

1

2 2 3

:
 :
 : 85 (70 , 15 ; 51-88 , 70
) 148 . 3 2
 , , , 가 ,
 . MRI
 CT .
 , 1 , 2 .
 : 24
 , 9 48 , 1
 가 1 .
 :

50
 26% (1).
 15% , 5.4% 가 (2).
 1999 6 2001 8 , ,
 MRI (80) CT (5)
 ,
 , 85
 (3). polymethyl- 70 , 15
 methacrylate (PMMA) , 51 -88 (70) . 85
 . Galibert (4)
 , 65
 , 가 4 . 25
 (5-9),
 (10-17). 가 11 , 1-3 13 , 4-7 14 , 8 1
 가 11 , 2 1 가 21 , 1 6 13
 , 6 2 (38.2).
 3 가 5 , 4-
 7 11 , 8-14 19 , 2 1 가 34 , 1
 6 가 14 , 6 2 (

1
 2
 3

2002 12 20 2003 4 17

42.3). 가 38 , 1 cc
가 가 14 , 가 6 ,
가 6 , 가 가 3 , 2
가 18 , 34
, 9 , 가
42 , 가 70 , 가 78 148
가 . 85 1
가 46 , 2 가 20 , 3 가 3 1 , 4
가 14 , 4 2-3 MRI 가
가 5 3 5
, 가 가 가 1 30
, 12 27 (Fig. 1).
85
X

11G ("J" Type Bone marrow needle,
Manan Medical Products,U.S.A.)
1/3
. Polymethylmethacrylate (PMMA, CMW3 bone
cement, DePuy International Ltd, England) 5 cc 5 cc
. 30 cc 1

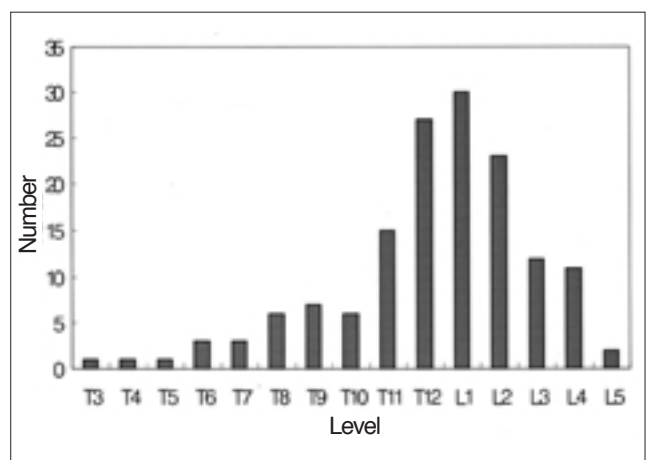


Fig. 1. Distribution of vertebral compression fractures.

