ST2WI
 (p=0.0001) (p=0.0000)
 : , ST1WI , ST2WI
 가

(MRI) (protrusion) MRI ST2WI 가 가 ,
 (extrusion) 가 가 (3). MRI
 MRI T2 (ST2WI) T1 (ST1WI) MRI
 (1).
 ST2WI
 (2).
 가 가
 MRI 가

1998 12 1999 3
 MRI 142 , 159
 94:48 , 16
 2002 2 15 2002 10 4

73 (83), 32 (48), (11)
 , grade 4가 47 , grade 3가 36 , grade 2가 29 , grade 1 2 , grade 0 1 .
 360 (67) .
 MRI 0.5T (GyrexV - DLX, Elscint, Israel)가 (97) , 1.0T 5 , 1.5T 18 .

T1 (TR/TE=366 - 750/11 - 14) T2 (TR/TE=2900 - 5000/112 - 130) .
 (FOV) 320 mm, / 4 mm/0.4 mm, matrix size 256 x 256 . ST1WI 가 가

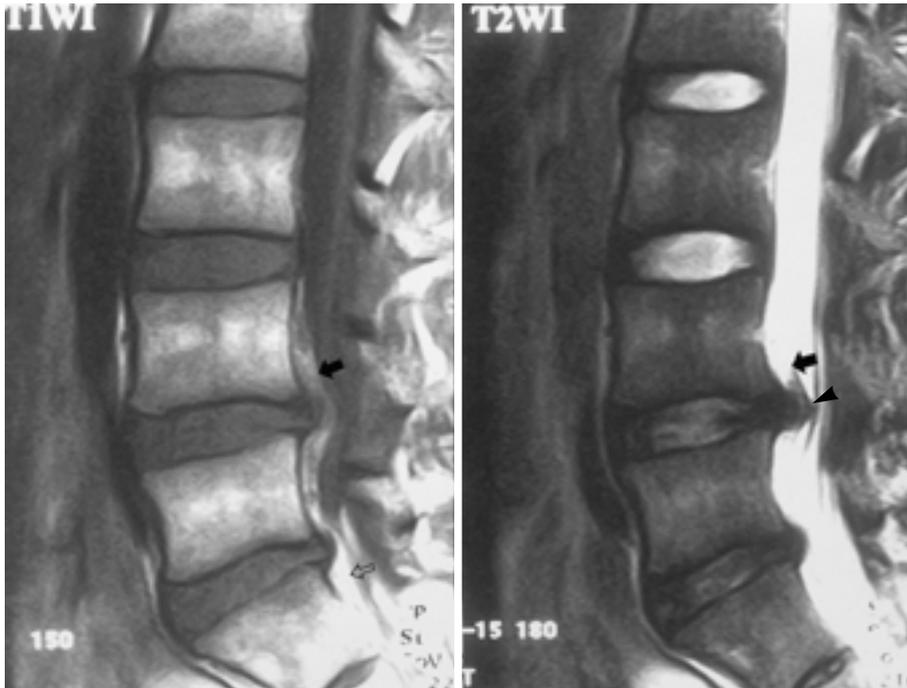
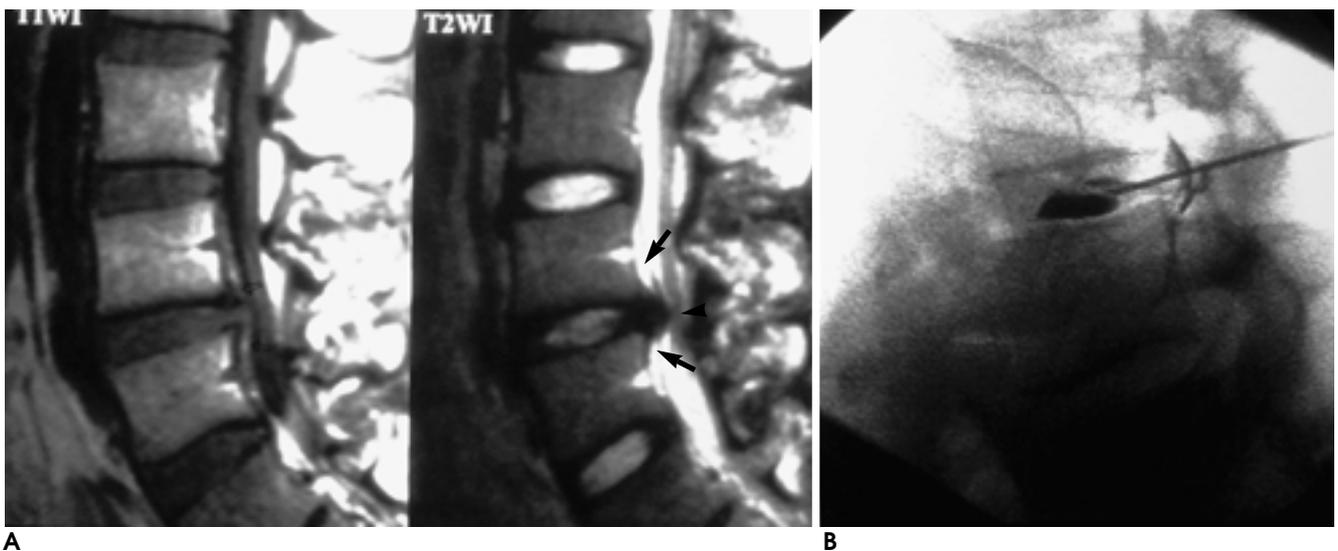


