

골다공증을 동반한 척추체 압박골절에 대한 경피적 척추 성형술 - 예비보고 -

가

이 상 구 · 유 찬 종

= Abstract =

Percutaneous Vertebroplasty in the Treatment of Vertebral Body Compression Fracture with Osteoporosis - Preliminary Report -

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Objective : Percutaneous vertebroplasty is an effective and minimally invasive procedure consisting of the injection of a PMMA(polymethyl methacrylate) into the vertebral body compression fracture with osteoporosis.

Materials and Methods : Twenty - eight procedures were performed for vertebral body compression fractures with osteoporosis in 25 patients(22 women, 3 men). The mean age was 65.9 years old. The inclusion criteria for percutaneous vertebroplasty were 1) acute vertebral body compression fracture with osteoporosis, 2) expected high operative morbidity in old age, 3) no neurologic deficits, 4) no or minimal canal encroachment, 5) patient refusal of invasive surgery. All patients underwent MR images before the procedure. Under local anesthesia, after the percutaneous needle puncture of the involved vertebra via a transpedicular approach and venography using the water soluble contrast material, PMMA injection was introduced into the fractured vertebral body.

Results : The procedure was technically successful in all patients. All patients experienced excellent pain relief (complete pain relief ; 10, marked pain relief ; 14). One patient experienced marked pain relief, however, the patient died during the follow - up period due to stomach cancer. There were twelve paravertebral tissue leaks, twelve paravertebral venous plexus leaks, four epidural leaks and one intradiskal leak, but no clinically significant complications occurred in all patients.

Conclusion : Percutaneous vertebroplasty is a valuable procedure in the treatment of vertebral body compression fracture with osteoporosis, providing immediate pain relief and early mobilization. MRI is the most reliable diagnostic tool for identifying painful fractured vertebral body.

KEY WORDS : Vertebroplasty · Osteoporosis · Vertebral compression fracture · PMMA (polymethyl methacrylate).

서 론

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가 가

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10)

(hemangioma), (myeloma)
 thylmethacrylate(PMMA) Polyme -
 broplasty) (verte -
 1)6)7)10)13)15)22),
 CT
 (fluoroscopy) 가 2)5)8)9)12)14)16).
 2)14).

대상 및 방법

1998 7
 3 가 25

1. 적용 범위

- 1) 가 , 2)
 , 3)
 , 4) 가
 , 5)

2. 척추 성형술 전 검사

MRI CT
 (bone marrow densimetry), (bone scan)

3. 척추 성형술 후 검사

CT PMMA

4. 통증의 호전정도

tten . Co -

McGill - Melzack score
 (complete, pain relief), (marked pain relief ; score 1, 2), (mild pain relief ; score 3), (abscent pain relief ; score 4, 5)
 5)6)17),
 Cotten .

시 술 방 법

1. 시술 전 준비

(prone position)
 (nasal cannular)
 neuroleptic analgesic midazolam fentanyl .

C - arm

PMMA

2. 경피적 척추체 천공술

(0.25% bupivacaine 1% lidocacine)
 11G (Jamshidi ne -
 edle®)

50%

(Fig. 1A, B).

3. 정맥 촬영술(Venography)

Omnipaque® 5cc Iropamidole®
 (staining) 가
 가 (Azygous vein)
 (pulmo -

nary embolism) 가
 (Fig. 2A, B).

