

The Efficacy of rhBMP-2 Versus Autograft for Posterolateral Lumbar Spine Fusion in Elderly Patients

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Introduction

- Elderly patients generally have poorer bone quality and potentially less bone available for harvest when compared to their younger counterparts.
- Elderly patients may also have more overall health issues with multiple medical comorbidities
- For these reasons, a number of studies have reported poor surgical outcomes in elderly patients when autograft is used as a bone grafting material, thereby leading to the exploration of comparable alternatives.
- One possible alternative is to induce fusion with rhBMP-2

Purpose

- To evaluate the efficacy of rhBMP-2 with allograft versus autograft for posterolateral lumbar fusion in patients 65 years and older

Materials

- 127 patients
- UCLA Medical Center, Comprehensive Spine Center
- Instrumented PLF between 2002 and 2006
- At least 2 years follow-up
- Group A (n=34) : 65 years and older, rhBMP-2 with allograft
- Group B (n=52) : less than 65 years, rhBMP-2 and allograft
- Group C (n=41) : 65 years and older with autograft only

		Group A (n=34)	Group B (n=52)	Group C (n=41)
Sex	M / F	18/16(47.1%)	20/32 (61.5%)	17/24(58.5%)
Follow-up (months)		38.3±7.4	39.2±11.7	34.7±8.2
Comorbidity	- / +	16/18(52.9%)	43/9(17.3%)	17/24(58.5%)
Osteoporosis	- / +	20/14(41.2%)	46/6(11.5%)	23/18(43.9%)
Smoke	- / +	29/5(14.7%)	38/14(26.9%)	34/7(17.1%)
Fusion Level	S * / M ‡	17/17(50.0%)	39/13(25.0%)	13/28(68.3%)
Revision	- / +	22/12(35.3%)	26/26(50.0%)	33/8(19.5%)

* S: Single-level fusion, ‡ M: Multilevel fusion

Methods

- A comparison was made based on fusion rate, fusion time (noticed, solid), clinical results, VAS, perioperative complication and revision rates.
- A comparison was also made based on the presence or absence of risk factors for pseudoarthrosis between the rhBMP-2 (group A) and autograft group (group C) in patients 65 years and older.
- Fusion: presence of bilateral bridging trabecular bone on plan radiographs with less than 3° of translation and less than 5° of angulation on flexion/extension views.
- Fusion time : noticed fusion time and solid fusion time.
- A blinded, independent musculoskeletal radiologist.
- Clinical outcomes: Kirkaldy-Willis criteria
- Fisher exact test, independent t-test

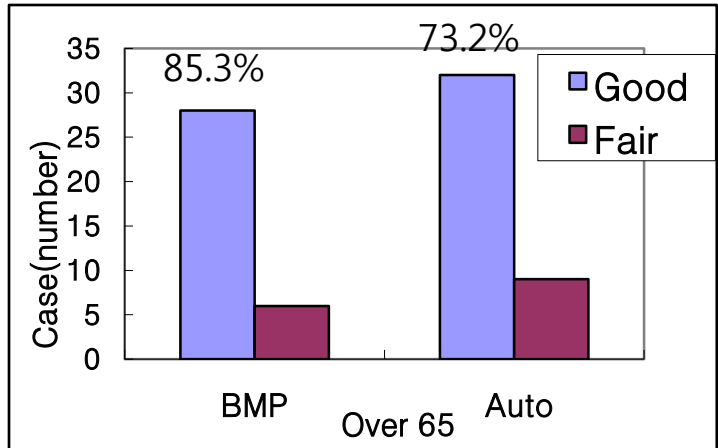
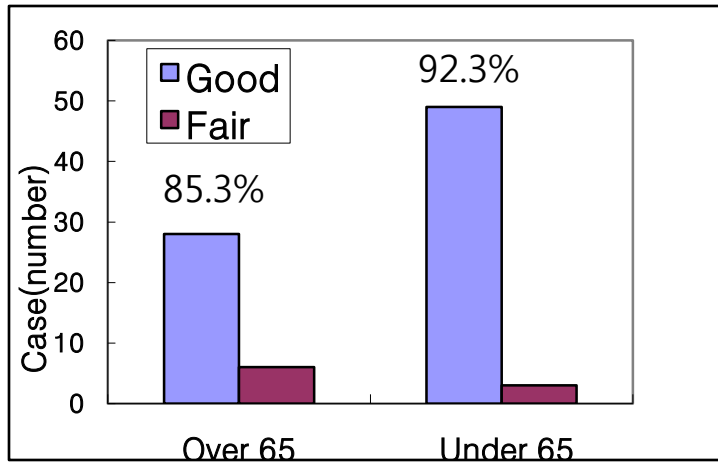
Fusion time and fusion rate in rhBMP-2 groups (Group A and B)

Age	Fusion Time				Fusion Rate				
	Noticed Fusion	Solid Fusion	Noticed Fusion	Solid Fusion	Fusion	No Fusion	%		
N	Mean ± S.D (day)		P-Value		N	N	P-value		
<65	49	83.7 ± 32.5	248.3 ± 77.3	0.010	0.564	49	3	94.2	0.146
≥65	28	95.7 ± 24.4	259.1 ± 76.9			28	6	82.4	