Fig. 1. A 22-year-old male patient with an extruded disc. Sagittal T1-weighted turbo spin-echo image (600/12) (left) shows low signal intensity change (black arrow) at the anterior epidural space around the L4-5 disc, compared with high signal intensity at the anterior epidural space of the S1 level (open arrow). Sagittal T2-weighted turbo spin-echo image (4000/112) (right) reveals an extruded disc at the L4-5 level, with the interruption of solid dark line (arrow head) and high signal intensity at the anterior epidural space (black arrow).



A
Fig. 2. A. A 24-year-old male patient with an extruded disc. T1-weighted turbo spin-echo image (500/15) (left) shows low signal intensity change (open arrows) at the anterior epidural space around the L4-5 disc. Sagittal T2-weighted turbo spin-echo image (3000/103) (right) reveals an extruded disc at the L4-5 level, with the interruption of solid dark line (arrow head) and high signal intensity at the anterior epidural space (black arrows).
B. Discogram at the L4-5 level shows curvilinear marginal staining and central epidural leakage of contrast media.

(Fig. 1).

($p = 0.0001$).

X-ray, 8-10 cm, 45, 18, MRI, 29 (8.2), ST1WI, MRI, ST2WI, MRI

ST2WI, 134 MRI, 63, 47%, 134, 71, 25, ST2WI, 100% (Table 2), MRI ($p = 0.0000$).

chi-square, $p < 0.05$

MRI (1).

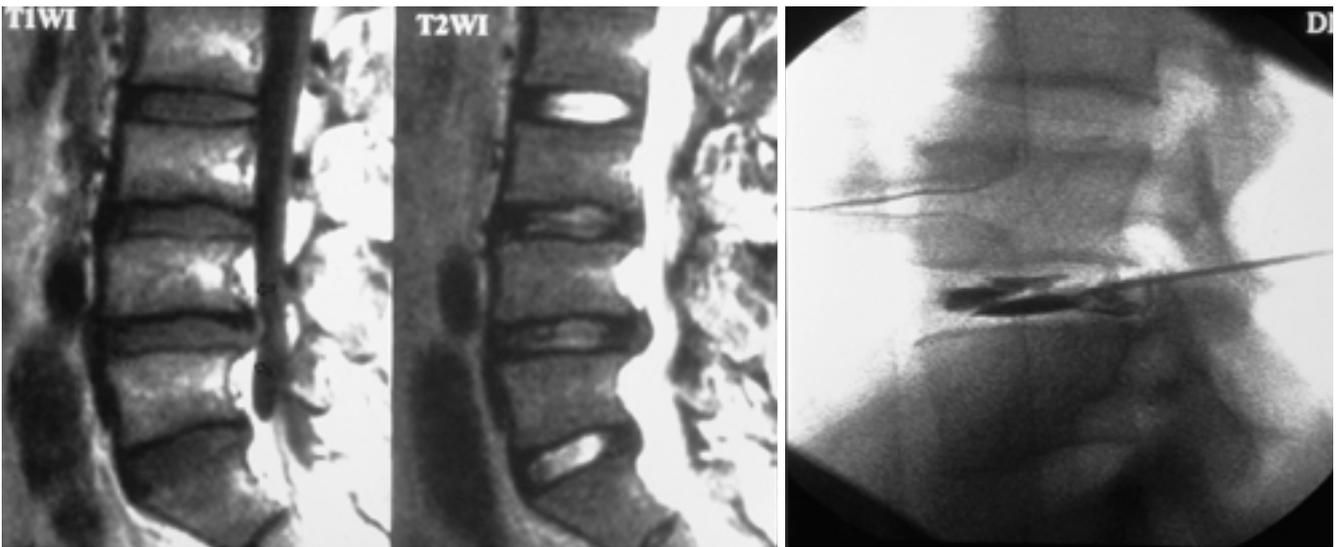
L4-5, 109, L5-S1, L3-4, 14, L2-3, 4, L1-2, 1, 159, 134, 25, MRI, ST1WI, 134, 75, 56% (Fig. 2), 가, 134, 59, ST1WI, 가, 25, 22, 88% (Fig. 3), 25, 3 (12%) (Table 1).

