



12, 2, 1999 4

The Journal of the Korean Society of Fractures
Vol.12, No.2, April, 1999

= Abstract =

The Change of Kyphotic Angle and Anterior Vertebral Height after Posterior or Posterolateral Fusion with Transpedicular Screws for Thoracolumbar Bursting Fractures

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The purposes of this study are to make an operative treatment option of thoracolumbar burst fractures by the degree of initial kyphotic deformity or by the degree of initial loss of anterior vertebral height. We analyzed sixty-three cases of one segmental thoracolumbar bursting fractures treated surgically by posterior or posterolateral fusion with short segmental transpedicular screws fixation method using Diapason or CD from January, 1992 to October, 1996. Indications of operative treatment were that the degree of initial kyphotic deformity was above 15 ° or initial loss of anterior vertebral height was above 30%. Minimum follow-up period was 12 months and the results were as follows :

1. Entirely, mean kyphotic angle was 21.6 ° initially, 11.3 ° postoperatively and 14.2 ° at the end

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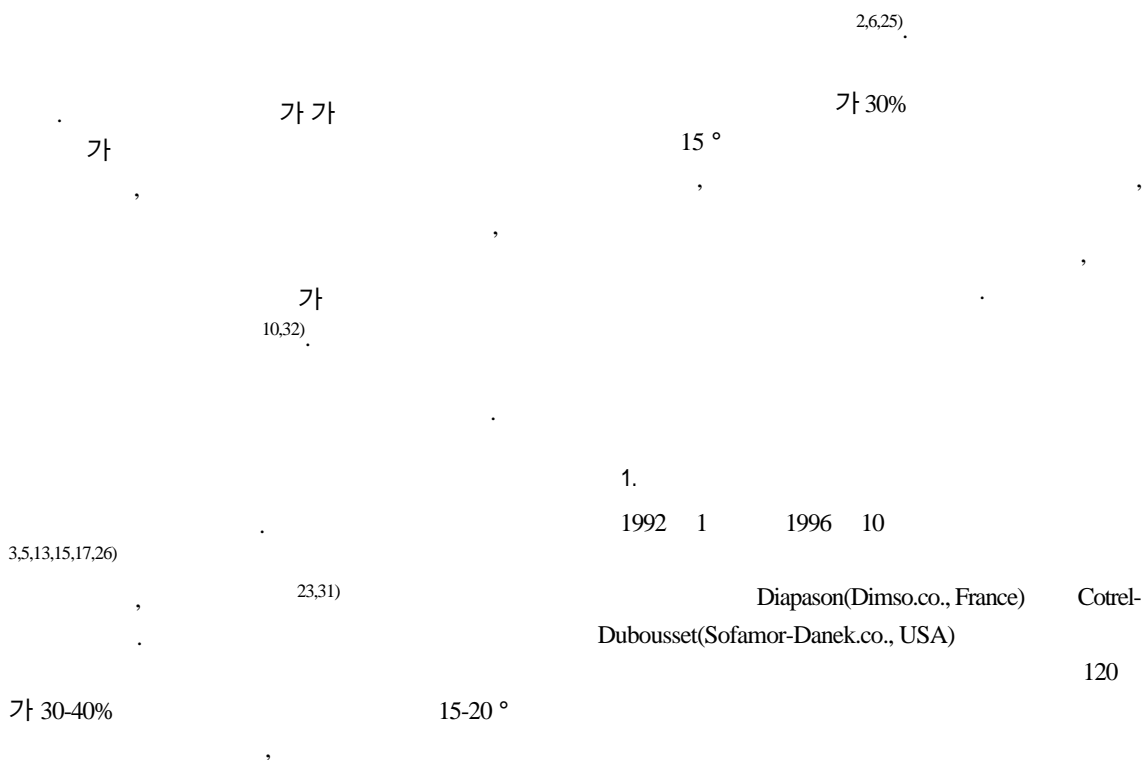
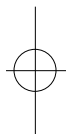


of follow-up. Mean anterior vertebral height was 59.6% initially, 83.8% postoperatively and 80.8% at the end of follow-up. So 10.3 °, 24.2% was corrected postoperatively and loss of correction was 2.9 °, 3% at the end of follow-up.

2. In the respect of the degree of initial kyphotic deformity, when compared above 30 ° with below 30 °, loss of correction was 7.3 °, 1.4 ° at the end of follow-up respectively and this result had significant difference between these two groups statistically.
3. In the respect of initial loss of anterior vertebral height, when compared above 55% with below 55%, loss of correction was 7.7%, 2.2% at the end of follow-up respectively and this result had significant difference between these two groups statistically.
4. In the respect of time interval from injury to operation, when compared within 2 weeks with after 2 weeks, respectively loss of correction was 1.7-2.2 °, 3-3.9% and 4.1 °, 6.7% at the end of follow-up and this results had significant difference between these two groups statistically.