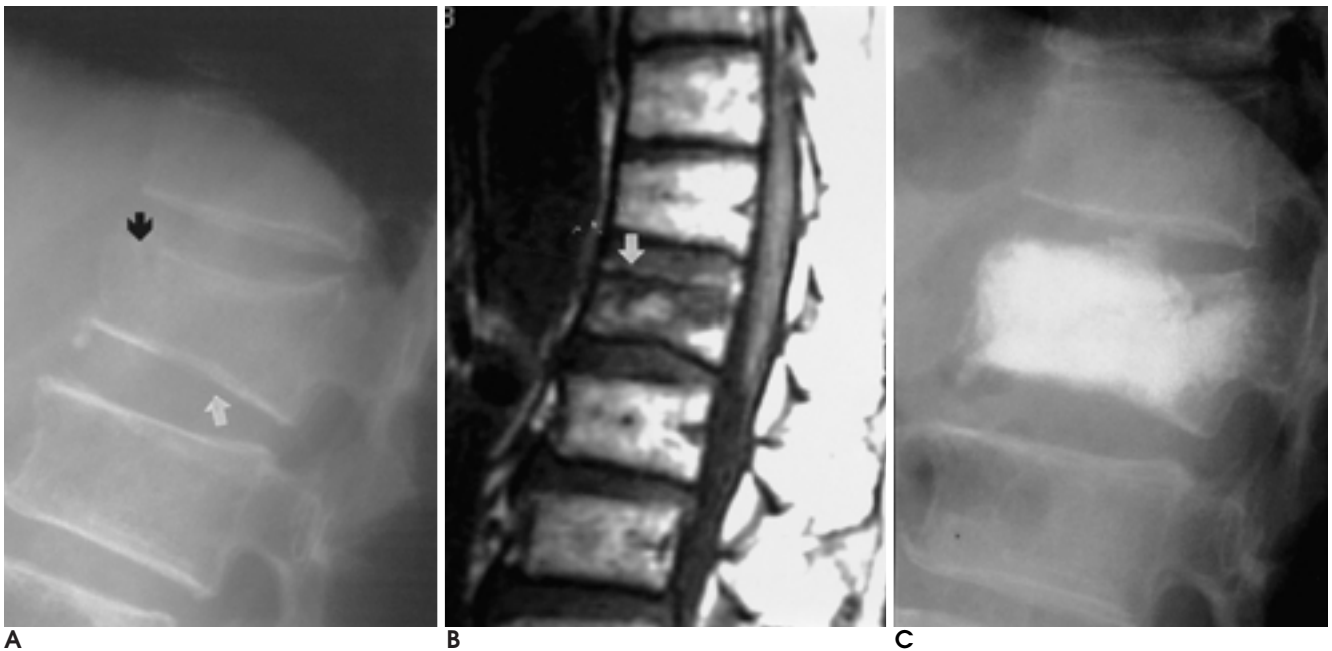


Fig. 2. A 79-year-old man with back pain from T9 compression fracture (white arrow). A plain lateral radiograph (A) shows decreased anterior vertebral height and linear sclerotic fracture line (black arrow). On-T1 weighted sagittal MR image (B), central low signal intensity is present representing bone marrow edema or recent evolution (arrow). After percutaneous vertebroplasty bone cement filled entire vertebral body and then significant height restoration was achieved (C).

(Visual Analogue Scale) 10
가 , / , , ,
1 - 2
2 , 3
3
가 , , , 1
4
2
3
5 1
1 - 4
가 5
2
1
1.9) 2 1.8(1.5) 5.6(1.5)
($p < 0.01$, Wilcoxon Rank Test).
(4.5)
85 44
, 41 , 13 가 28 1가 L2 가 가 ,
20 가 가 , 5 10.5 cc, L4가 8.5 cc
MRI L2, 3, 4
L2가 6.7 cc, L3

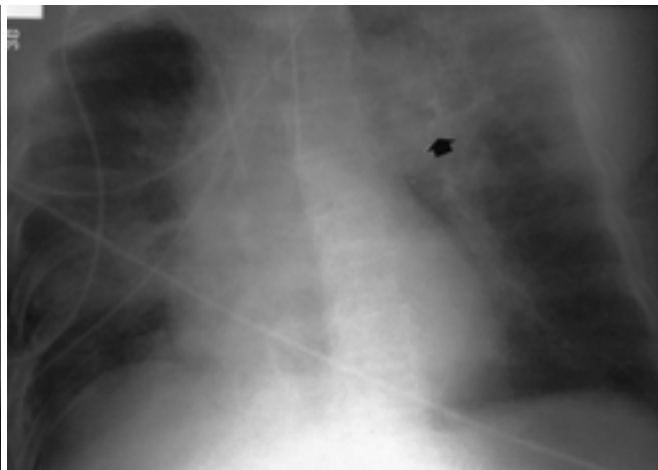
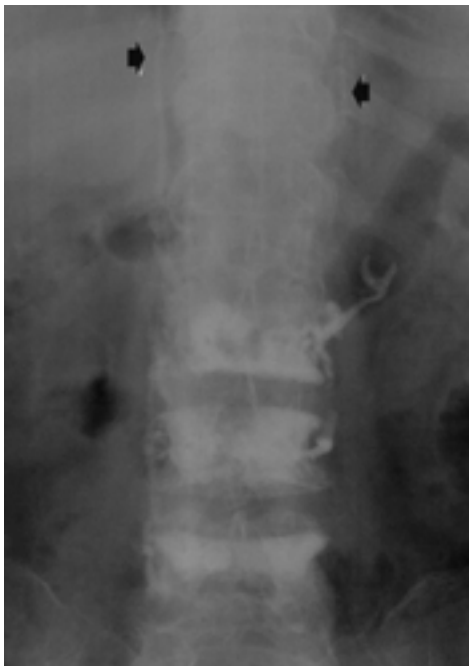


