

## Effect of Bone Cement Augmentation of Pedicular Screwing for Osteoporotic Lumbar Spine

Kye-Nam Cho, M.D., Hyung-Ku Yoon, M.D., Ho Seung Jeon, M.D.,  
Seung Ju Jeon, M.D., Han Joon Cho, M.D., Jeong Woo Hong, M.D. and Joon Yong Lee, M.D.

*Department of Orthopaedic Surgery, Sung-Ae General Hospital, Seoul, Korea*

*Department of Orthopaedic Surgery, Pochun Joongmoon Medical School\**

*Department of Orthopaedic Surgery, Kwang Myung Sung-Ae General Hospital, Seoul, Korea\*\**

### – Abstract –

**Study Design :** Eighteen patients undergoing bone cement augmentation of pedicular screwing for osteoporotic lumbar spine were reviewed retrospectively.

**Objectives :** To assess the effectiveness of bone cement augmentation of pedicular screwing for osteoporotic lumbar spine.

**Summary of Literature Review :** For the technical limit obtaining the dynamic stability in the bone-screw interface for osteoporotic lumbar spine, the additional device to enhance pedicular screw fixation strength needs.

**Materials and Methods :** We reviewed 18 cases undergoing pedicular screwing and fusion for the osteoporotic (Jikei grade I, II, III/III) lumbar spine from Feb. 2000 to Mar. 2001 with an average follow-up of 1.5 years. Mean age was 69.5 years with 6 male and 12 female. Inclusion criteria was 9 degenerative spinal stenosis, 5 spinal stenosis associated with compression fracture, 2 Kummel's disease, 1 spondylolisthesis and 1 internal disc disruption. We performed bone cement injection around the screws showing significantly low insertion torque, screw pullout or cut-up during surgery. We assessed the radiographic results of sagittal angle correction (SAC) of the fused segment and disc height restoration (DHR) on the preoperative, postoperative and last follow up lumbar lateral views. Clinical results were evaluated according to the Kumano's criteria.

**Results :** Mean sagittal angle at preoperative, postoperative and last follow-up was 11.6-21.6-19.6 ° with mean SAC gain 10 ° ( $p<0.05$ ) and gain loss 2° ( $p>0.05$ ). Mean disc height of each period was 33.3-49.8-43.5% with mean DHR gain 16.5% ( $p<0.05$ ) and gain loss 6.3% ( $p>0.05$ ). The clinical result was analyzed as 14 good, 3 fair and 1 poor. Fusion success was achieved in all. There were 2 perioperative complications of 1 superficial surgical site infection and 1 incomplete L4 root injury, and 6 complications during follow up of 3 compression fractures above fused segment, 1 screw pullout, 1 screw cut-up, and 1 bone cement extravasation into canal.

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Address reprint requests to

**Kye Nam Cho, M.D.**

Department of Orthopaedic Surgery, Sung-Ae General Hospital

#451-5 Shingil-dong, Youngdeungpo-gu, Seoul 150-051, Korea

Tel : 82-2-8407-233, Fax : 82-2-8407-237, E-mail : choknm@hanmir.com

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**Conclusions** : The bone cement augmentation of pedicular screwing for osteoporotic lumbar spine can be an alternative to enhance screw fixation strength.

**Key Words** : Lumbar spine, Osteoporosis, Pedicular screwing, Bone cement augmentation

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**Table 1.** Indications of operation

Indication	No (%)
Degenerative spinal stenosis	9 (50)
Spinal stenosis with compression fracture	5 (27.8)
Kummel's disease	2 (11.1)
Spondylolisthesis	1 (5.55)
Internal disc disruption	1 (5.55)
Total	18 (100)

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**Table 2.** Sagittal angle correction

	Pre-Op	Post-Op	Last F/U
Mean SA*	11.6°	21.6°	19.6°
SAC** Gain	(10°)		
SAC Loss	(2°)		

SA\*, sagittal angle; SAC\*\*, sagittal angle correction

**Table 3.** Disc height restoration

	Pre-Op	Post-Op	Last F/U
Mean DHR*	33.3%	49.8%	43.5%
DHR Gain	(16.5%)		
DHR Loss	(6.3%)		

