



Cost-effectiveness Analysis of Conservative Treatment and Vertebroplasty and Balloon Kyphoplasty in Patients with **Acute Osteoporotic Vertebral Compression Fractures** in **South Korea**

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- ✓ The number of osteoporotic vertebral compression fracture (OVCF) in South Korea has been continuously rising from 117,361 in 2012 to 139,889 in 2016
- ✓ Medical costs for OVCF are also rising annually from \$193,210,353.6 in 2012 to \$284,968,877.7 in 2016
- ✓ No study on cost-effectiveness analysis of cement augmentation for OVCF has been performed in South Korea
- ✓ Purpose : “To investigate the cost-effectiveness analysis of VP and KP for OVCFs in South Korea compared with Conservative treatment”

✓ Patient Selection

- Retrospective study
- January 2014 ~ February 2019
- Single medical center (Hanyang University Hospital)
- Diagnosed as a acute OVCF
- Minimum 1 year follow-up

• Exclusion Criteria

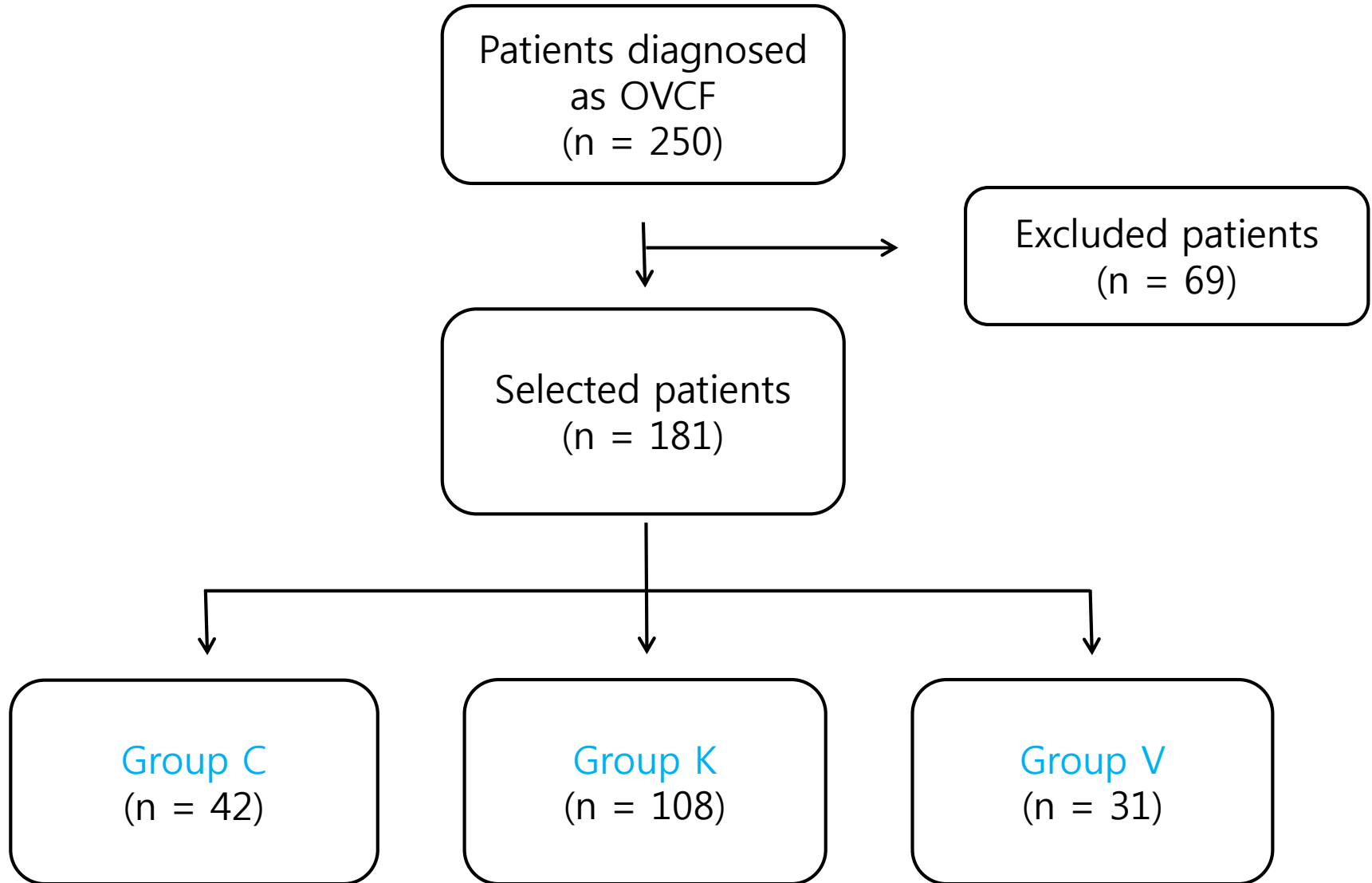
- Multiple compression fractures
- Previous or subsequent spine surgery
- Neurologic deficits
- Pathologic fractures
- Dementia
- Follow up loss