Fig. 3. A 76-year-old female received vertebroplasty for L2 to L4 vertebra. After vertebroplasty plain radiograph shows lumbar venous leakage of bone cement which is extending to upward direction (arrows) (A). Follow-up chest AP (B) after 4 days later shows consolidation in left upper lung field and right perihilar area. Chest tube drainage was done for large amount of right pleural effusion. Pulmonary artery embolism with bone cement could be suggested due to focal bright high density in left hilum (arrow).

1/4 - 2/4

T12

PMMA

가

가

1

2

(Fig. 4).

1

77

T11

PMMA

4

11

(Fig. 3).

2

가

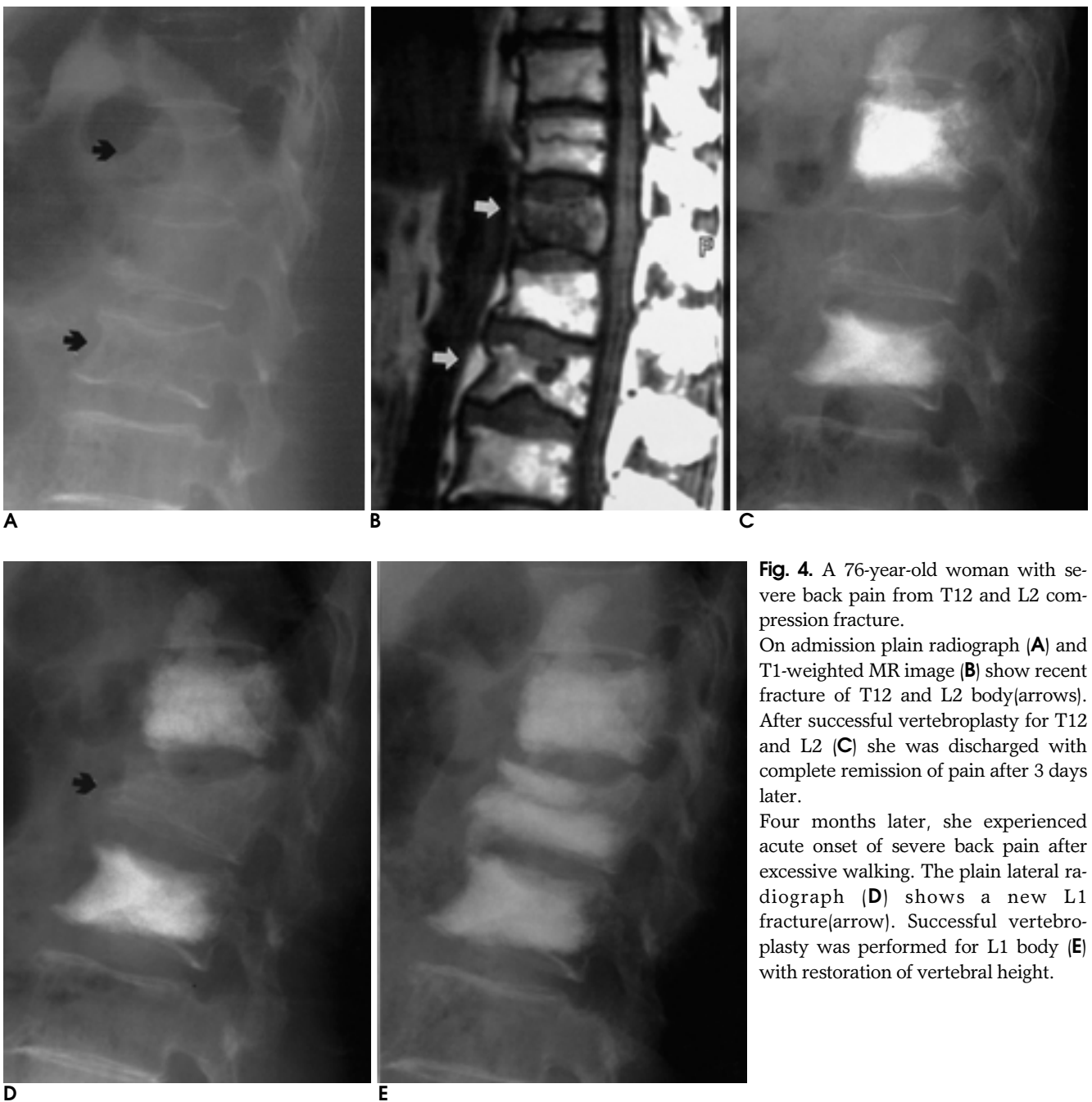


Fig. 4. A 76-year-old woman with severe back pain from T12 and L2 compression fracture. On admission plain radiograph (A) and T1-weighted MR image (B) show recent fracture of T12 and L2 body(arrows). After successful