4. PMMA 혼합물의 구성 및 주입 (1 : 2 4) (liquid agent)
 PMMA (sterile barium sulfate powder) PMMA(Polymethylmethacrylate)*

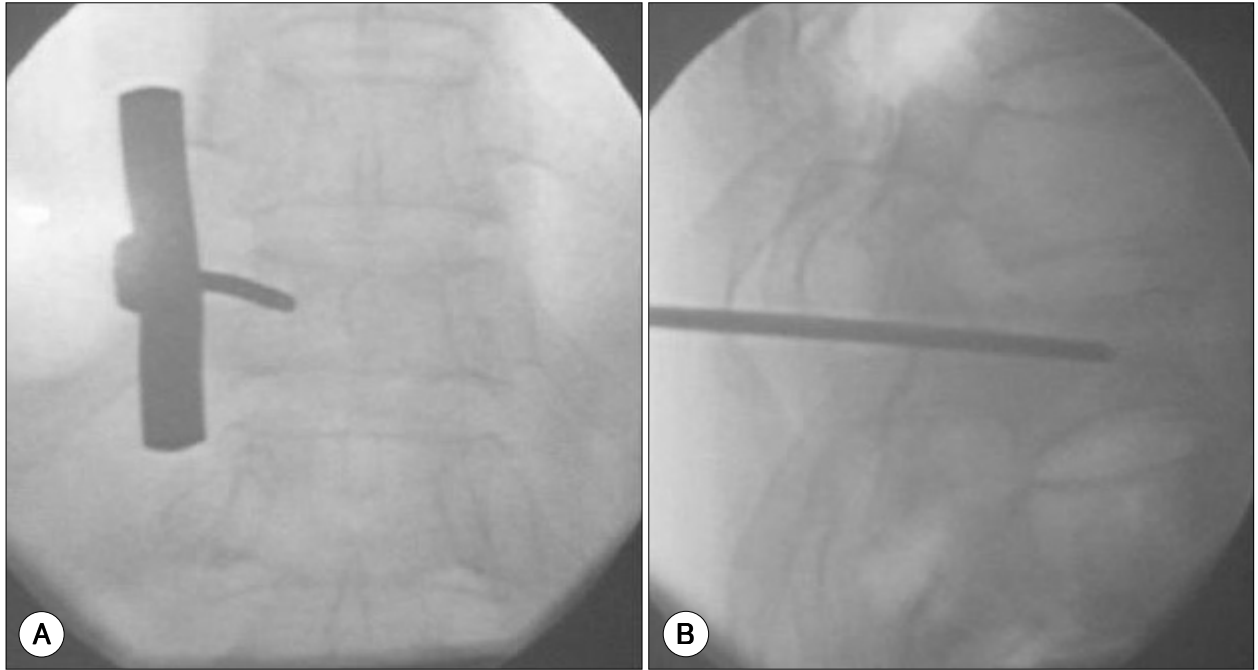


Fig. 1. The 11G biopsy needle(Jamshidi) was advanced into the pedicle by the percutaneous approach. Under the fluoroscopic view, anteroposterior(A) and lateral(B) planes showing the correct position of the needle.



Fig. 2. Venography : Injection of contrast material in the anteroposterior(A) and lateral(B) planes demonstrating the fillings of the body trabeculae before the drainage of the paravertebral venous plexus.

PMMA 가 가 Bone cement ANTIBIOTIC SIMPLEX®

PMMA 가
 PMMA 가
 PMMA 가
 1cc 2cc
 Luer - Lok
 2 4cc

(Fig. 3A, B).

PMMA가
 PMMA가

결 과

1. 연령 및 성별분포

50 1 , 60 12 , 70 8
 80 1
 3 22 가
 65.9

2. 골절부위 및 원인

8 5

12 11 , 2 6 2
 3
 22 가
 3

3. 특수검사

MRI CT MRI , T₂
 T₁

(Fig. 4A, B).

4. 통증 호전시기 및 보행시기

2.16 1
 가 가 11 44%
 가
 가 3.76 11 3
 가

5. 통증효과

Cotten
 10 , 14
 . 1

(Table 1).

