

Comparison of Modified Marmot operation and  
Lumbar Spinous Process Splitting Laminectomy  
in lumbar spinal stenosis  
- two years outcome-

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# **Background:** *Less invasive surgery for Lumbar spinal stenosis*

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**Spinous process splitting approach** for lumbar spinal stenosis is less invasive than conventional posterior lumbar decompression surgery.



because

preserve the attachment of paraspinal muscles or the ligaments.

**Two types** of method for Spinous process splitting approach

- 1) Lumbar spinous process splitting laminectomy (LSPSL)**
- 2) Modified Marmot Operation (MM operation)**

*(Uehara M. et al. Asian Spine J 2014)*

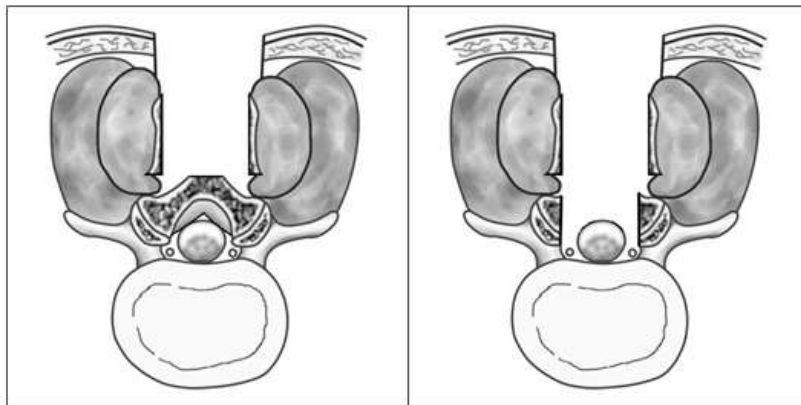
*(Watanabe K. et al. J Neurosurg Spine 2005)*

*(Kawakami M. et al. Spine 2013)*

*(Kanbara S. et al. Spine 2013)*

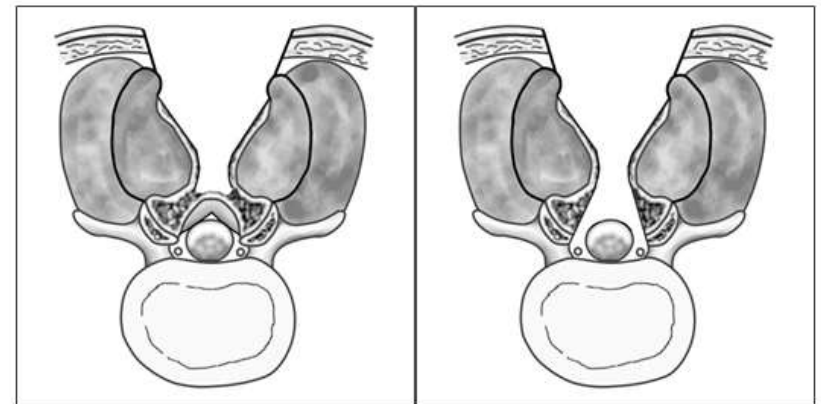
# Purpose

Lumbar Spinous Process Splitting Laminectomy (LSPSL)



VS

Modified Marmot Method



The spinous process was **detached** from the lamina.

The spinous process was **not detached** from the lamina

*(Watanabe et al. J Neurosurg Spine 2005)*

*(Kawakami et al. Spine 2013)*

To clarify the **short-term surgical results.**

# Material : Total **69 patients**

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## inclusion criteria

- age  $\geq$  20
- symptomatic LSS with  $\geq$  1 clinical sign
- imaging evidence of lumbar spinal stenosis
- failure of conservative treatment
- no previous surgery

## exclusion criteria

- previous spine operation
- trauma
- foraminal or extraforaminal stenosis
- degenerative scoliosis
- Spondylolisthesis (required fusion surgery)