vertebroplasty for T12 and L2 (C) she was discharged with complete remission of pain after 3 days later. Four months later, she experienced acute onset of severe back pain after excessive walking. The plain lateral radiograph (D) shows a new L1 fracture(arrow). Successful vertebroplasty was performed for L1 body (E) with restoration of vertebral height.

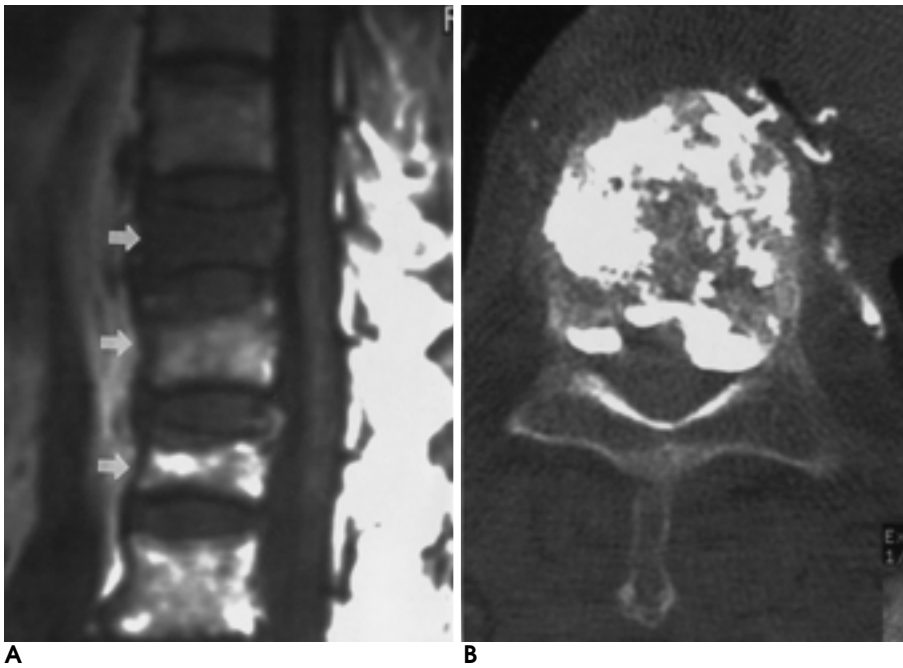


Fig. 5. A 69-year-old woman with multiple osteoporotic vertebral compression fractures.

T1 weighted sagittal MR image shows multiple fractures from T10 to T12 (A). She had thoracolumbar junction tenderness on admission. After vertebroplasty CT image shows epidural leakage of bone cement from T10 vertebra (B). She suffered from flank pain after procedure and was treated in pain clinic. She was discharged with partial remission of flank pain after 10 days later.