These data suggested if initial kyphotic angle is below 30 ° or initial loss of anterior vertebral height less than 55%, short segmental transpedicular screw fixation provide sufficient stability but if initial kyphotic angle is above 30 ° or initial loss of anterior vertebral height is above 55%, additional anterior interbody fusion may be considered.

Key Words : Thoracolumbar Spine, Burst Fracture, Transpedicular Screw, Anterior Vertebral Height and Kyphotic angle





15 ° . Diapason(Dimso.co., France) CD(Sofamor-Danek.co., USA)

가 30% , 2

가가 63 .

11 3 , 12 17 , 1

23 2 20 ,

Denis ¹⁴⁾ Type A 22 , Type B 23 , Type C 11 ,

Type D 3 Type E 4 .

3 9 , 1 18 , 2

26 2

10 . 가 43 , 가 20

10 7 , 20 15 , 30 13 , 40 1

23 50 5 . ,

12 45 , 18 (Table 1, 2) .

21.6 ° 11.3 °

14.2 ° 10.3 °

2. , 2.9 °

(Table 1),

59.6%, 83.8%

80.8% 24.2%

3%

Student T-test , (Table 2).

30 °

(Table 3),

35.2 °

endplate) (upper 30 °

(lower endplate) 15.7 °

23.0 °

19.5 ° 7.3 °

30 °

17.0 ° 9.8 °

가 11.2 ° 7.2 °

1.4 °

3. (P 0.01) .

가 55%

(Table 3),

가 55%

68.6%, 88.5%

86.3% 19.9%

2.2%

15 ° ,

가 30%

가 55%

38.9%,

73.2% 65.5%

**Table 1.** Fx. level and change of kyphotic angle

| Level | Kyphotic angle (°) | | |
|-------|----------------------|----------------|----------------|
| | pre-operation | post-operation | last follow-up |
| T11 | 20.0 | 15.5 | 18.5 |
| T12 | 25.5 | 13.7 | 16.9 |
| L1 | 20.5 | 11.0 | 13.9 |
| L2 | 19.7 | 9.1 | 11.5 |
| Total | 21.6 | 11.3 | 14.2 |

Table 2. Fx. level and change of anterior vertebral height

| Level | Anterior vertebral height(%) | | |
|-------|------------------------------|----------------|----------------|
| | pre-operation | post-operation | last follow-up |
| T11 | 62.5 | 80.3 | 73.8 |
| T12 | 53.3 | 82.7 | 77.8 |
| L1 | 58.6 | 84.1 | 80.7 |
| L2 | 65.8 | 85.2 | 82.1 |
| Total | 59.6 | 83.8 | 80.8 |

Table 4. Duration from injury to operation and change of kyphotic angle

| Duration from injury to operation | Kyphotic angle (°) | | |
|-----------------------------------|----------------------|----------------|----------------|
| | pre-operation | post-operation | last follow-up |
| Within 3 days | 24.3 | 12.7 | 14.4 |
| Within 1 week | 18.2 | 9.8 | 12.3 |
| Within 2 weeks | 22.8 | 10.9 | 13.1 |
| After 2 weeks | 22.0 | 14.0 | 18.1 |
| Total | 21.6 | 11.3 | 14.2 |

Table 5. Duration from injury to operation and change of anterior vertebral height

| Duration from injury to operation | Anterior vertebral height (%) | | |
|-----------------------------------|-------------------------------|----------------|----------------|
| | pre-operation | post-operation | last follow-up |
| Within 3 days | 54.4 | 83.5 | 80.4 |
| Within 1 week | 62.4 | 86.4 | 82.5 |
| Within 2 weeks | 58.9 | 83.7 | 80.7 |
| After 2 weeks | 61.3 | 80.2 | 73.5 |
| Total | 59.6 | 83.8 | 80.8 |

34.3% 12.3 ° , 62.4%, 86.4%

7.7% , (P 0.01) 82.5%

(Table 4, 5) 2 ,

3 22.8 ° ; 10.9 °

24.3 ° ; 12.7 ° 13.1 ° ,

14.4 ° , 58.9%, 83.7%

54.4%, 80.7%

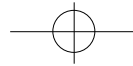
83.5% 80.4% 2 ,

1 22.0 ° ; 14.0 °

18.2 ° ; 9.8 ° 18.1 ° ,

Table 3. Comparison kyphotic angle and anterior vertebral height at injured time with those at last follow-up

| | | No. of patients | Kyphotic angle or vertebral height | | |
|---|------------|-----------------|------------------------------------|----------------|----------------|
| | | | pre-operation | post-operation | last follow-up |
| Kyphotic angle at injured time (°) | above 30 ° | 16 | 35.2 | 15.7 | 23.0 |
| | below 30 ° | 47 | 17.0 | 9.8 | 11.2 |
| Anterior vertebral height at injured time (%) | above 45% | 44 | 68.6 | 88.5 | 86.3 |
| | below 45% | 19 | 38.9 | 73.2 | 65.5 |

