

## Wedge Cage(SynCage )

### Anterior and Posterior Surgical Treatment with Wedged Cage (SynCage ) in Lumbar Degenerative Kyphosis

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#### – Abstract –

**Study Design :** Prospective study.

**Objectives :** Analyzing the clinical outcome of operative treatment in lumbar degenerative kyphosis (LDK) by means of anterior and posterior operation using Wedged cage (SynCage ) and pedicle screws.

**Summary of Literature Review :** LDK is common in old farmers who have worked in a stooping posture for decades and is a quite rigid form of kyphosis accompanied by adjacent instability, dystrophic changes of vertebral bodies and weakness of back and hip extensors. For surgical treatment, restoration and maintenance of lumbar lordosis is mandatory for global balance. Anterior release and restoration of disc space with the same morphologic cage seems to be a quite anatomic and harmonious approach.

**Materials and Methods :** Ten LDK patients, who underwent anterior interbody fusion using Wedged cage (SynCage ) and posterior fusion with pedicle screws between 2000 to 2001, were followed up for more than 2 years. The operation was done in one or two stages. We performed anterior release, gradual widening of the intervertebral space with wedge trials of increasing size, insertion of wedged cages filled with auto-, allo- or synthetic bone and posterior pedicle fixation and fusion. We measured the lumbar lordotic angle, sacral inclination, fusion segmental angle, thoracic kyphotic angle and vertical axis line in preoperative, immediate postoperative and follow-up standing X-ray.

**Results :** Mean fusion segments using Wedged cage were 2.8 segments for anterior interbody fusion and 3.4 segments for posterior fusion. Mean sagittal correction angle was 40.3 ° with mean correction loss of 2.6 °. Whole lordosis was 6.9 ° kyphosis preoperatively, which was corrected to 33.4 ° lordosis postoperatively and 30.8 ° lordosis at last follow-up. Mean sacral inclination was corrected from 18.2 ° preoperatively to 37.8 ° postoperatively and 30.7 ° at follow-up. Vertical axis line was corrected from 11.4 cm preoperatively to 0.4 cm postoperatively and 1.3 cm at follow-up. Thoracic lordosis was corrected spontaneously without any surgical extension to the thoracic spine by mean 19.9 ° (0.2 ° lordosis preoperatively to 19.7 ° kyphosis at follow-up). Loss of cardinal signs occurred in 70-80 % of patients and satisfactory clinical results were shown in 90% of patients.

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**Conclusions** : Anterior and posterior fusion using Wedged cage (SynCage ) and pedicle screws showed high efficiency in the correction and maintenance of LDK. It is a good modality in the surgical treatment of lumbar degenerative kyphosis.

**Key Word** : Lumbar degenerative kyphosis, Wedged cage (SynCage ), Pedicle screw, Anterior and posterior fusion.

Wedged Cage (SynCage )

2 가

10

stooping

55 71 62.7 가

1) 3 (30%), 가 7 (70%) . ,

(whole spine)

2)

가

1 1 Cobb

가 3,4) 1988 Takemitsu 5,6) Cobb 1 12

(Fusion

Segmental Angle)

(limbar degenerative kyphosis) Cobb ,

(Sacral inclination) 1, 2 ( -angle)

7) , 3 3) (vertical axis line) C7

80% 76% S1 , smooth trial

8) cage

wedged cage(SynCage )

5~11 ( 8.6 )

가

가 Kirkaldy-Willis 9)

Wedged Cage (SynCage )