7 (8.2%)
5
, 2
(Fig. 1).
46
1
, 20
2
, 19
3
2
가
가
가 (23)
0.884 g/cm² 0.694 g/cm²
85 83 1-7
(18). 83 73 (87.9%) 1
(10.8%) 2 , 1 (1.3%) 1
1-20 (4.5)
가
가
2-15 (3.3)
(13).
PMMA
90%
(11, 14, 21, 24).
PMMA
PMMA
PMMA가
(19-21).
가 (21).
2-3
9
63
(14.3%), 36
(28.6%)
30 1
2 , 6 3
(57.1%), 18
1
, 27
(22).
437

가 3
2 3
가
가
PMMA가 , 가
가
(Fig. 5).
PMMA
가
(5, 11, 12, 16, 21, 24, 25).
가 4 가
2
4
3
가
PMMA가 가
(Fig. 3).
1)
, 2)
, 3) 가 , 4) PMMA
가 , 6)
, 5)
(25).
가
2.27
가 1.44
60%
(26). 85 7
2
가

1. Melton LJ 3rd, Kan SH, Frye MA, Wahner HW, O Fallon WM, Riggs BL. Epidemiology of vertebral fractures in women. *Am J Epidemiol* 1989;129:1000-1011
2. Kanis JA, McCloskey EV. Epidemiology of vertebral osteoporosis. *Bone* 1992;13:1-10
3. Rapado A. General management of vertebral fractures. *Bone* 1996; 18:191-196
4. Galibert P, Deramond H, Rosat P, Le Gars D. Preliminary note on the treatment of vertebral angioma by percutaneous acrylic vertebroplasty. *Neurochirurgie* 1987;33:166-168
5. Weill A, Chiras J, Simon JM, Rose M, Sola-Martinez T, Enkaoua E. Spinal metastasis: Indications for and results of percutaneous injection of acrylic surgical cement. *Radiology* 1996;199:241-247
6. Cotten A, Dewatre F, Cortet B, et al. Percutaneous vertebroplasty for osteolytic metastasis and myeloma: effect of the percentage of lesion filling and the leakage of methyl methacrylate at clinical follow up. *Radiology* 1996;200:525-530
7. Murphy KJ, Deramond H. Percutaneous vertebroplasty in benign and malignant disease. *Neuroimaging Clin N Am* 2000;10:535-545
8. Tong FC, Cloft HJ, Joseph GJ, Rodts GR, Dion JE. Transoral approach to cervical vertebroplasty for multiple myeloma. *AJR Am J Roentgenol* 2000;175:1322-1324
9. Schachar NS. An update on the nonoperative treatment of patients with metastatic bone disease. *Clin Orthop* 2001;382:75-81
10. Debussche-Depriester C, Deramond H, Fardellone P, et al. Percutaneous vertebroplasty with acrylic cement in the treatment of osteoporotic vertebral crush fracture syndrome. *Neuroradiology* 1991;33:149-152
11. Mathis JM, Barr JD, Belkoff SM, Barr MS, Jensen ME, Deramond H. Percutaneous vertebroplasty: a developing standard of care for vertebral compression fractures. *AJNR Am J Neuroradiol* 2001;22: 373-381
12. Kim HJ, Lee SK, Hwang HY, et al. Percutaneous vertebroplasty in osteoporotic vertebral body compression fracture. *J Korean Radiol Soc* 2001;44:145-151
13. Heini PF, Walchli B, Berlemann U. Percutaneous transpedicular vertebroplasty with PMMA: operative technique and early results. A prospective study for the treatment of osteoporotic compression fractures. *Eur Spine J* 2000;9:445-450
14. Centenera LV, Choi S, Hirsch JA. Percutaneous vertebroplasty treats compression fractures. *Diagn Imaging* 2000;22:147, 148, 153
15. Gangi A, Kastler BA, Dietemann JL. Percutaneous vertebroplasty guided by a combination of CT and fluoroscopy. *AJNR Am J Neuroradiol* 1994;15:83-86
16. Jensen ME, Evans AJ, Mathis JM, Kallmes DF, Cloft HJ, Dion JE. Percutaneous polymethylmethacrylate vertebroplasty in the treatment of osteoporotic vertebral body compression fractures: technical aspects. *AJNR Am J Neuroradiol* 1997;18:1897-1904
17. O'Brien JP, Sims JT, Evans AJ. Vertebroplasty in patients with severe vertebral compression fractures: a technical report. *AJNR Am J Neuroradiol* 2000;21:1555-1558
18. Jung ES, Lee YK, Baek SI. Differences of bone mineral density between osteoporotic group with or without compression fracture of the spine. *J Korean Soc fractures* 1998;11:629-633
19. Cortet B, Cotten A, Boutry N, et al. Percutaneous vertebroplasty in the treatment of osteoporotic vertebral compression fractures: an open prospective study. *J Rheumatol* 1999;26:2222-2228
20. Deramond H, Derrasson R, Galibert R. Percutaneous vertebroplasty

