

CT MRI 가<sup>1</sup>

2

:  
 : 1993 12 1998 7 CT  
 MRI 27 CT  
 , , , , , MRI  
 : C6-7 10 가 , C5-6 8  
 12 (44%), 15 (56%) , 17 (63%)  
 가 , 가  
 (pillar) 11 (41%), (lamina) 6 (22%), 14 (52%),  
 13 (48%), 3 (11%)가 8  
 (30%), 4 (15%), 20 (74%)  
 12 (44%) , 8 , 4 11  
 (41%) , 9 (33%)  
 :  
 , CT MRI

(1,2).  
 , ,  
 , , 1993 12 1998 7 CT  
 (1,3-6). MRI 27  
 20 60  
 (1,5-7). 37 , 가 25 , 가 2 ,  
 27 (19 ) , 가 3 , 5  
 ( CT) . CT 10 ( 2 ) , M-  
 RI 11 ( 3 )  
 CT SCT-5000T (Shimadzu, Japan) ,  
 5mm ,  
 2-3 mm  
 . CT

1

2

(1), , T2 가 (3,9).  
 CT 2 T2 (3,9).  
 가 (locked), T2 (2,8).  
 MRI 1.0T Magnex 100X/100XP(Shimadzu, Japan) (Spin echo) T1 (3,9).  
 (TR/TE:500/50) , T2 (TR/TE:2000/80) (TR/TE: 3000/100)  
 , (Gradient echo) (TR/TE/FA, 600-500/ C6-7 10 가 ,  
 20/30) C5-6(8 ), C3-4(4 ), C4-5(3 ), C7-T1(2 )  
 5mm , 4mm 27 CT 12 (44%)  
 1mm . MRI (Fig. 1, 2), 15 (56%)(Fig. 3, 4) ,  
 , , 17 (63%) , 11  
 . MR (Table 1).

