

·  
·

1

· (T - L spinal MRI) (osteoporosis)  
(compression fracture) (sacral insufficiency  
fracture)

· MRI 160 (·  
27:133, 50 - 89 )

(pelvis)

· 160 17  
(10.6%) 27:133 5  
2/27 (7.4%), 15/133 (11.3%) 가  
( $p=0.80$ ). 50 가 0% (0/23), 60 가 10.6% (7/66), 70 가  
12.5% (7/56), 80 가 20.0% (3/15)  
8/65 (12.3%), 9/95 (9.5%)

( $p=0.37$ ).

5/76 (6.6%), 12/84 (14.3%)  
67 27 (40.3%)

· 10% MRI

(fragility)

가

(4 - 8),

(1).

(1 - 3, 9 - 13)

(long bone)

(1 - 3).

MRI

(back),

(buttock),

(groin)

MRI

가

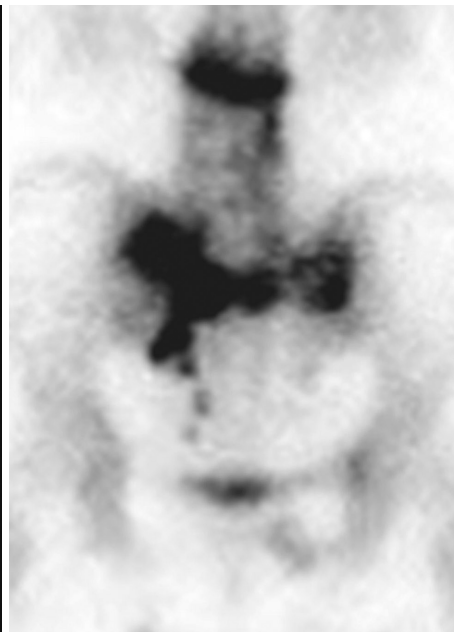
2001 7 2005 6 4  
MRI

(pathologic fracture)  
69.4 ) , 가 27 , 133  
MRI 1.5 Tesla (Siemens, Erlangen, Germany), (GE  
Medical Systems, Milwaukee, U. S. A.)  
T1 (TR/TE=400 - 666/10 - 12),  
T2 (TR/TE=3000/22 - 123) (sagittal  
image) (axial image)  
(echo train length) 20, (matrix number)

448 × 256, (slice thickness) 4 - 4.5 mm,  
(slice gap) 0.1 mm, 14,  
384 × 256, 4.5 mm, 1 - 2 mm  
MRI 5  
3 , MRI 2 -  
3  
MRI  
MRI T1  
(slice)  
(band),  
(margin) 가  
(12).  
MRI



A

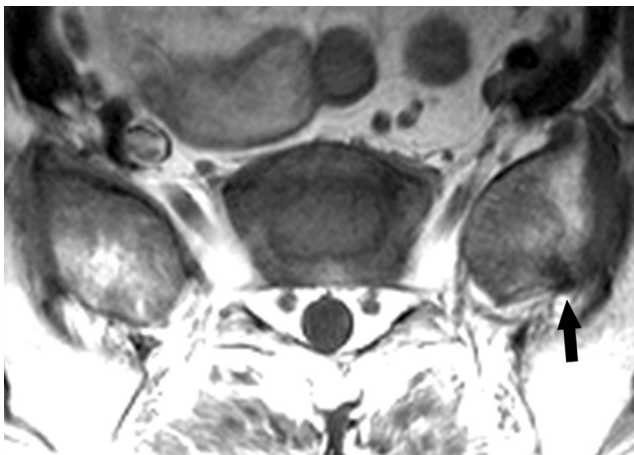


C

**Fig. 1.** 61-year-old woman with compression fracture at L3 body and insufficiency fracture at upper portion of S2 body.

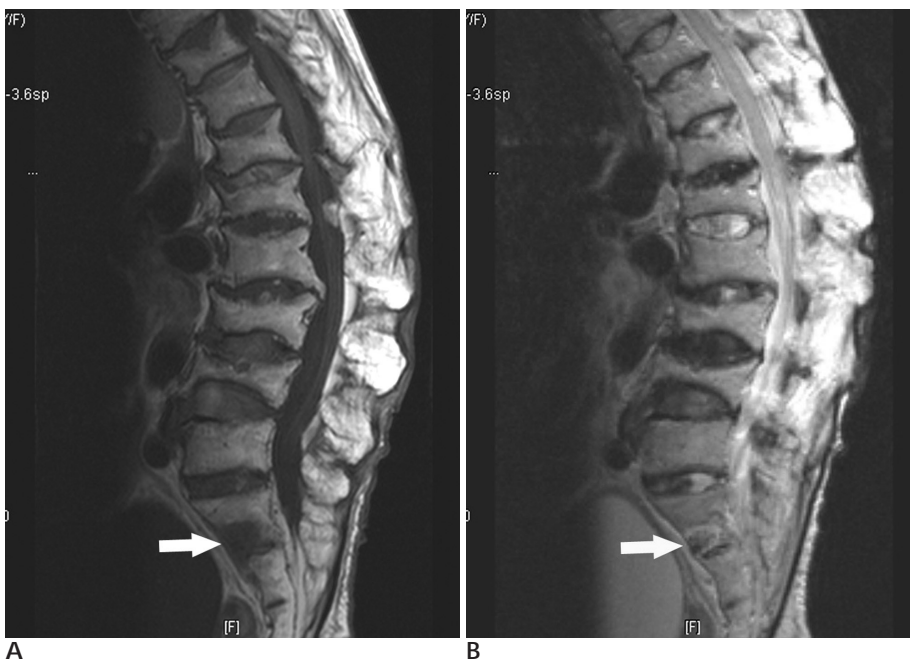
**A.** T1 weighted sagittal image shows low signal intensity at upper portion of S2 body (arrow).