- LSPSL (S group) : **37 patients**
- MM Operation (M group) : **32 patients**

# Methods

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## Clinical outcome

- The Japanese Orthopaedic Association(JOA) score
- Oswestry Disability Index (ODI) score  
*preop, postop (3 mths, 6 mths, 1 yr, 2 yr)*

## Laboratory data

- C-reactive protein (CRP)
- creatine phosphokinase (CPK)  
*preop, postop (1 day, 4 days, 7 days)*

## Wound pain

- Visual analogue scale (VAS)  
*postop (1 day, 4 days, 7 days)*

## Safety

- Perioperative complication

# Result -demographic data and intraoperative data-

	S group	M group	p value
Number of patients	37	32	
Sex (male:female)	1.6:1	1.3:1	0.62
age	69.0 (61.0-73.5)	72.5 (64.5-78.0)	0.06
Decompression segments	2.0 (1.0-3.0)	3.0 (2.0-3.0)	<0.05
Operation time	157 (120.5-195.5)	151 (138.3-184.0)	0.69
Blood loss	50 (0.0-130.0)	100 (38.3-243.8)	<0.05

## complication

- S group
  - 1 hematoma
  - 1 surgical site infection
  - 1 dural tear
- M group
  - 1 hematoma
  - 3 dural tear

# Result -clinical outcomes-

	S group	M group	p value
JOA score			
Preoperation	14 (11-17)	14.5 (10.3-19)	0.99
3 month	25 (22-26)	21.5 (17-25.8)	0.21
6 month	25 (22-27)	21.5 (17-25)	<0.05
12 month	25 (22-27)	21.5 (18.3-26.8)	0.06
24 month	25 (23-26.5)	20 (15.3-25.8)	<0.05
Recovery rate(%)			
3 month	70.6 (48.5-77.9)	62.1 (30.8-79.2)	0.18
6 month	66.7 (58.6-87.1)	50 (32.2-69.7)	<0.05
12 month	71.7 (56.3-85.4)	50 (33.3-77.7)	<0.05
24 month	66.7 (58.9-77.5)	37.2 (10.6-69.9)	<0.05
ODI			
Preoperation	45 (37.5-62.5)	52 (31-59.5)	0.95
3 month	22.3 (14.5-36.6)	30 (13.4-51.2)	0.38
6 month	20 (8-40)	36 (22.3-54.5)	0.07
12 month	20 (10-42.3)	28.9 (17.0-37.8)	0.47
24 month	24.5 (8.9-35.6)	40.1 (22.2-61.9)	0.08

# Result -Laboratory data-

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	S group	M group	p value
<b>CRP</b>			
pre OP	0.1 (0-0.1)	0 (0-0.1)	0.76
POD1	1.0 (0.5-1.4)	1.5 (0.8-2.4)	<0.05
POD4	3.3 (2.0-6.4)	4.7 (3.0-8.1)	0.24
POD7	0.9 (0.6-1.7)	1.2 (0.8-1.7)	0.29
<b>CPK</b>			
pre OP	136.5 (79.8-196.5)	122 (84-173.8)	0.78
POD1	159 (104-220.5)	155 (108.3-270.5)	0.93
POD4	112 (64.5-164)	108.5 (75.3-184)	0.49
POD7	75 (40-116.5)	67 (42-122)	0.95

