

Case Report

Extreme Multi-Level Percutaneous Vertebroplasty for Newly Developed Multiple Adjacent Compression Fractures

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Osteoporotic patients who undergo percutaneous vertebroplasty (PVP) have the risk of a repeated collapse of their adjacent vertebral body due to alteration of load transfer into the adjacent vertebral body. The authors have experienced a rare case of repeated osteoporotic vertebral compression fractures (VCF) resulting in extreme multi-level PVP. A 74-year-old female developed severe back pain after slipping down one month ago. Her X-ray and MR images indicated a T11 VCF. She underwent successful PVP with polymethylmethacrylate (PMMA). Two weeks later, she returned to our hospital due to a similar back pain. Repeated X-ray and MR images showed an adjacent VCF on T12. A retrieval of PVP was performed on T12, which provided immediate pain relief. Since then, repeated collapses of the vertebral body occurred 12 times in 13 levels within a 24-month period. Each time the woman was admitted to our hospital, she was diagnosed of newly developed VCFs and underwent repeated PVPs with PMMA, which finally eased back pain. Based on our experience with this patient, repeated multiple PVP is not dangerous because its few and minor complications. Therefore, repeated PVP can serve as an effective treatment modality for extreme-multi level VCFs.

KEY WORDS : Percutaneous vertebroplasty · Extreme multi-level vertebroplasty compression fracture.

INTRODUCTION

Vertebral compression fractures (VCFs) are considered as the most common complication of osteoporosis. This can be a significant burden for patients, because it impairs their physical activities and quality of life. There is also the possibility for the complication to lead to progressive kyphotic deformity. Most VCFs are given traditional treatment, such as bed rest, analgesics and orthotics, etc. However, prolonged bed rest may lead to bone demineralization, muscle weakness and poor general conditions. As a result, percutaneous vertebroplasty (PVP) has been developed to provide immediate stabilization and pain relief with early mobilization. It is also regarded as an effective and relatively safe technique, but at the same time, it also carries the risk of some complications, such as the leakage of cement into the neural canal or vessels. Subsequ-

ent VCFs in other vertebral bodies can occur due to the alteration of load transfer. We have experienced a case of repeated VCFs and have performed extreme multi-level PVPs with promising results.

CASE REPORT

A 74-year-old female developed severe back pain after slipping down a month ago. Her X-ray and MR images demonstrated a T11 VCF (on BMD, T score; -5.82). She underwent PVP with polymethylmethacrylate (PMMA), and was prescribed risedronate and calcium carbonate mixed with vitamin D in order not to aggravate the osteoporotic bone. Two weeks later, she returned to our hospital due to similar back pain. She slipped down again and was admitted for severe back pain. Repeated X-ray and MR images showed an adjacent VCF on T12. We gave her conservative treatments, including the facet joint block, medication and bed rest. Despite the conservative treatment, her symptoms did not subside, so we decided to perform PVP on T12. After the retrieval of PVP, she was relieved of pain. A year later, she revisited our hospital due to the same com-

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plaint after an automobile accident. Our radiologic findings including the X-ray and MRI, indicated another fracture on L3 remote to the previously treated levels. We performed PVP on L3. The procedures were done by the transpedicular approach, which was divided as a bipedicular or unipedicular approach. We decided the direction of approach by the more painful side and MRI findings. Four months later, she complained of back pain once more after slipping down again. We diagnosed her with a newly developed VCF on T9, and performed PVP.

Overall, we performed PVP 12 times on 13 levels within a 24-month period from July 2003 to May 2006. Every time she visited us due to severe back pain, we rechecked her X-ray and MRI. Whenever she was diagnosed with a newly developed VCF, we performed PVP repeatedly. The levels consisted of T5, 6, 8, 9, 10, 11, 12, L1, 2, 3, 4, 5, S1 (a total of 13 levels). The patient slipped down very often. We firmly told her to be cautious in her movements but she didn't heed our warning. The visual analogue scale (VAS) was 10 for the first time. The last VAS was 2. Mean

duration between the VCFs was about 3 months. Fortunately, there were no noted complications. Nowadays, the patient is active and satisfied with the treatment (Table 1, Fig 1).

DISCUSSION

Severe back pain in the elderly is usually due to osteoporosis. Major symptoms are pain, tenderness, limitation in mobility, collapse of the body resulting to the kyphotic deformity and loss of independence. The pain is typically localized to the fracture site and sometimes radiates around the flank and buttocks. Traditionally, osteoporotic VCFs have been treated with absolute bed rest, bracing, physical therapy, and analgesic medication. Unfortunately, bone loss is accelerated due to disuse; patients who are restricted to bed rest for long periods of time increase their risks of developing new fractures and other serious medical problems. Therefore, early ambulation is an important factor in the recovery of osteoporotic VCFs^{2,6}.

Due to these reasons, PVP has rapidly evolved as an effective, minimally invasive procedure for the treatment of VCFs. Many studies demonstrating the significant improvements in pain and mobility have already been published¹.