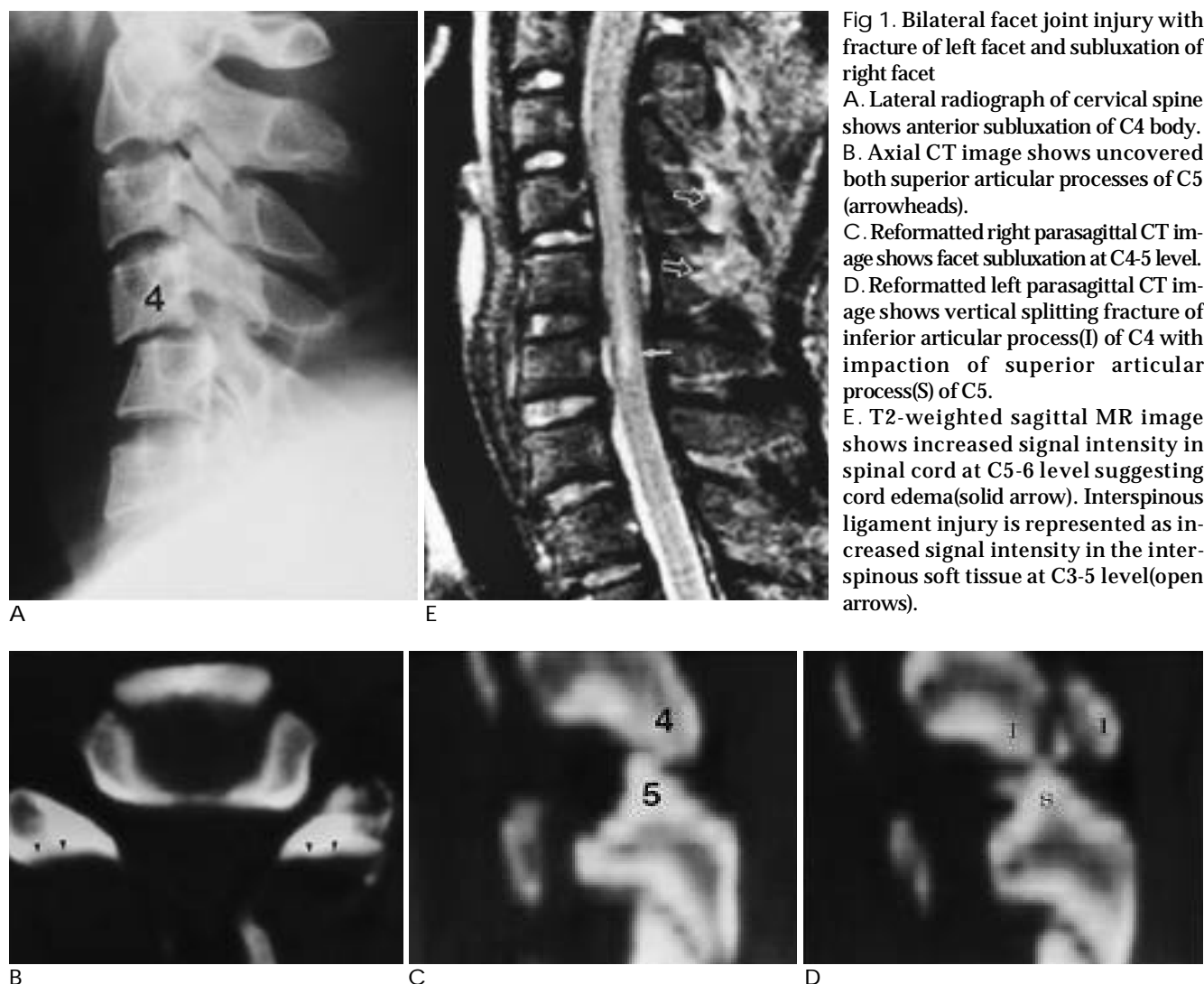


Fig 1. Bilateral facet joint injury with fracture of left facet and subluxation of right facet  
 A. Lateral radiograph of cervical spine shows anterior subluxation of C4 body.  
 B. Axial CT image shows uncovered both superior articular processes of C5 (arrowheads).  
 C. Reformatted right parasagittal CT image shows facet subluxation at C4-5 level.  
 D. Reformatted left parasagittal CT image shows vertical splitting fracture of inferior articular process(I) of C4 with impaction of superior articular process(S) of C5.  
 E. T2-weighted sagittal MR image shows increased signal intensity in spinal cord at C5-6 level suggesting cord edema(solid arrow). Interspinous ligament injury is represented as increased signal intensity in the interspinous soft tissue at C3-5 level(open arrows).

(Fig. 1D, 4B), (Table 2).

가

가

14 (52%), 13 (48%), 3 (11%)가 (Fig. 3C).

MRI

8 (30%) (Fig. 2D), 4 (15%), 20 (74%) (Fig. 1E, 2D, 3D, 4C)

12 (44%)

8 (Fig. 1E, 4C), 4 (Table 3).

11

Table 1. Classification of Facet Joint Injuries

	Bilateral injury	Unilateral injury	Total
Subluxation	3	1	4
Perched facet	0	1	1
Locking	3	2	5
Fracture and dislocation*	4	0	4
Fracture	2	11	13
Total	12	15	27

Note.-values are numbers of patients.

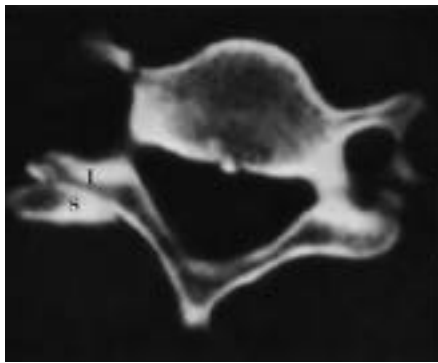
\*bilateral facet injury involving fracture of one facet and dislocation of the other facet

Table 2. Fracture of the Facets(n= 17)

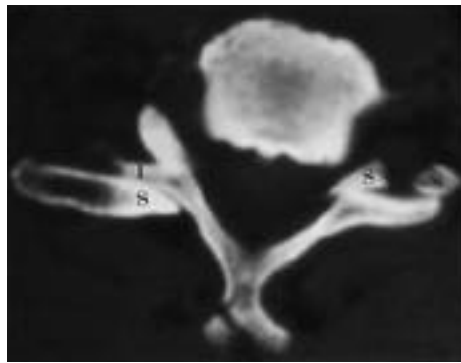
	Superior facet	Inferior facet	Total
Vertical	5	10	15
Horizontal	0	1	1
Comminuted	2	2	4
Total	7	13	20*

Note.-values are numbers of fractures.

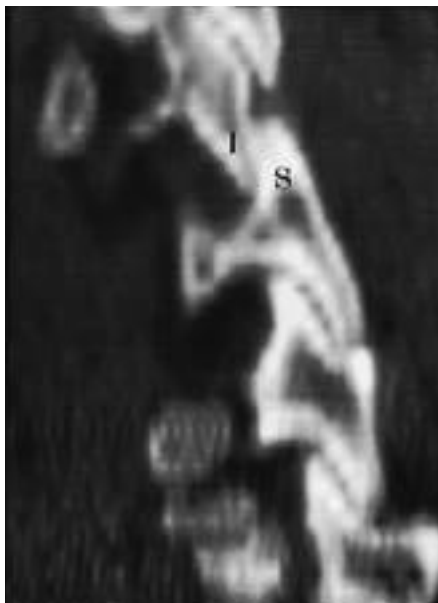
\*3 cases have both superior and inferior facet fractures.