Diagnosis of OVCF

- **Acute pain** with minor trauma or no trauma history
- **Recent fracture** on a MRI or bone scan
- **Osteoporosis** by DXA

Vertebroplasty	Kyphoplasty
Persisting pain despite conservative treatment for more than 2 weeks	Persisting pain despite conservative treatment for more than 3 weeks
	Collpase of vertebral body from 30% to 60%

*In the case of **congestive heart failure, pneumonia, thrombophlebitis, uncontrolled diabetes, chronic renal failure receiving dialysis, age older than 80 years, the procedure was performed **early*****



✓ Demographic data

- Age, Sex, BMI, Follow-up length, Hospital days, BMD

✓ Clinical outcomes

- VAS-BP (Initial/4 weeks follow-up/Final follow-up)
- K-ODI (Initial/Final follow-up)

✓ Cost

- Total Cost (4 weeks and 1 year follow-up)
- Hospitalization cost
 - Hospital room cost, Meal cost, Drug cost, Injection cost, Test cost
 - Operation fee, Operation instrument cost, Rehabilitation cost
- Outpatient cost

✓ Comparison of the Demographic Data Among Groups

	Group C (n = 42)	Group K (n= 108)	Group V (n = 31)	p	
Age (yr)	73.1 (\pm 10.4)	75.9 (\pm 7.8)	77.2 (\pm 9.2)	0.193	
Sex (M/F)	4/38	9/101	6/25	0.203	
Body mass index	22.8 (\pm 3.2)	23.0 (\pm 4.0)	22.5 (\pm 3.5)	0.803	
Hospital days	12.8 (\pm 6.6)	9.1 (\pm 8.4)	10.5 (\pm 7.8)	0.035*	
BMD	-2.9 (\pm 1.0)	-3.1 (\pm 0.9)	-3.0 (\pm 0.9)	0.608	
Comorbidity	HTN	21 (50.0%)	70 (63.6%)	19 (61.3%)	0.304
	DM	8 (19.0%)	24 (21.8%)	10 (32.3%)	0.375
	IHD	6 (14.3%)	17 (15.5%)	3 (9.7%)	0.718
	RF	0 (0.0%)	2 (1.8%)	1 (3.2%)	0.535
	CVA	2 (4.8%)	7 (6.4%)	3 (9.7%)	0.704

Data are presented as mean (\pm SD) or as numbers (percentage)

*Significant difference

HTN indicates hypertension; DM, diabetes mellitus; IHD, ischemic heart disease; RF, renal failure; CVA, cerebrovascular disease, SD, standard deviation

Results



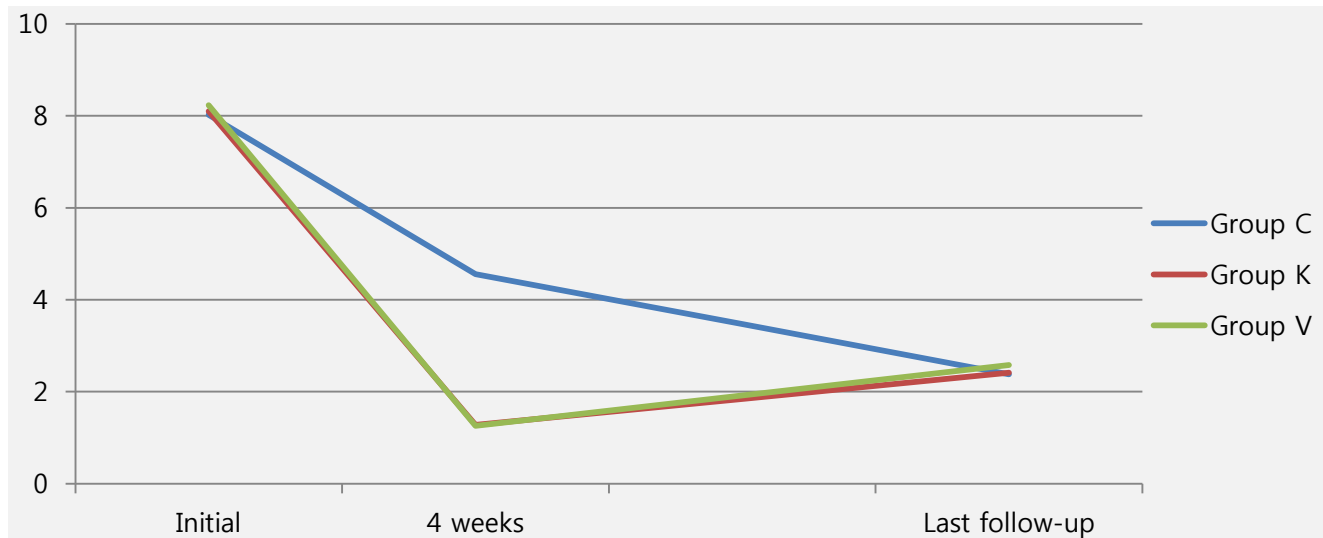
✓ Comparison of the Clinical Outcomes Among Groups