**B.** On T1 weighted axial image, slight low signal intensity is seen at both sacral alae, especially left side (arrow).  
**C.** Bone scan shows hot uptake of radioisotope at sacral body and both sacral alae, consistent with insufficiency fracture.



B

0% (0/23),  
 10.6% (7/66), 12.5% (7/56), 20.0% (3/15)  
 50-59, 60-69, 70-79, 80-89  
 MRI  
 가 가 가  
 (p=0.23).  
 (Fig. 1) 가 65  
 T1, T2 (bone marrow edema pattern)  
 (Fig. 2) 가 95  
 가 8/65 (12%), 9/95 (9%)  
 (p=0.37).  
 qui-square test  
 MRI (bone scan)  
 가 84 (52.5%)  
 가 5/76 (6.6%), 12/84 (14.3%)  
 MRI  
 (p=0.19).  
 99 (61.9%)  
 7 (7.1%)  
 (4 ) (Fig. 1), (3 )  
 160 27  
 (16.9%), 133 (83.1%) 5 67 ( 6:61), 27/67 (40.3%)  
 가  
 160 17 (10.6%) 가  
 가 7.4% (2/27), 11.3% (15/133)  
 (p=0.80). 50-59 가  
 23, 60-69 가 66, 70-79 가 56, 80-89 가 15



**Fig. 2.** 73-year-old woman with multiple compression fractures at T/L-spine.

**A.** On T1 weighted sagittal MR image, diffuse low signal intensity is seen at lower portion of S1 body (arrow), consistent with insufficiency fracture.

**B.** On T2 weighted image shows heterogeneous signal intensity at the same area (arrow).

:

,  
10.6%

가

67

61

(91.0%)

10%

(9%)

10

3

가

16.9%, 83.1%

5

가 가

7.4%,

11.3%

(5).

76%,

82%

60 - 70

80

가

, 50

50

(kyphosis)

가

(loss of

가

height)

가

60

(5).

70

10.6%, 12.5%, 80

20%

(1),

(elastic resistance)

가

(physiologic stress)가 가

12.3%, 9.5%

(fibrous dysplasia),

(Paget disease),

(osteogenesis imperfecta),

가

(osteopetrosis),

(osteomalacia)

(hyperparathyroidism)

(radiation therapy)

(1).

(ilium),

(calcaneus)

(1 - 3).

7 (6.6%), 12 (14.3%)

. Weber (9)

2,366 (58 - 94 , 79 ) 20 (0.9%)

가

55

가

1.8%가

. De Smet (13)

40.3%

8

(weight

bearing)

가 50

26%

(6),

가 50

15%,

5.4%

(7).

가 가

가 ,

가 (8).

MRI

가

가

T1

가

T1

T2

(10, 11).

7

10

MRI

(bone mineral density)

, MRI

MRI

2 - 3

, MRI

3

가

가

가

MRI

MRI

가

10%

MRI

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## Osteoporotic Compression Fracture of the Thoracolumbar Spine and Sacral Insufficiency Fracture: Incidence and Analysis of the Relationship according to the Clinical Factors<sup>1</sup>

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**Purpose:** To evaluate the incidence of sacral insufficiency fracture in osteoporotic patients with compression fracture of the thoracolumbar (T-L) spine on magnetic resonance image (MRI), and to analyze the correlation of variable clinical factors and the incidence of sacral insufficiency fracture.

**Materials and Methods:** We retrospectively reviewed 160 patients (27 men, 133 women; age range of 50 to 89 years) who underwent spinal MRI and had compression fracture of the T-L spine. Compression fractures due to trauma or tumor were excluded. We evaluated the incidence of sacral insufficiency fracture according to the patients' age, sex, number of compression fractures, and the existence of bone marrow edema pattern of compression fracture. During the same period, we evaluated the incidence of spinal compression fracture in the patients of pelvic insufficiency fracture.

**Results:** Out of the 160 patients who had compression fracture in the T-L spine, 17 (10.6%) had insufficiency fracture of the sacrum. Compression fracture occurred almost 5 times more frequently in women (27:133), but the incidence of sacral insufficiency fracture was 2/27 for men (7.4%) and 15/133 for women (11.3%), with no statistically significant difference ( $p = 0.80$ ). According to age, the ratio of insufficiency fracture to compression fracture was 0% (0/23) in the 50's, 10.6% (7/66) in the 60's, 12.5% (7/56) in the 70's, and 20.0% (3/15) in the 80's. In respect of single and multiple compression fracture, the incidence of sacral insufficiency fracture was 8/65 for men (12.3%) and 9/95 for women (9.5%), showing no significant difference ( $p=0.37$ ). In the patients with and without compression fracture with bone marrow edema, insufficiency fracture occurred in 5/76 (6.6%) and 12/84 (14.3%), respectively. On the other hand, of the 67 patients who had pelvic insufficiency fracture, 27 (40.3%) also had spinal compression fracture.

**Conclusion:** About 10% of the patients with osteoporotic compression fracture in the T/L spine also had pelvic sacral insufficiency fracture, which was not uncommon. These findings suggest the need to consider the possibility of pelvic sacral insufficiency fracture in cases of T/L spinal MRI for patients with osteoporotic compression fracture.

**Index words :** Fractures, MR  
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Fractures, stress  
Sacrum, fractures  
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