6. PMMA 주입 및 주입량

25 28

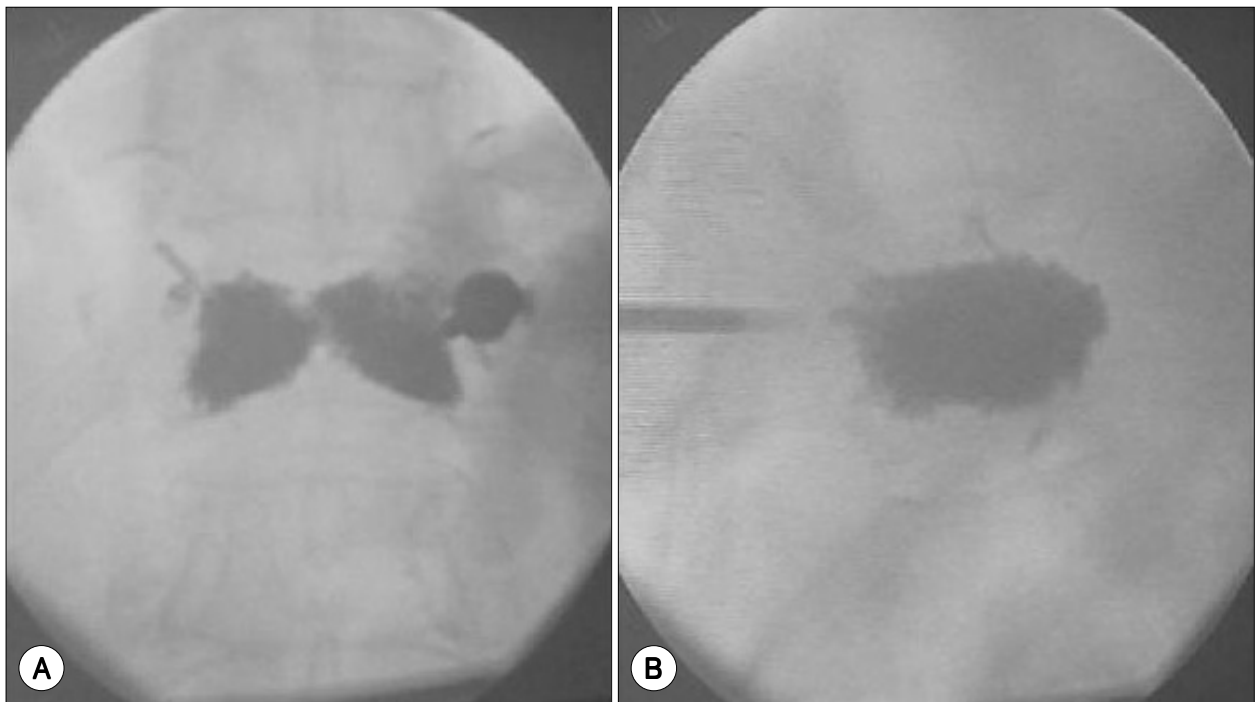


Fig. 3. The fractured vertebral body was filled with PMMA mixture on the anteroposterior(A) and lateral(B) view.