[illegible]



35% 15-20° Gerzbein¹⁹⁾ 50%
 1.9°, 3.5% 40% , Gurr²⁰⁾
 9) 20. 4)
 CD 3°, 4% 50%
 15° , Kostuik²⁴⁾
 가 30% 2.9°, 3% 8)

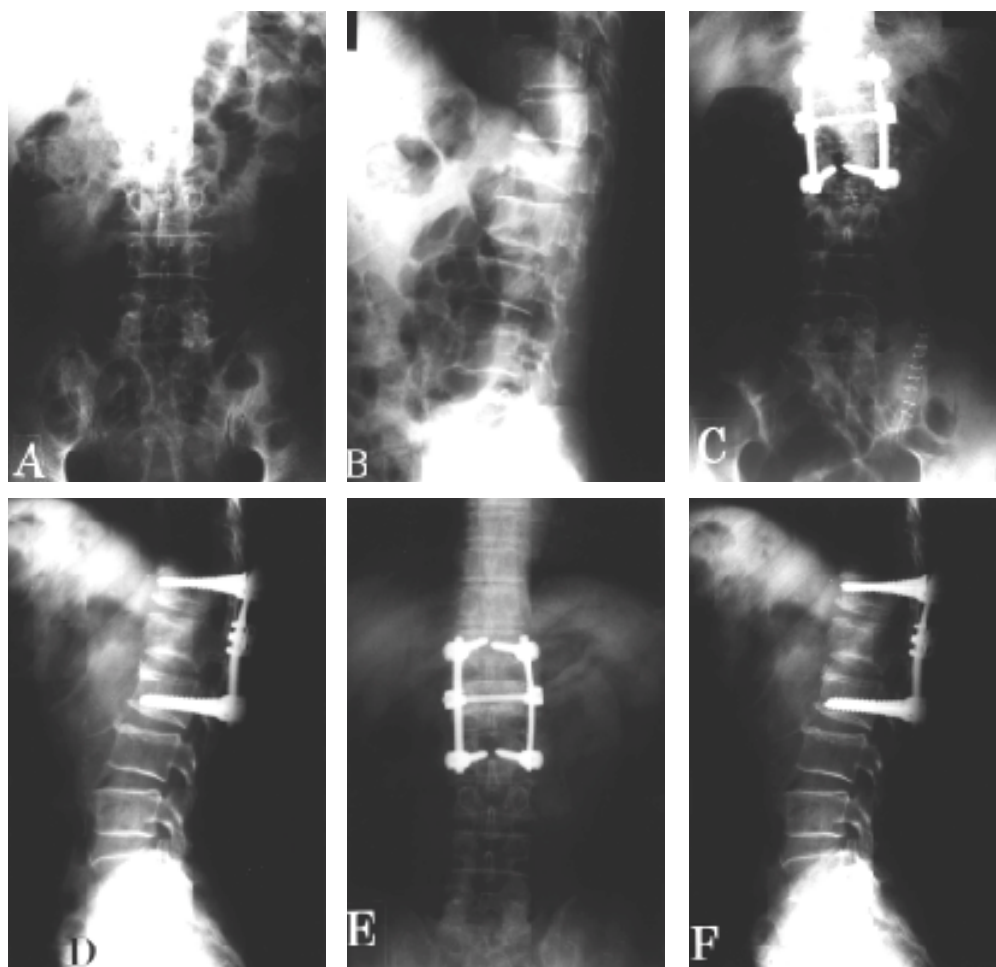


Fig 1-A,B. Preoperative plain X-ray showing L1 bursting fracture with 24° of kyphotic angle and 40% of initial loss of anterior vertebral height.

C,D. Immediate postoperative plain X-ray showing reduction with 18° of kyphotic angle and 10% of loss of anterior vertebral height.

E,F. Postoperative 6 months plain X-ray showing solid fusion with 20° of kyphotic angle and 10% of loss of ant. vertebral height.