- ty with acrylic cement in the treatment of aggressive spinal angiosarcomas. *Rachis* 1989;1:143-153
21. Cotten A, Boutry N, Cortet B, et al. Percutaneous vertebroplasty: state of the art. *Radiographics* 1998;18:311-320
 22. Kim SW, Chung YK. Long term follow-up of osteoporotic vertebral compression fractures according to the morphologic analysis of fracture pattern. *J Korean Spine Surg* 2000;7:611-617
 23. Jang JS, Moon SH. Correlation of the bone mineral density with morphometric dimensions and characteristics of osteoporotic vertebral fracture. *J Korean Orthop Assoc* 1998;33:375-385
 24. Deramond H, Depriester C, Galibert P, Le Gars D. Percutaneous vertebroplasty with polymethylmethacrylate. Technique, indications, and results. *Radiol Clin North Am* 1998;36:533-546
 25. Jensen ME, Dion JE. Percutaneous vertebroplasty in the treatment of osteoporotic compression fractures. *Neuroimaging Clin N Am* 2000;10:547-568
 26. Grados F, Depriester C, Cayrolle G, Hardy N, Deramond H, Fardellone P. Long-term observations of vertebral osteoporotic fractures treated by percutaneous vertebroplasty. *Rheumatology* 2000;39:1410-1414

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Percutaneous Vertebroplasty for the Treatment of Osteoporotic Vertebral Compression Fractures¹

Jin-Young Park, M.D., Seung Cheol Kim, M.D.², Jee Young Lee, M.D.², Sang Hoon Cha, M.D.³

¹Department of Orthopedic Surgery, College of Medicine, Dankook University

²Department of Radiology, College of Medicine, Dankook University

³Department of Radiology, College of Medicine, Choongbuk University

Purpose: To assess the usefulness of percutaneous vertebroplasty for the treatment of painful osteoporotic vertebral compression fractures.

Materials and Methods: Eighty five patients [70 women and 15 men aged 51 - 88 (mean, 70) years with 148 vertebral compression fractures underwent percutaneous vertebroplasty. The causes of fracture were slip, lifting, fall, traffic accident, walking, and other unknown causes; the duration of pain varied from three days to two years. All patients underwent MRI or CT to assess the recent condition of the fracture, and vertebroplasty was performed under DSA fluoroscopic guidance. Routine clinical follow-up examination involved visual analogue pain-scale testing one and two days after vertebroplasty; the results obtained were compared with those of pre-operative assessment. The outcome of vertebroplasty was assessed in terms of its efficacy and resulting complications, if any.

Results: The procedures were technically successful in all patients. In 73, back pain was relieved within 24 hours; in nine, within 48 hours and in one, within seven days. In two patients, pain relief was insignificant, and one of these died.

Conclusion: Percutaneous vertebroplasty was a useful procedure for treating painful osteoporotic compression fractures.

Index words : Spine, interventional procedures
Spine, fractures
Osteoporosis

Address reprint requests to : Kim Seung Cheol, M.D., Department of Radiology, Dankook University Hospital,
16-5 Anseo-dong, Cheonan-si, Chungnam 330-715, Korea.
Tel. 82-41-637-8275 Fax. 82-41-631-8275 E-mail: kimschl@netian.com