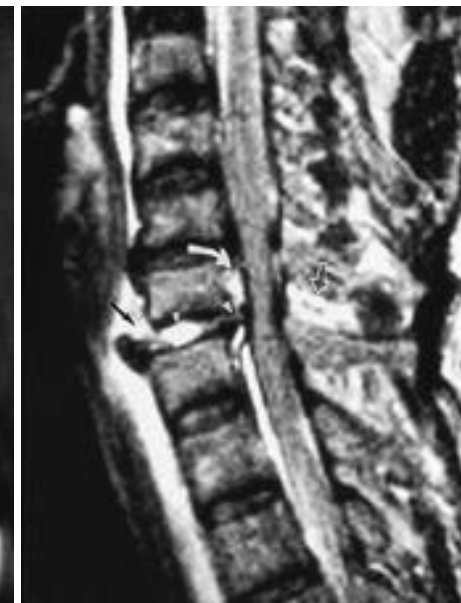
A



B



C



D

Fig. 2. Bilateral facet joint injury with fracture of left facet and locking of right facet

A, B. Continuous axial CT images show fracture of left superior articular process (S) of C7 and locking of right facet. Dislocated right inferior articular process (I) of C6 is anterior to superior articular process (S) of C7.

C. Reformatted right parasagittal CT image shows locking of facet at C6-7 level (I, S).

D. T2-weighted sagittal MR image shows increased signal intensity of intervertebral disc with posterior disc herniation at C6-7 interspace suggesting traumatic intervertebral disc herniation (arrowheads). There is disruption of anterior longitudinal ligament (solid arrow) and retracted annuloligamentous complex represented as nodular low signal intensity lesions. There is high signal intensity in the interspinous soft tissue (open arrow) at the same level suggesting ligament injuries. Also noted is compression of spinal cord by epidural hematoma (curved arrow) at the C6 level.

, T2  
 (Fig. 2D, 3D).  
 12 (44%)  
 7 ,  
 2 9 (33%)  
 (Fig. 2D, 4C), 3

Table 3. Associated Soft Tissue Injuries in Facet Joint Injuries

	Bilateral facet injury(n= 12) No.(%)	Unilateral facet injury(n= 15) No.(%)	Total(n= 27) No.(%)
HIVD	6(50)	3(20)	9(33)
ALL	8(67)	0( 0)	8(30)
PLL	3(25)	1( 7)	4(15)
ISL	8(67)	12(80)	20(74)
Cord injury	5(42)	7(47)	12(44)

Note. -HIVD;traumatic intervertebral disc herniation  
 ALL;anterior longitudinal ligament injury  
 PLL;posterior longitudinal ligament injury  
 ISL;interspinous ligament injury

:  
 9 8  
 (synovial joint)  
 30-45 ° 가 가  
 (1,2).  
 가  
 (2,4).  
 가  
 (locking),  
 (perched facet)