With the advent of minimally invasive techniques of cement augmentation through PVP, there has been an increase in the number of surgically treated cases. PVP augments the fractured vertebral body with cement, restores strength and improves stiffness, and provides significant or complete pain relief and

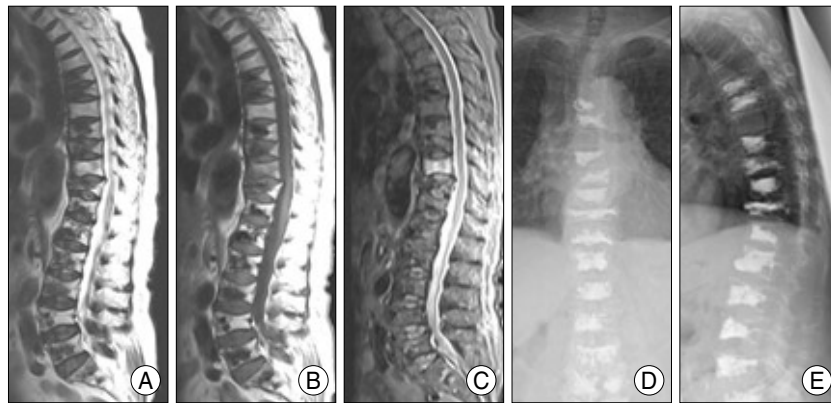


Fig. 1. A, B and C : Last T2, T1 & fat suppression T2 sagittal magnetic resonance images demonstrating the newly developed compression fracture on T10. D and E : Last thoracolumbar spine radiographs of anteroposterior & lateral image.

Table 1. Summarized review of extreme multi-level compression fractures

	Fracture level	Date of PVP	Intervals of PVP (days)	History	Amounts of PMMA (cc)	Complication	Approach [†]
1	T11	8/7/2003		S/D	3	None	Rt
2	T12	18/8/2003	40	S/D	2.5	None	Rt
3	L3	16/8/2004	363	TA	3	None	Lt
4	T9	19/1/2005	157	S/D	2	None	Lt
5	T6,8	6/4/2005	77	Working	2.5	None	Rt
6	T5	9/5/2005	33	Pneumonia*	2.5	None	Rt
7	L4	25/7/2005	75	Working	3.5	None	Lt
8	L2	29/8/2005	34	S/D	3	None	Lt
9	L1	7/10/2005	38	no history	4	None	Rt
10	L5	28/10/2005	22	S/D	4	None	Rt
11	S1	22/2/2006	114	S/D	5 (Rt), 3 (Lt)	None	Both
12	T10	29/5/2006	97	S/D	4	None	Lt

*she was admitted to other hospital due to pneumonia, and got a newly developed compression fracture, [†] transpedicular approach (both or unilateral). S/D : slipping down, TA : traffic accident, PVP : percutaneous vertebroplasty, PMMA : polymethylmethacrylate

activity⁸⁾. The mechanism by which the injected cement relieves pain is still debated.

Thermal, chemical, and mechanical effects have been reported as possible mechanisms. However, with PVP, mechanical stabilization appears to be the most likely mechanism of pain relief⁹⁾. Though the possibility of complication related to PVP is not so high, some reported cases include the leakage of cement into the vessels or neural canal⁴⁾. Because it may increase results that could be harmful, the operator must pay attention to the leakage of cement into the vessels or neural canal. Another expected complication is subsequent VCFs¹⁰⁾.

Grados et al. reported that the subsequent VCFs occur more frequently in a vertebroplastic patient more than in conservatively treated patient^{3,6)}. Some patients develop a subsequent VCF after PVP. The presence of preexisting vertebral fractures were associated with increased formation of new fractures. The changed weight-bearing effects and increased vertebral stiffness resulting from PVP is the contributing factor in the development of new VCFs after PVP^{5,7,11)}. The majority of the subsequent fractures occur in the vertebral body adjacent to those previously treated. Therefore, we must reevaluate the new fracture in the adjacent vertebral body if pain recur or remains.

In the case presented, we experienced an extreme multi-level subsequent VCFs and yielded good results with repeated PVPs. The newly observed fractures after PVP could be an expression of natural course of the disease, but also may be provoked by adjacent rigid reinforcement.

Osteoporotic patients who have undergone PVP are exposed to risk of repeated collapse of the adjacent vertebral body, so we must explain the possibility of subsequent VCFs preoperatively. In our case, other complications were not detected and the treatment worked well for the patient. Repeated PVP can be an effective treatment modality for subsequent VCFs.

CONCLUSION

Osteoporotic patients who underwent PVP are exposed

to the risk of repeated collapse of the adjacent vertebral body, so we must explain preoperatively the possibility of subsequent vertebral body fractures. Repeated PVP can be an effective treatment modality for subsequent VCFs. Based on our experience, repeated multiple PVPs are not dangerous since, complications are minor and infrequent.

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