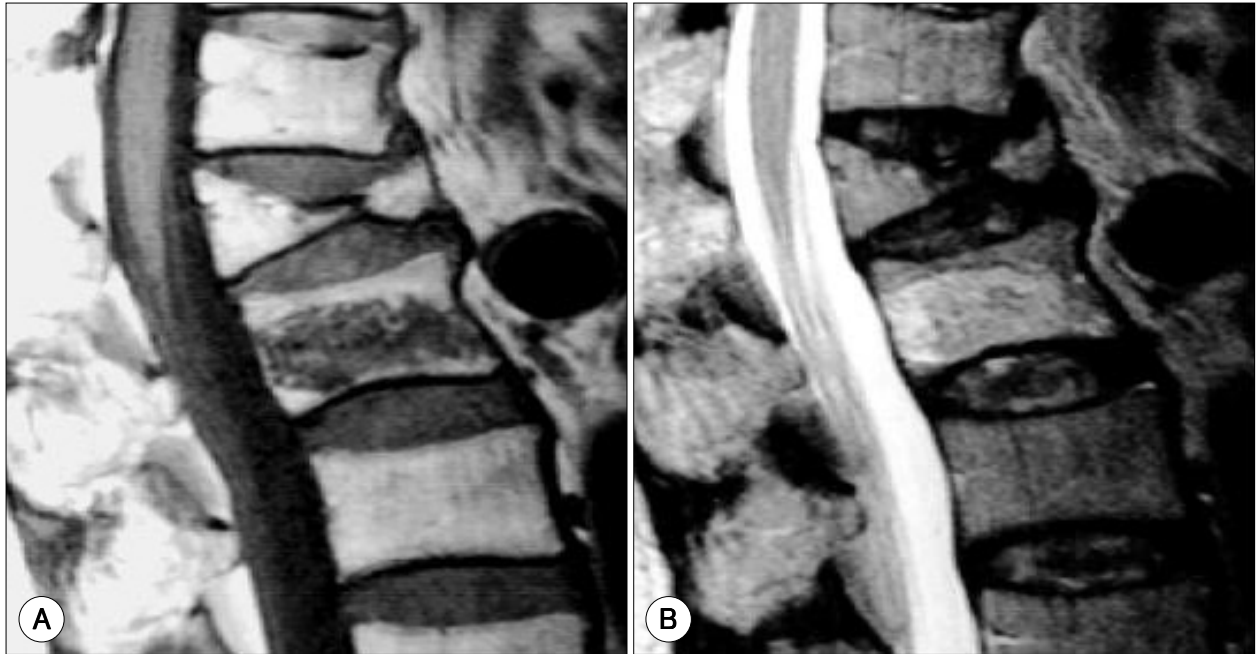


Fig. 4. MR image in a 72-year-old woman showing acute fractured evidence below the suspicious old fractured body. MR finding of acute compression fracture revealing low signal on T1WI(A) and high signal on T2WI(B). PMMA injection was introduced into the acute fractured body site.

Table 1. Degree of Pain Relief after Percutaneous Vertebroplasty according to Cotton's Classification (mean follow-up = 5.7 months)

Degree of pain relief	No. of cases
Complete	14
Marked	10
Mild	0
Abscent	0
	24

One patient experienced marked pain relief, however, the patient

3
7cc

7. 척추체 주위의 PMMA의 유출

PMMA
(Fig. 5A, B, C, D). PMMA 25 18
12
4
12
4
1 가 (Table 2).

8. 합병증

PMMA
2 1

가
고 찰
가
30% 11)
3
1)6)7)10)13)15)22) 1988 Lapras 16)
, 1991 De-
bussche 9)
1992 Gangi 12) CT fluroscopy
1995 Chiras 3)
가
. 1997 Jensen 14) 29
가
가 2)3).