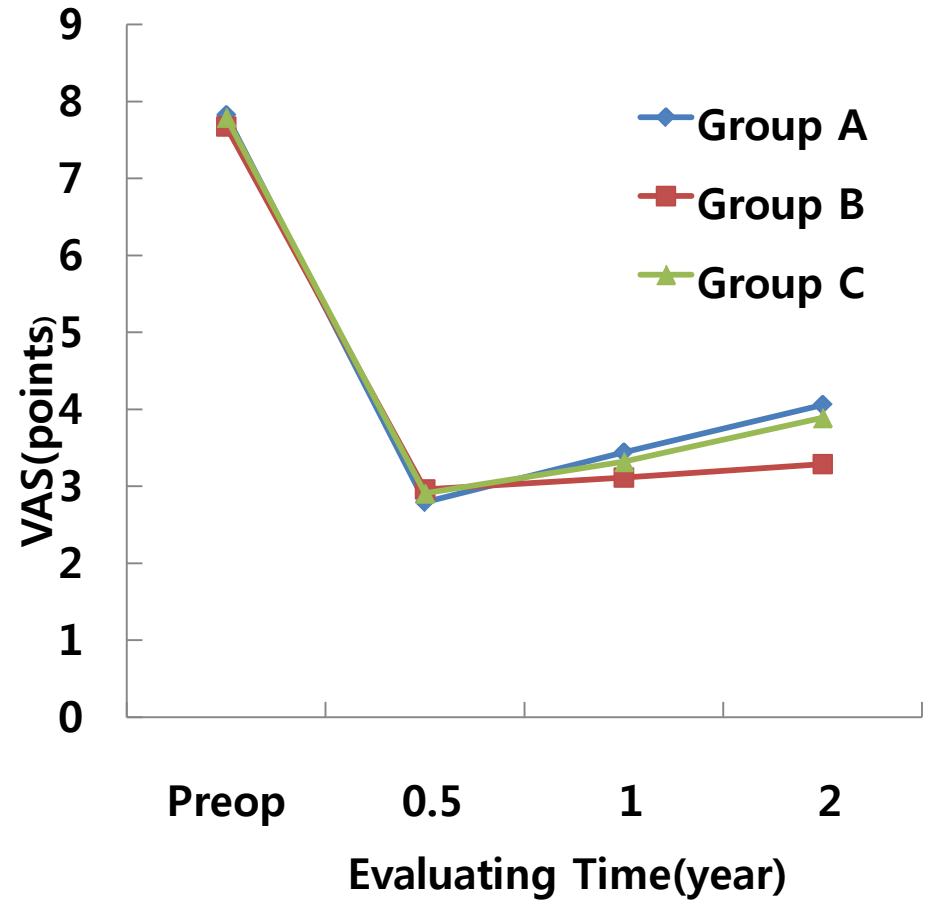
Comparison of rhBMP-2 versus Autograft in patients over 65 years of age with other risk factors for nonunion

Factors	Materials	Fusion Time				Fusion Rate				
		N	Mean±SD (day)	Solid Fusion	P-value	Fusion	No Fusion	%	P-value	
Female	Autograft	19	105.5±26.6	285.5±66.7	0.393	0.247	19	5	79.2	0.681
	BMP	14	98.1±21.3	256.8±71.8			14	2	87.5	
Revision	Autograft	8	101.8±24.2	301.7±72.9	0.588	0.411	8	0	100.0	0.495
	BMP	10	95.1±27.6	270.4±82.1			10	2	83.4	
Multiple Fusion Level	Autograft	21	97.5±17.2	294.1±62.6	0.677	0.972	21	7	75.0	0.719
	BMP	14	100.4±22.9	293.2±61.9			14	3	82.4	
Smoke	Autograft	4	127.6±33.5	319.6±76.9	0.801	0.745	4	3	57.1	1.000
	BMP	3	121.1±32.3	295.7±99.6			3	2	60.0	
Osteoporosis	Autograft	14	103.5±21.1	287.4±59.7	0.516	0.762	14	4	77.8	0.672
	BMP	12	98.5±17.1	279.5±72.2			12	2	85.7	
Comorbidity	Autograft	20	103.5±25.1	289.8±69.4	0.993	0.682	20	4	83.4	0.706
	BMP	14	103.6±19.8	299.9±70.6			14	4	77.8	

Clinical Outcomes



VAS



P=0.041
in Group A and B

Major complications in patients over 65 years of age (Group A and C)

	rhBMP-2 (n=34)	Autograft (n=41)	p-value
Dural tear	1	3	
Cardiac problem	2	4	
Gastrointestinal problem	2	4	
Urinary tract infection	1	2	0.254
Neurological deficit	1	1	
Deep vein thrombosis	3	5	
Wound infection	1	1	
Total	12(35.3%)	20 (48.8%)	

Revision surgery

Group A	Group B	Group C
1/6	0/3	2/9
16.7%	0%	22.2%
A vs B: p=0.480		A vs C: p=0.799

Conclusion

- In patients 65 years and older, rhBMP-2 may lead to acceptable fusion rates and fusion times, good clinical outcomes and reduced perioperative complications.
- The combination of rhBMP-2 and allograft yields equivalent outcomes as autograft in elderly patients undergoing instrumented posterolateral lumbar fusion.
- Additionally, when compared to patients under 65 years of age undergoing posterolateral lumbar fusion, the use of rhBMP-2 was not sufficient to overcome all aspects of the age-related weakened osteoinductive capacity encountered in elderly patients.