Table 1. Correlation of Sagittal T1WI of MRI and Discogram

		Low Signal Intensity Change		Total
		Present	Absent	
Extrusion on Discography	Present	75	59	134
	Absent	3	22	5
Total		78	81	159

Table 2. Correlation of Sagittal T2WI of MRI and Discogram

		Interruption of Solid Dark Line		Total
		Present	Absent	
Extrusion on Discography	Present	63	71	134
	Absent	0	25	25
Total		63	96	159



A
Fig. 3. A. A 26-year-old male patient with a protruded disc. T1-weighted turbo spin-echo image (366/14) (left) shows well-preserved anterior epidural fat (open arrows) of high signal intensity around the L4-5 disc. Sagittal T2-weighted turbo spin-echo image (2900/112) (right) reveals a protruded disc at the L4-5 level, with well-preserved solid dark line.
B. Discogram at the L4-5 level shows diffuse filling of contrast media without leakage.

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(3). ST2WI 가 , Doita (5)
Takahashi (6) 가

(3, 4). , McCarron (2) 가
가 , (7) (2) Granier (1)
(2)
, Doita (5) MRI

21 14 가 0.5T MRI 가 ST2WI
가

Takahashi (6) ST2WI Granier (1) ST2WI
가

가 ST1WI ST1WI 가
가 ST1WI ST1WI 가
McCarron, Doita, Takahashi (7) 75 ST2WI 가
38 ST2WI 47%

가 ST1WI 56% 가
, MRI ST1WI

. Simons (8, 9) 가

MRI Linson Crowe (10) 94% 가
53% (11-13).

가 20% T1 T2
50% 가 T1
, T2
. Hanley (14) 가

, MRI , ST2WI
ST1WI

ST1WI 56% . Demaerel (15) T1 T2
가 44% 1

. Fukui (16)

ST2WI 59 29 T1
(1) , Granier , T2

25 3 (12%) 가 ST1WI

가

T2WI

ST2WI

MRI ST1WI
가
ST2WI

가

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Comparison of MRI and Discography in Disc Extrusion: Low Signal Intensity Change in the Anterior Epidural Space at Sagittal T1-weighted Imaging¹

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Purpose: To determine the significance of low signal intensity change in the anterior epidural space at sagittal T1-weighted (ST1WI) magnetic resonance imaging (MRI) of patients in whom discography revealed disc extrusion, and to correlate interruption of the solid dark line seen at sagittal T2-weighted imaging (ST2WI) with discographic findings of extrusion.

Materials and Methods: One hundred and forty-two patients (159 cases) with lumbar disc disease proven at MRI underwent discography. Disc extrusion was diagnosed in cases in which contrast media leaked into the anterior epidural space. The findings of ST1WI were used to determine whether low signal intensity change had occurred in the anterior epidural space between the posterior aspect of the vertebral body and the posterior longitudinal ligament, and whether ST2WI depicted interruption of the solid dark line at the posterior aspect of the disc was also assessed.

Results: At discography, disc extrusion was diagnosed in 134 of 159 cases. At ST1WI, low signal intensity change was noted in 75 (56%) of the 134 cases, and at ST2WI interruption of the solid dark line was observed in 63 (47%). In the remaining 25 cases, there was no evidence of disc extrusion, and at ST2WI the solid dark line was well-preserved. At ST1WI, 22 (88%) of 25 cases showed normal signal intensity in the anterior epidural space, but in the remaining three, low signal intensity change was evident. Correlation between the findings of MRI and discography was statistically significant.

Conclusion: In disc disease, low signal intensity change at ST1WI, as well as interruption of the solid dark line seen at ST2WI, are useful indicators of disc extrusion.

Index words : Spine, intervertebral disks
Spine, MR

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