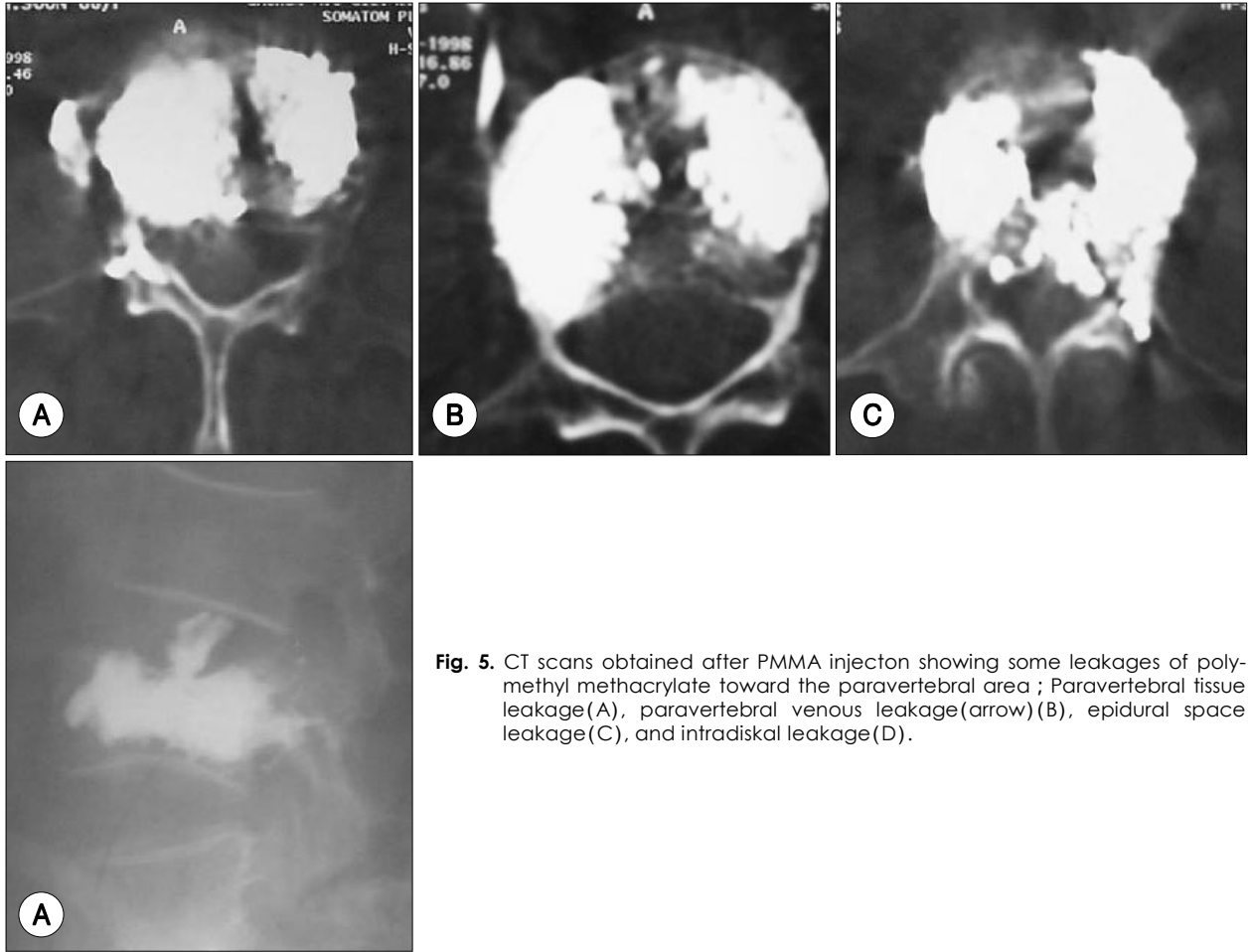


Fig. 5. CT scans obtained after PMMA injection showing some leakages of polymethyl methacrylate toward the paravertebral area ; Paravertebral tissue leakage(A), paravertebral venous leakage(arrow)(B), epidural space leakage(C), and intradiskal leakage(D).

Table 2. Location of leakage of PMMA(n = 18/25 cases)

Location	No. of cases
Paravertebral tissue	12
Paravertebral venous plexus	12
Epidural space	4
Intradiskal space	1
Foramen	0

가
MRI가 가
MRI
T 1 T 2
14) Bone scan 6
90% 가
2
MRI가 bone scan
X-
MRI
72
가 (Fig. 4A, B).
PMMA
가 (CT, MRI, bone
가 0.25 0.5
가

(staining)
(azygous vein) 가
(Fig. 2A, B).

PMMA 가
PMMA가
5)6)12)14)18)20)22)

PMMA 가
PMMA 가
PMMA가

가 , Jensen 14)
PMMA

5)14)
PMMA 가
Wang 21)

3 7cc

2 4cc
Cotten 6)

80

PMMA 가
가

5)6)22) Weil

결 론

22)
52 20
5
Cotten 6)
40 29
15

가 가

1 2
25 18

MRI가 가

가 Weil 22)
PMMA가

- : 1999 6 15
- : 2000 3 6
- :

4 PMMA가

405 - 220 1198
가
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E - mail : nslsg@ghil.com

가
가 5)