	Group C (n = 42)	Group K (n= 110)	Group V (n = 31)	P
VAS-BP				
Initial	8.0 ± 1.3	7.7 ± 2.1	8.2 ± 1.3	0.321
4 weeks follow-up	4.6 ± 1.2	1.4 ± 0.7	1.3 ± 0.4	0.000*
Final follow-up	2.4 ± 1.0	2.4 ± 1.3	2.6 ± 1.2	0.765
K-ODI				
Initial	38.6 ± 8.4	37.1 ± 8.8	37.3 ± 9.0	0.217
Final follow-up	24.7 ± 6.7	22.6 ± 8.4	21.4 ± 5.7	0.161

Data are presented as mean ± SD

*Significant difference

K-ODI indicates Korean Oswestry Disability Index; VAS, visual analogue scale; SD, standard deviation



✓ Comparison of the Cost Among Groups

	Group C (n = 42)	Group K (n= 110)	Group V (n = 31)	P
Total cost, USD (4 weeks f/u)	3773.8 ± 2254.0	3914.9 ± 1931.8	3443.7 ± 1860.9	0.509
Total cost, USD (1 year f/u)	3813.0 ± 2260.9	3939.1 ± 1961.0	3467.4 ± 1884.3	0.518
Hospitalization cost, USD	3758.4 ± 2261.5	3887.5 ± 1955.7	3420.0 ± 1879.4	0.522
Hospital room cost, USD	1213.4 ± 930.8	825.1 ± 741.4	991.7 ± 646.1	0.022*
Caregiver cost, USD	903.7 ± 466.5	640.1 ± 592.7	739.6 ± 548.8	0.035*
Meal cost, USD	168.7 ± 132.9	117.3 ± 121.4	138.5 ± 115.9	0.071
Drug cost, USD	188.9 ± 149.1	135.4 ± 138.2	167.8 ± 161.0	0.106
Injection cost, USD	165.4 ± 135.8	165.4 ± 152.0	183.8 ± 131.6	0.814
Operation fee, USD	0	253.3 ± 65.1	240.5 ± 0.0	0.276*
Operation instrument cost, USD	0	1063.0 ± 151.2	129.3 ± 0.0	0.000*
Test cost, USD	878.0 ± 666.9	449.0 ± 374.7	599.1 ± 480.1	0.000*
Rehabilitation cost, USD	8.1 ± 25.7	0.1 ± 0.8	1.3 ± 4.3	0.002*
Outpatient cost, USD	54.6 ± 24.8	51.6 ± 39.9	47.4 ± 24.8	0.683

Data are presented as mean ± SD

*Significant difference

K-ODI indicates Korean Oswestry Disability Index; VAS, visual analogue scale; SD, standard deviation

- ✓ Hospitalization days of group C was significantly longer than that of group K

No significant difference among groups in other demographic data

VAS-BP of group K & V was significantly lower than that of group C at 4 weeks follow-up

Hospitalization days may have been shortened due to improved acute pain after VP or KP

- ✓ **No** significant difference in the **total cost among groups**, but there was a difference in the detail

Hospital room cost : group C > group K

Caregiver cost : group C > group K

Test cost : group C > group K

Operation fee : group K & V > group C

Operation instrument cost : group K > group V > group C

Conservative treatment tend to cause longer hospital days and additional test costs !

✓ Limitation

- Retrospective study
- Calculate only costs up to one year after injury
- Selection bias due to difference in the number of patients of groups
- Only measured costs for treatment at this center, it did not include costs paid to other medical centers after being discharged from this center
- **Could not evaluate** the value of **early ambulation, early returning to daily activity living, socioeconomic gain and emotional gain** in group K & V

Cement augmentation is cost-effective treatment of OVCF compared to conservative treatment in South Korea for 4 weeks follow-up regarding to acute pain.

*Cement augmentation is **not cost-effective treatment of OVCF** compared to conservative treatment in **South Korea** for 1 year follow-up regarding to **pain and disability**.*

*However, it is beneficial to **acute pain, early ambulation, socioeconomic gain, emotional gain** with the **same cost**.*

- ✓ **Disclosure declaration**
- ✓ **none of the authors has any potential conflict of interest**
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