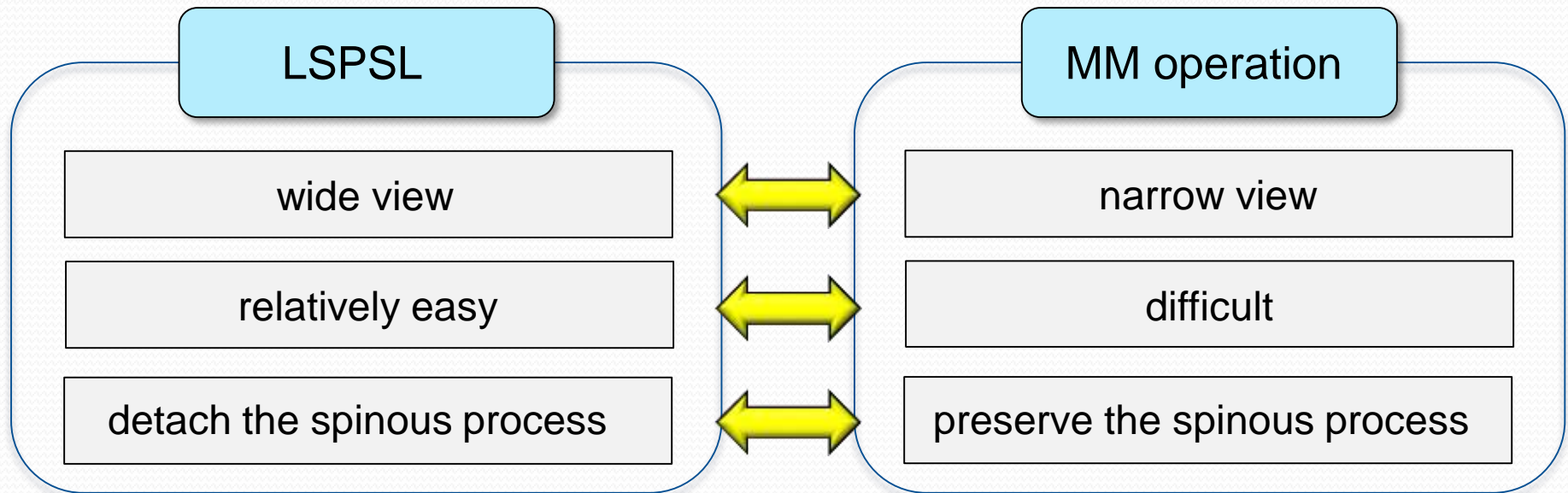


# Result -Wound pain (VAS)-

	S group	M group	p value
pain at rest			
POD1	4.5 (3.0-5.6)	2.0 (0.8-4.3)	<0.05
POD4	1.6 (1.0-2.0)	2.0 (0.0-3.8)	0.75
POD7	0.9 (0.0-2.0)	2.0 (0.2-4.0)	0.06
POD14	0.7 (0.0-1.3)	1.4 (0.0-4.3)	0.47
pain with movement			
POD1	5.7 (2.5-7.2)	5.5 (4.8-7.0)	0.70
POD4	4.5 (1.5-7.0)	4.0 (2.9-7.0)	0.61
POD7	2.0 (1.0-6.0)	3.0 (1.0-5.0)	0.71
POD14	1.5 (0.0-4.5)	2.0 (0.0-5.9)	0.98

# Discussion

-advantage and disadvantage of each procedure-



## In this study

**M group > S group** : blood loss, decompression segments  
CPK (POD1)

**M group < S group** : JOA score and recovery rate (6, 12, 24 mths)  
VAS at rest (POD1)

# *Discussion* -in this study-

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## Why M group resulted in insufficient improve?

- narrow view may lead to incomplete decompression.
- large number of decompression segments might lead to insufficient improve.

## Why VAS in M group was small?

1. paraspinal muscle damage
  - detachment of paraspinal muscles from the posterior elements
  - the pressure and time of retraction by self-retaining retractors
2. pain due to detach the spinous process

## About surgical invasion and safety

- Laboratory data indicate that both surgical procedures were minimally invasive.
- considering perioperative complications, both procedures were sufficiently safe.

# Conclusion

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- In the Modified Marmot Method, **clinical results** did not improve compared to that in LSPSL.
- There were no statistically significant differences between the two surgical procedures regarding **safety**.
- The Modified Marmot Method may reduce **wound pain** during the early postoperative period.

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## Disclosure of Conflict of Interest

*Name of first author: Keisuke Masuda*  
I have no COI with regard to our presentation.