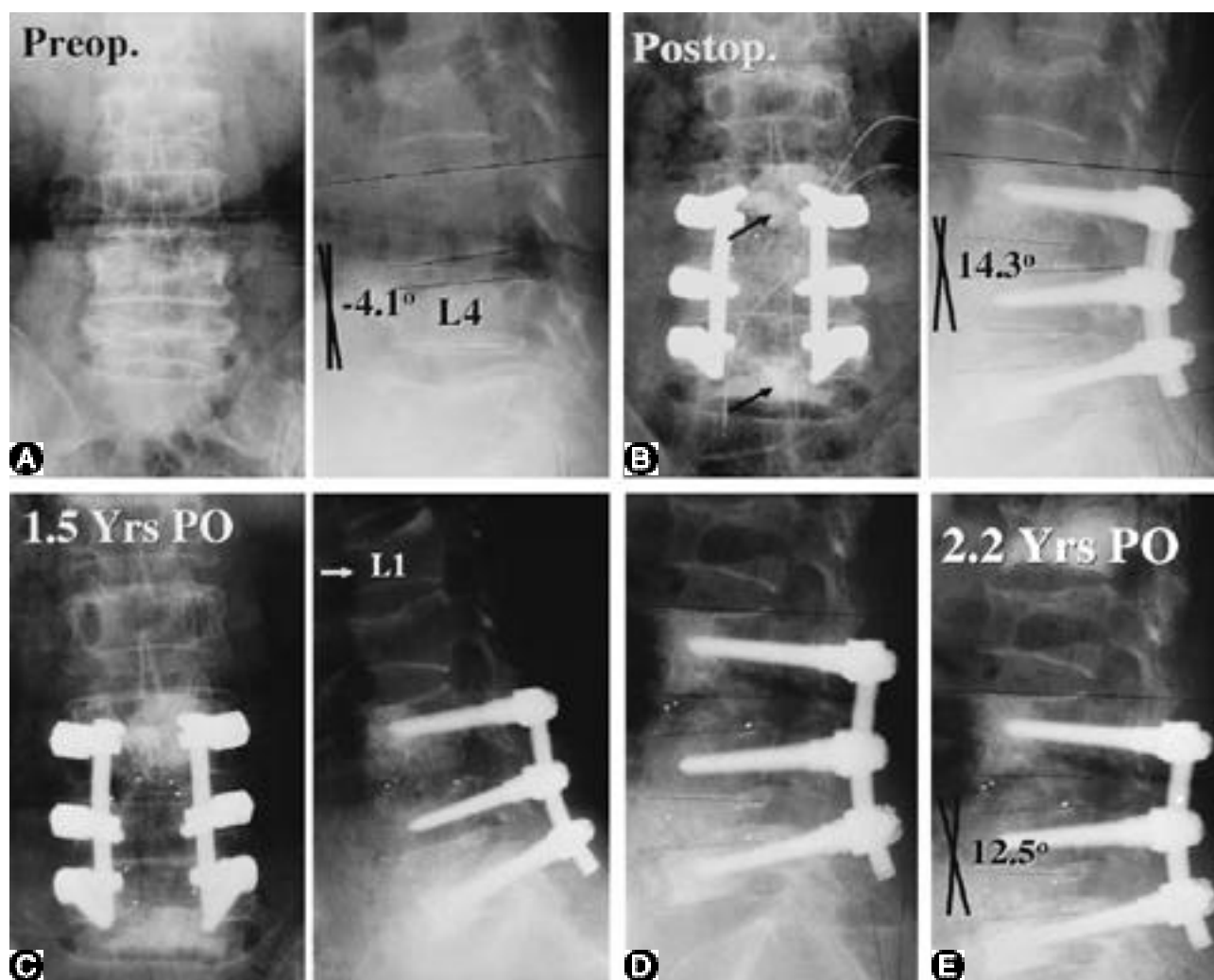
DHR\*, disc height restoration

pullout

**Table 4.** Postoperative complications (N=18)

	perioperative	during F/U
Incomplete L4 root palsy	1	
Superficial SSI*	1	
Compression fracture above fused segment		3
Screw pullout		1
Screw cut-up		1
Bone cement extravasation into canal during revision		1
Total	2 (11.1%)	6 (33.3%)

SSI\*, surgical site infection



**Fig. 1.** A 66-year-old female with spinal stenosis at L3-4-5 associated with compression fracture of L4 and L5 bodies. Preoperative AP and lateral radiographs show Jikei grade II/III osteoporosis with  $-4.1^\circ$  of local L3 to L5 kyphosis (A). Postoperative radiographs after L3-4-5 cage-PLIF and PMMA augmentation for Rt L3 and L5 screws (black arrows) show satisfactory correction of L3 to L5 sagittal angle to  $14.3^\circ$  (B). The 1.5-year follow-up examination shows L1 compression fracture (white arrow) from slipped down accident (C). Two weeks after fracture we performed percutaneous L1-vertebroplasty (D), and 2.2-year follow-up radiograph shows only a minor loss of the correction and no device-related problems (E).

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