SynCage

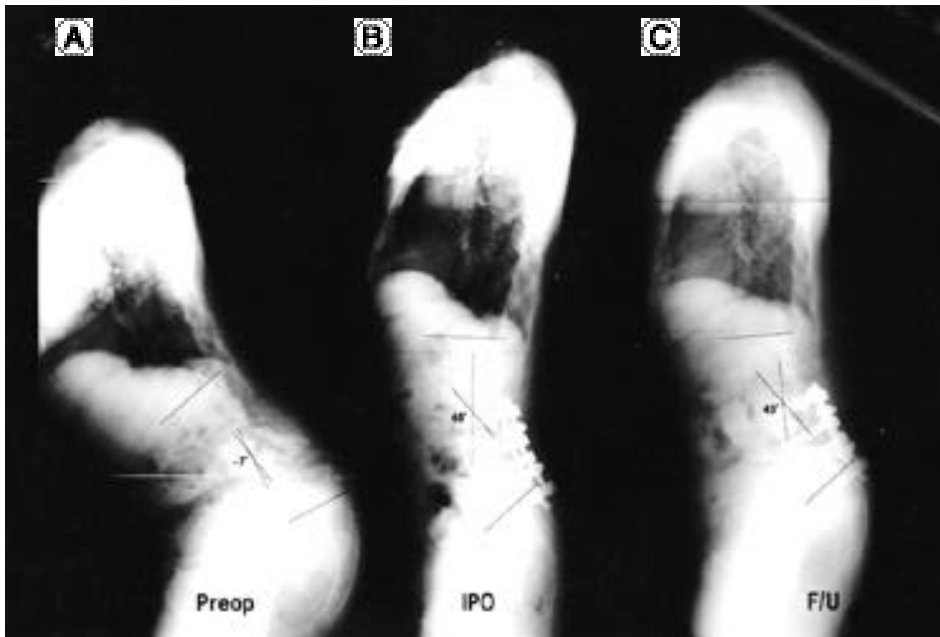
2.9 , 3.4

33.4 40.3 6.9

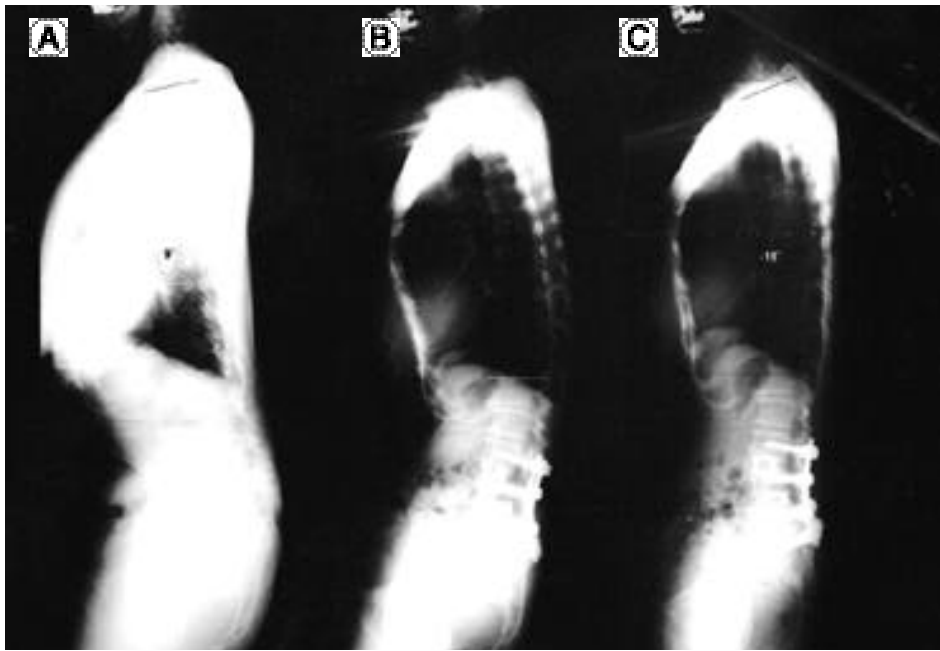
30.8 2.6 (Fig.

1). 14.8

2000 2001 26.1 40.9 , 24.1



**Fig. 1.** (A) Standing lateral radiograph of a 60 year-old female with lumbar degenerative kyphosis was showed kyphosis 7 degree of lumbar lordosis angle. (B) Immediate postoperative standing lateral radiograph was showed 48 degree lodorsis of lumbar lordosis angle. Lumbar lordosis correction was 55 degree. (C) Postoperative 24 month radiograph was showed 43 degree lordosis of lumbar lordosis angle. Correction loss was 5 degree.



**Fig. 2.** (A) Standing lateral radiograph of a 63 year-old female with lumbar degenerative kyphosis was showed lordosis 9 degree of thoracic angle. (B) Immediate postoperative standing lateral radiograph was showed posterior tilt of upper end vertebra. (C) Postoperative 25 month radiograph show 18 degree kyphosis of thoracic angle. Thoracic angle correction was 27 degree.

2.0				12.1	13.3		
18.2		37.8	19.6	19.7	7.6	가	(Fig. 2).
,		30.7	7.1	C7		S1	
.			0.2	11.4 cm		0.4 cm	11cm

