

---

[ ]

:

21 . Oner

:

state 1 4 , state 2가 14 , state 3 3  
state 1 12 , state 2가 6 , state 3 3 .  
state 2가 1 , state 3 3 , state 4가 17 . state 1  
4 , state 2가 6 , state 3 7 , state 4가 4 , state 1 12 , state 2  
가 6 , state 3 2 , state 4가 1 , state 1 4 , state 2가  
9 , state 3 8 . 21

:

가 ,

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158-710,

911-1

: (02) 2650-5564, Fax: (02) 2642-0349  
e-mail: ydkoh@ewha.ac.kr

가

17)

Oner (Fig. 1).

가

McCormack<sup>14)</sup>

1 4 , state 1

가

가

2,10,16-19)

가

3,7,8,13)

가

11 가 1 , 12 가

6 , 1 가 8 , 2 가 4 , 3 가

2

0.68 (0.44~0.89) ,

0.92 (0.71~0.99) ,

16 (1~32) . Denis<sup>4)</sup> ,

Type IIA가 1 , Type IIB가 16 , Type IIC가 4

가 ,

21 18

3

Oner

state 1

4 , state 2가 14 , state 3 3 ,

1999 4 2003 3

state 1 12 , state 2가 6 , state 3 3

21

state 2가 1 , state 3 3 , state 4가 17 .

38 (21~67) ,

state 1 4 , state 2가 6 , state 3 7

16 , 5 .

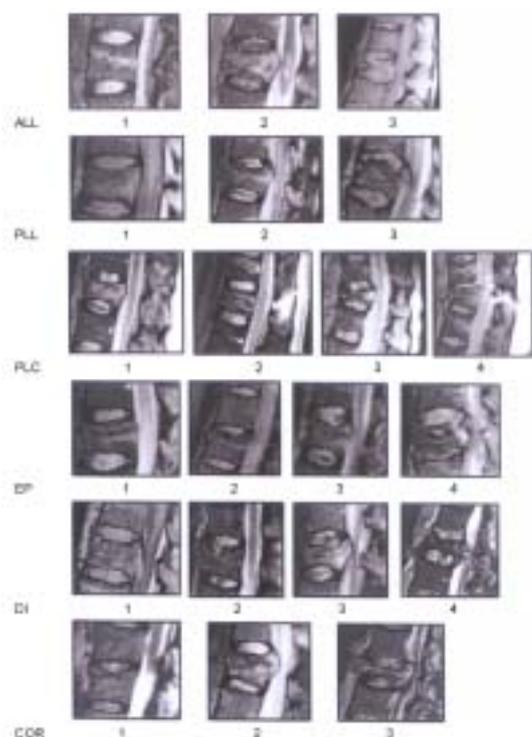
state 4가 4 , state 1 12 ,

state 2가 6 , state 3 2 , state 4가 1 ,

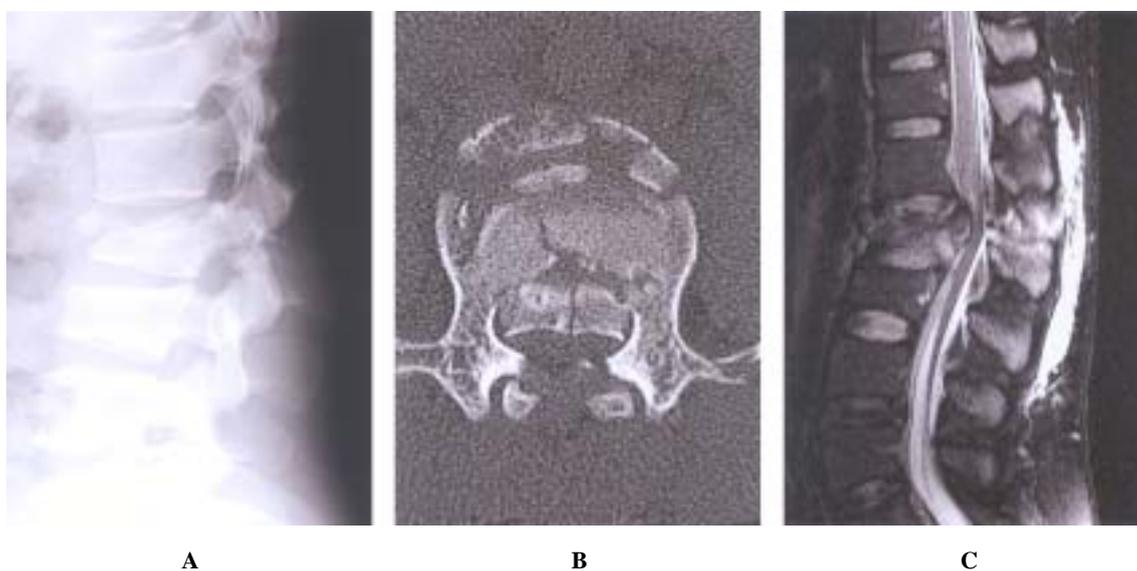
state 1 4 , state 2가 9 , state 3 8

(Fig. 2).