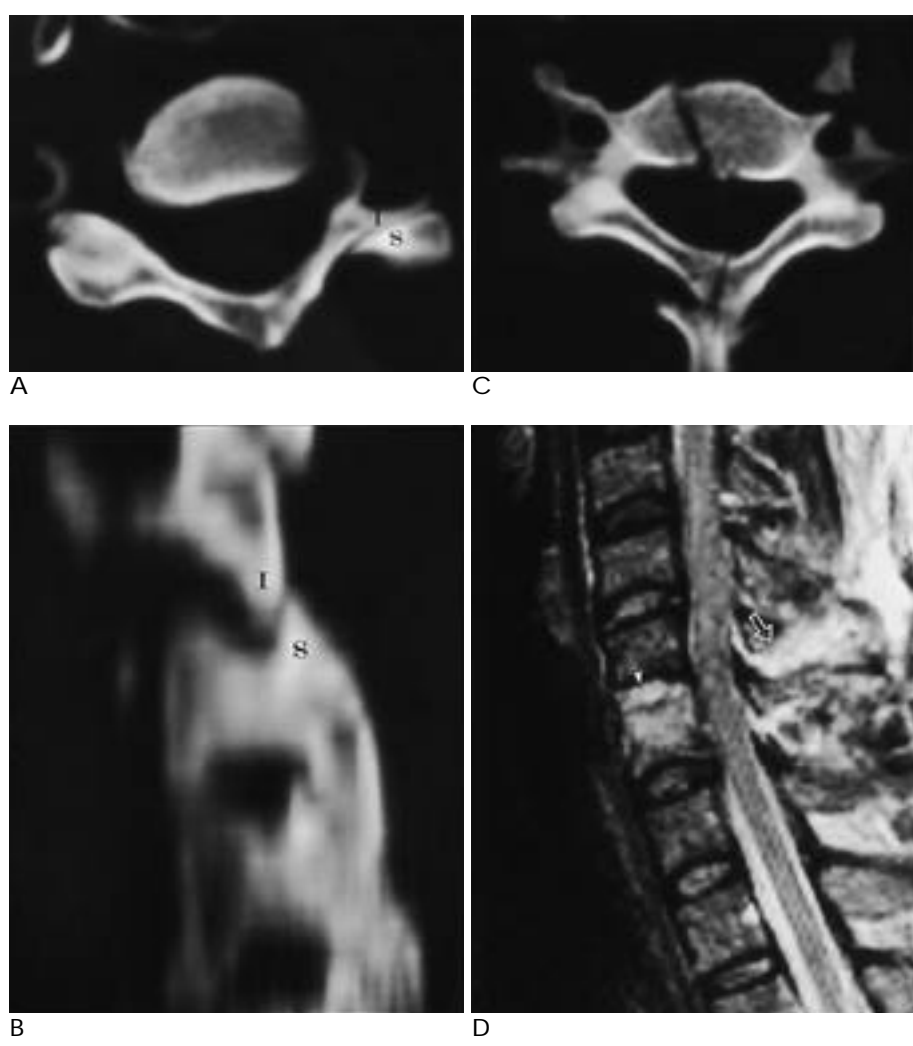
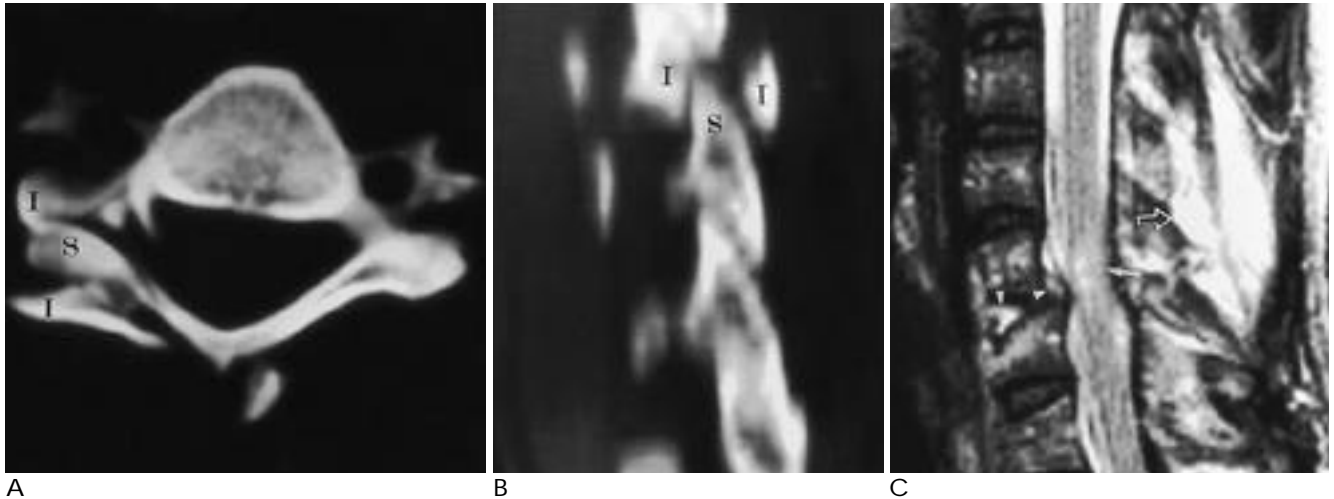


Fig. 3. Unilateral facet locking  
 A, B. Axial (A) and reformatted left parasagittal(B) CT images show unilateral facet locking(I, S).  
 C. Axial CT image below level A shows multiple fractures involving vertebral body, lamina, and transverse process of C6.  
 D. T2-weighted sagittal MR image shows intervertebral disc injury(arrowhead) and interspinous ligament injury(open arrow) at C5-6 level. The marrow signal intensity of C6 body is increased suggesting contusion.