Table 1. Results of ten operated cases of LDK

Case	Age	Sex	Associated disease	Method	PreOP					IPO					F/U				
					LLA	FSA <sup>†</sup>	SI	C7-S1	TKA <sup>‡</sup>	LLA	FSA	SI	C7-S1	LLA	FSA	SI	C7-S1	TKA	
1	63	F		PR §L3-L5															
				Ant:L3-L5	-22	-22	-10	8.8	9	25	29	23	0.5	26	30	22	3	-18	
				Post:L3-S1															
2	55	F	Spinal stenosis	Ant:L3-L5															
				Post:L3-L5	-13	-9	25	15.5	13	28	22	39	5.5	14	21	34	1.5	-2	
3	71	M	Spinal stenosis	Ant:L3-S1															
			Spondylolisthesis	Post:L3-S1	25	25	32	-1.5	-38	32	32	41	-5.2	38	33	30	-4.9	-38	
4	60	F	Spondylolisthesis	PR:L4-S1															
				Ant:L3-S1	-7	-30	7	24	39	48	34	46	1.3	43	24	36	9	-8	
				Post:L3-S1															
5	58	F	Instability	Ant:L3-S1															
			Spondylolysis	Post:L3-S1	-15	-15	17	13.4	-9	29	25	43	6.4	21	22	24	4	-13	
6	57	M		Ant:L3-S1															
				Post:L2-S1	0	-6	16	8	3	33	34	37	1	30	32	31	1	-21	
7	58	F	Spinal stenosis	Ant:T12-L3															
				Post:T12-L3	25	-31	39	11	-3	56	0	60	-1	52	-2	46	-2.9	-24	
8	70	M	Old comp. fx L3	Ant:L3-S1															
				Post:T12-S1	-34	-32	14	19.1	-12	31	27	24	-6.1	30	27	28	-4.5	-31	
9	67	F	Spinal stenosis	Ant:L3-S1															
				Post:L3-S1	4	-3	27	3.1	1	26	27	27	2.7	27	26	35	2.5	-20	
10	68	F		Ant:L2-S1															
				Post:L2-S1	-32	-25	15	13	-1	26	31	38	-1.4	27	28	21	4.4	-22	
Ave rage	62.7			Ant: 2.9 Post: 3.4	-6.9	-14.8	18.2	11.4	0.2	33.4	26.1	37.8	0.4	30.8	24.1	30.7	1.3	-19.7	

LLA: lumbar lordosis angle, <sup>†</sup>FSA: Fusion segmental angle, SI: Sacral inclination, <sup>‡</sup>TKA: Thoracic kyphotic angle, §PR: Posterior release, +: Lordosis, -: Kyphosis

Table 2. Clinical Result (Kirkaldy-Willis, 1974)

Excellent	5 cases
Good	4 cases
Fair	1 cases
Poor	0 cases

Table 3. Clinical Result (Loss of cardinal sign)

Loss of cardinal sign	
Loss of forward stooping	8 cases
Restore ability of climbing slop	9 cases
Relief of low back pain	8 cases
Relief of all cardinal sign	7 cases

2,3,4,5) , 1.3 cm 0.9 cm Willis (fair) , L1-2-3 가 5 L5-S1 , 가 3, 4, 5 5-8 L1-2-3 (upper end vertebra) 6 ( 1, 3, 6, 7, 8, 10) , 25.7 (18~38 ) , 4 ( 2, 4, 5, 9) 10.8 (2~20 ) Kirkaldy-

1, 4, 6, 7, 9, 10 20 ,

가 6.9 17) 49 Wambolt

18) 59 19)

(stooping)

9) 9 Kirkaldy-Willis (Table 2),

stooping (L3-S1)

2 (Table 3). 가

가 spiked wedged cage (SynCage ) wedged cage (SynCage )

5~11 ( 8.6 ) , 8

1972 Doherty 10) , L5-S1 Harrington

11,12), 1976 Moe Denis 13)

(anterior column support)

flatback syndrome , , ,

flatback syndrome 20) Nakai 21)

10,13,14,15) 1988 Takemitsu 가

flatback 가 , 19)

(Lumbar degenerative Takemitsu 6)

Kyphosis) 5,6)

70%

가

가 cage

가 22,23,24) 25)

(4 )

(3 ), (1 ), (3 ) 16)

stooping

, 가 ,

가 ,

26,27,28,29)

가

가

80%

cardinal sign

8)

가

. wedged cage

(SynCage )

Wedged Cage (SynCage )

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가

가

, cage

trial

가

## REFERENCES

wedged

cage (SynCage )

가

cage

( 1, 4).

cage

가

가

cage

가

가

cage

wedged

cage (SynCage )

cage spike

2

bicortical

가

,

3

chopin plate

4

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: Wedged Cage (SynCage )

: 2000 2001 Wedged Cage (SynCage )

2 가 10  
1

: SynCage 2.8 , 3.4  
6.9 33.4 40.3 ,  
30.8 2.6 26.1 24.1 2.0  
18.2 37.8 19.6 ,  
11.4 cm 0.4 cm 11 cm 0.2  
19.7 19.9 9

: Wedged Cage (SynCage )  
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: , Wedged Cage(SynCage ),

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6가 18-79

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