References

PMMA

1) Bascoulergue Y, Duquesnel J, Leclercq R, Mottolese C, La-

- pras C : *Percutaneous injection of methyl methacrylate in the vertebral body for the treatment of various diseases : percutaneous vertebroplasty (abstr)*. *Radiology* 169 : 372, 1988
- 2) Bostrom MP, Lane JM : *Future directions. Augmentation of osteoporotic vertebral bodies*. *Spine* 22 : 39-42, 1997
 - 3) Chiras J, Sola-Martinez MT, Weill A, Rose M, Cognard C, Martin-Duverneuil N : *Percutaneous vertebroplasty*. *Rev Med Interne* 16 : 854-859, 1995
 - 4) Convery FR, Gunn DR, Hughes JD, Martin WE : *The relative safety of polymethylmethacrylate*. *J Bone Joint Surg* 57A : 57-64, 1975
 - 5) Cotten A, Boutry N, Cortet B, Assaker R, Demondion X, Leblod D, et al : *Pecutaneous vetebroplasty : state of the art*. *Scientific Exhibit* 18 : 311-320, 1998
 - 6) Cotten A, Dewatre F, Corter B, Assaker R, Leblod D, Duquesnoy B, et al : *Percutaneous vertebroplasty for osteolytic metastases and myeloma : effects of the percentage of lesion filling and the leakage of methyl methacrylate at clinical follow-up*. *Radiology* 200 : 525-530, 1996
 - 7) Cybulski GM : *Methods of surgical stabilixation for metastatic disease of the spine*. *Neurosurgery* 25 : 240-252, 1989
 - 8) Deramond H, Galibert P, Debussche C : *Percutaneous vertebroplasty with methylmethacrylate : technique, method, results (abstr)*. *Radiology* 177 : 352, 1990
 - 9) Debusshe-Depriester C, Deramond H, Fardellone P : *Percutaneous vertebroplasty with acrylic cement in the treatment of osteoporotic vertebral crush fracture syndrome*. *Neuroradiology* 33[suppl] : 149-152, 1991
 - 10) Deramond H, Darrasson R, Galibert P : *Percutaneous vertebroplasty with acrylic cement in the treatment of aggressive spinal angiomias*. *Rachis* 1 : 143-153, 1989
 - 11) Gallagher JC : *Pathophysiology of osteoporosis*. *Sem Nephrol* 12 : 109-115, 1992
 - 12) Gangi A, Kastler BA, Dietemann JL : *Percutaneous vertebroplasty guided by a combination of CT and fluoroscopy*. *Am J Neuroradiol* 15 : 83-86, 1994
 - 13) Harrington KD : *The use of methylmethacrylate for vertebral body replacement and anterior stabilization for pathological fracture-dislocations of the spine due to metastatic malignant disease*. *J Bone Joint Surg[Am]* 63 : 36-46, 1981
 - 14) 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*. *Am J Neuroradiol* 18 : 1897-1904, 1997
 - 15) Kaemmerlen P, Thiesse, Jonas P, Duquesnel J, Bascoulegue Y, Lapras C, et al : *Percutaneous injection of orthopaedic cement in metastatic vertebral lesion(letter)*. *N Engl J Med* 321 : 121, 1989
 - 16) Lapras C, Mottolose C, Deruty R, Remond J, Duquesnel J : *Infection percutanée de Méthyl-méthacrylate dans le traitement de l'ostéoporose dt l'ostéolyse vertébrale grave(technique de P. Galibert)*. *Ann Chir* 43 : 371-376, 1989
 - 17) Melzack R : *The McGill pain question-naire : Major properties and scoring methods*. *Pain* 1 : 275-279, 1975
 - 18) Philips H, Cole PV, Lettin AWF : *Cardiovascular effect of implanted acrylic cement*. *Br Med J* 3 : 460-461, 1971
 - 19) Saha S, Paul S : *Mechanical properties of bone cement : review*. *Biomed Mater Res* 18 : 435-462, 1984
 - 20) Schlag G, Schliep HJ, Dingeldein E, Grieben A, Rinsdore W : *Does methylmethacrylate induce cardiovascular complications during alloarthroplasty surgery of the hip joint?* *Anaesthesist* 25 : 60-67, 1976
 - 21) Wang GW, Wilson CS, Hubbard SL : *Safety of anterior cement fixation in the cervical spine : in vivo study of dog spine*. *South Med J* 77 : 178-179, 1984
 - 22) Weil A, Chiras J, Simon JM, Rose M, Sola-Martimez T, Enkaoua E : *Spinal metastases : indicatiосn for and results of percutaneous injection of acrylic surgical cement*. *Radiology* 199 : 241-247, 1996