G. Initial CT showing L1 bursting fracture

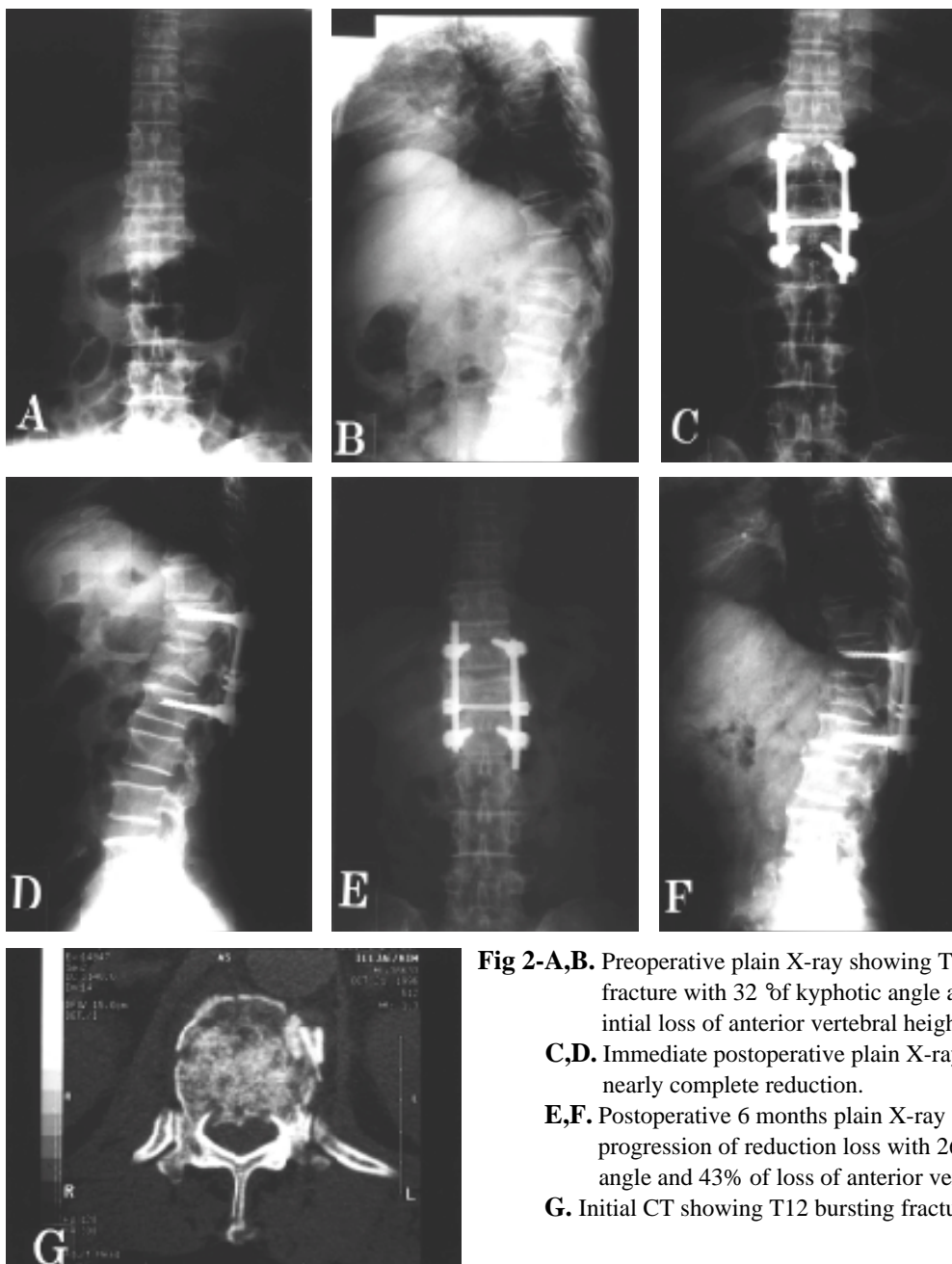
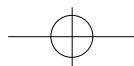


Fig 2-A,B. Preoperative plain X-ray showing T12 bursting fracture with 32 ° of kyphotic angle and 60% of initial loss of anterior vertebral height.

C,D. Immediate postoperative plain X-ray showing nearly complete reduction.

E,F. Postoperative 6 months plain X-ray showing progression of reduction loss with 26 ° of kyphotic angle and 43% of loss of anterior vertebral height.

G. Initial CT showing T12 bursting fracture

가 40%

30 °

가 55%

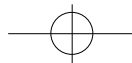
7.3 °, 7.7%

1.2 °

30 °

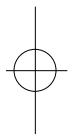
30 °

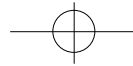
가 55%



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- 30 °
가 55%
Kostuik²⁴⁾ 10
, Dickson¹⁵⁾ 14
가
3
, 가
,
2
8.4-11.9 °, 24-29.1%
2.2 °, 3-3.9%
8 °, 18.9%
4.1 °, 6.7%
2
가
2
가 30%
Diapason CD
63
30 °
가 55%
(Fig. 1),
30 °
가 55%
(Fig.2).
2
- 1) , : ,
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