state 4 17



**Fig. 1.** The categorization scheme used for the trauma MRIs ALL = anterior longitudinal ligament. ALL 1 = no evidence of injury. ALL 2 = ligament is slackened. ALL 3 = ligament is ruptured. PLL = posterior longitudinal ligament. PLL 1 = no evidence of injury. PLL 2 = ligament is attached to the extruding bone fragment from the posterior cortex. PLL 3 = ligament is ruptured. PLC = posterior ligament complex. PLC 1 = no evidence of injury. PLC 2 = edema in the interspinous space. PLC 3 = elongation of the interspinous space. PLC 4 = clear disruption of the PLC. EP = endplate. CR = cranial. CA = caudal. EP 1 = only plastic deformity of the endplate. EP 2 = disruption in the anterior half. EP 3 = disruption in the posterior half. EP 4 = disruption of the whole endplate. DI = disc. DI 1 = no evidence of injury. DI 2 = rupture and/or debris in the anterior half. DI 3 = rupture and/or debris in the posterior half. DI 4 = involvement of the whole disc. COR = vertebral body. COR 1 = less than one third of the volume of the vertebral body is involved; the involvement of the body is evaluated using the amount of bone bruise as a measure of involvement. COR 2 = one third to two thirds of the vertebral body is involved. COR 3 = more than two thirds of the volume of the vertebral body is involved.



**Fig. 2.** L2 burst fracture with rupture of posterior ligament complex.  
**2A.** Lateral radiography revealed severe disruption of the superior endplate.  
**2B.** Computed tomography (CT) scan at the upper slice of L2 revealed that a large fragment of bone had retropulsed from the posterior wall.  
**2C.** Fat-suppressed T2-weighted sagittal sequence of magnetic resonance imaging shows disruption of posterior ligament complex.

**Table 1.** MRI findings of thoracolumbar burst fractures with PLC rupture

Case	MRI					
	ALL <sup>*</sup>	PLL <sup>†</sup>	PLC <sup>‡</sup>	EP	DI	COR <sup>¶</sup>
1	2	2	3	CA3	1	2
2	1	1	2	CA3	1	1
3	2	1	4	CR3	1	2
4	2	2	4	CR3	1	3
5	2	1	4	CR2	1	2
6	2	1	4	CR1	1	2
7	3	3	4	CR4	3	3
8	2	1	4	CR2	2	2
9	3	3	4	CR4	4	3
10	2	1	4	CR1	1	2
11	2	3	4	CR1	1	3
12	1	1	4	CR3	1	3
13	2	2	3	CR2	1	1
14	2	1	4	CA2	2	2
15	2	1	4	CA2	2	1
16	2	2	4	CA2	2	3
17	2	2	4	CA4	2	3
18	1	1	4	CA3	1	1
19	2	1	4	CA3	3	2
20	3	2	3	CA4	2	3
21	1	1	4	CR1	1	2

<sup>\*</sup>anterior longitudinal ligament, <sup>†</sup>posterior longitudinal ligament, <sup>‡</sup>posterior ligament complex, endplate, disc, <sup>¶</sup>vertebral body

, state 1 2 , state 2가 13 , state 3 2 , state 1 11 , state 2가 3 , state 3 3 .

, 21 (Table 1).

3,7,8,13)

가

가

가

Gertzbein<sup>6)</sup>

가

가

1,4)

state 4

2가 13 ,

state

state 1 11

가

가,

18)

가

18)

McCormack<sup>14)</sup>  
(load-sharing classification)

가

McAfee<sup>12)</sup>

, AO A3 B2 type  
11)

3,5,15)

13)

가

가

가

(20% 가)

16,18)

Gertzbein<sup>9)</sup>

10)

(accuracy) 90.9%,  
97.0%

가

9) 가

fat-suppressed T2-weighted

가

가

10)

가

1,2,17,18)

가 0.68 0.92  
Denis' type II

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Abstract

## MRI Findings of Posterior Ligament Complex Injury in Thoracolumbar Bursting Fractures

Young-Do Koh, M.D., Yeo-Heon Yun, M.D., Hoon Jeong, M.D.

*Department of Orthopaedic Surgery, College of Medicine,  
Ewha Woman's University, Seoul, Korea*

**Purpose:** To investigate the MR findings of structures injured in the burst fractures of thoracolumbar spine.

**Materials and Methods:** Twenty-one patients who had thoracolumbar burst fractures with posterior ligament complex injury on MRI were studied. For the evaluation of stability of fractures, we used the scheme described by Oner et al. We identified the state of posterior ligament complex on surgery.

**Results:** The MRI findings of ALL were state 1 in four, state 2 in fourteen, and state 3 in three. Those of PLL were state 1 in twelve, state 2 in six, and state 3 in three. The findings of posterior ligament complex were state 2 in one, state 3 in three, and state 4 in seventeen. The endplate state 1 was in four, state 2 in six, state 3 in seven, and state 4 in four. The disc state 1 was in twelve, state 2 in six, state 3 in two, state 4 in one. The vertebral body involvement state was 1 in four, state 2 in nine, and state 3 in eight. The injuries of posterior ligament complex were confirmed intraoperatively in all twenty-one patients.

**Conclusion:** We recommend the use of MRI to evaluate stability of fractures and state of posterior ligament complex in thoracolumbar burst fractures.

**Key Words:** Thoracolumbar spine, Burst fracture, Posterior ligament complex, Magnetic resonance imaging

**Address reprint requests to** \_\_\_\_\_

Young-Do Koh

911-1 Mok-Dong, Yangcheon-Gu, Seoul, 158-710, Korea

Department of Orthopaedic Surgery, College of Medicine, Ewha Woman's University

Tel : 02-2650-5564, Fax : 02-2642-0349

E-mail : ydkoh@ewha.ac.kr