A  
Fig. 4. Unilateral vertical splitting fracture of facet.  
A, B. Axial (A) and reformatted right parasagittal(B) CT images show vertical splitting fracture of inferior articular process(I) of C5 with impaction of superior articular process(S) of C6.  
C. T2-weighted sagittal MR image shows herniated intervertebral disc with increased signal intensity at C5-6 interspace suggesting traumatic disc herniation(arrowheads). Interspinous ligament injury(open arrow) and spinal cord edema(solid arrow) are also shown at C5-6 level. Also noted are compression fracture of C6 body and anterior subluxation of C5 body on C6.

(10-12). 가 7 가 5 MRI (10), 11 12 Levine(1) (7,9,13,16-18). (distraction) 1) 2)perched facet 3) MRI T1 T2 4) 5) (3,7,19). 가 5-6 가 (13,14), 6-7 가 10 (37%) 가 (3,7). 가 8 Flanders (9) 가 T2 Shanmuganatham (12) (1,15). 73% 가 6 11 Levine(1) 가 (9-63%) (4,5,13,16,20,21), 33% 가 17 20 (5,6,15,20).

1. Levine AM. *Facet injuries in the cervical spine*. In Camins MB, O'Leary PF, eds. *Disorders of cervical spine*. Baltimore: Williams & Wilkins, 1992: 293-302
2. Dussault RG, Lander PH. Imaging of facet joint. *Radiol Clin North Am* 1990; 28:1033-1053
3. Mirvis SE, Nasser M. *MRI of acute cervical spine trauma*. In Harris JH, Mirvis SE. *The radiology of acute cervical spine trauma*. Baltimore: Williams & Wilkins, 1996:114-179
4. Leite CC, Escobar BE, Bazan C, Jinkins JR. MRI of cervical facet dislocation. *Neuroradiology* 1977; 39:583-588
5. Eismont FJ, Arena MJ, Green BA. Extrusion of an intervertebral disc associated with traumatic subluxation or dislocation of cervical spine. *Spine* 1982; 7:115-120

## Facet Joint Injuries in Acute Cervical Spine Trauma : Evaluation with CT and MRI<sup>1</sup>

Jeon Ju Ha, M.D., Dong Hyun Kim, M.D., Jeong Hwa Lee, M.D., Keon Lee, M.D.,  
Hyeok Po Kwon, M.D., Jung Hyeok Kwon, M.D., Seong Mun Yun, M.D.<sup>2</sup>

<sup>1</sup>Department of Diagnostic Radiology, Dongkang General Hospital

<sup>2</sup>Department of Neurosurgery, Dongkang General Hospital

**Purpose :** To evaluate injury patterns of facet joints and associated soft tissue injuries in patients with acute traumatic cervical facet joint injuries.

**Materials and Methods :** From among patients with cervical spine trauma, 27 with facet joint injuries, as seen on CT and MRI, were chosen for this study. CT scans were analyzed with regard to the location of facet joint injury, the presence or absence of facet dislocation or fracture, and other associated fractures. MR images were analyzed with regard to ligament injury, intervertebral disc injury, intervertebral disc herniation, and spinal cord injury.

**Results :** The most common location of facet joint injury was C6-7 level(n= 10), followed by C5-6(n= 8). Among these 27 patients with facet joint injuries, 12(44%) had bilateral injuries and 15(56%) unilateral injuries. Facet fractures were present in 17 cases(63%) and the fracture of inferior facet was more frequent than superior. Patterns of fracture were vertical, transverse, or comminuted, but vertical fracture was the most common. Various degrees of dislocation were observed in patients with facet fractures. Fractures other than facet included pillar(n= 11), lamina(n= 6), transverse process(n= 14), body(n= 13), and spinous process(n= 3). On MR images, anterior longitudinal ligament injury was found in 8 patients(30%), posterior longitudinal ligament injury in 4(15%), and interspinous ligament injury in 20(74%). Twelve patients(44%) had spinal cord injuries including edema(n= 8) and hemorrhage(n= 4). Among patients with disc abnormalities, 11(41%) had intervertebral disc injuries, and traumatic disc herniations were found in nine.

**Conclusion :** Traumatic cervical facet joint injuries were manifested as various patterns and frequently associated with other fractures or soft tissue injuries. Analysis of CT and MR findings of these injury patterns helped formulate a therapeutic plan and determine of prognosis.

**Index words:** Spine, facet joints

Spine, injuries

Spine, CT

Spine, MR

Address reprint requests to : Hyeok Po Kwon, M.D., Department of Radiology, Dongkang General Hospital,

#123-3 Taehwa-dong, Jung-gu, Ulsan, 681-320, Korea.

Tel. 82-52-241-1342 Fax. 82-52-241-1343