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# Lumbar Degenerative Spondylolisthesis: To Fuse or Not to Fuse?

ADAM L. SHIMER

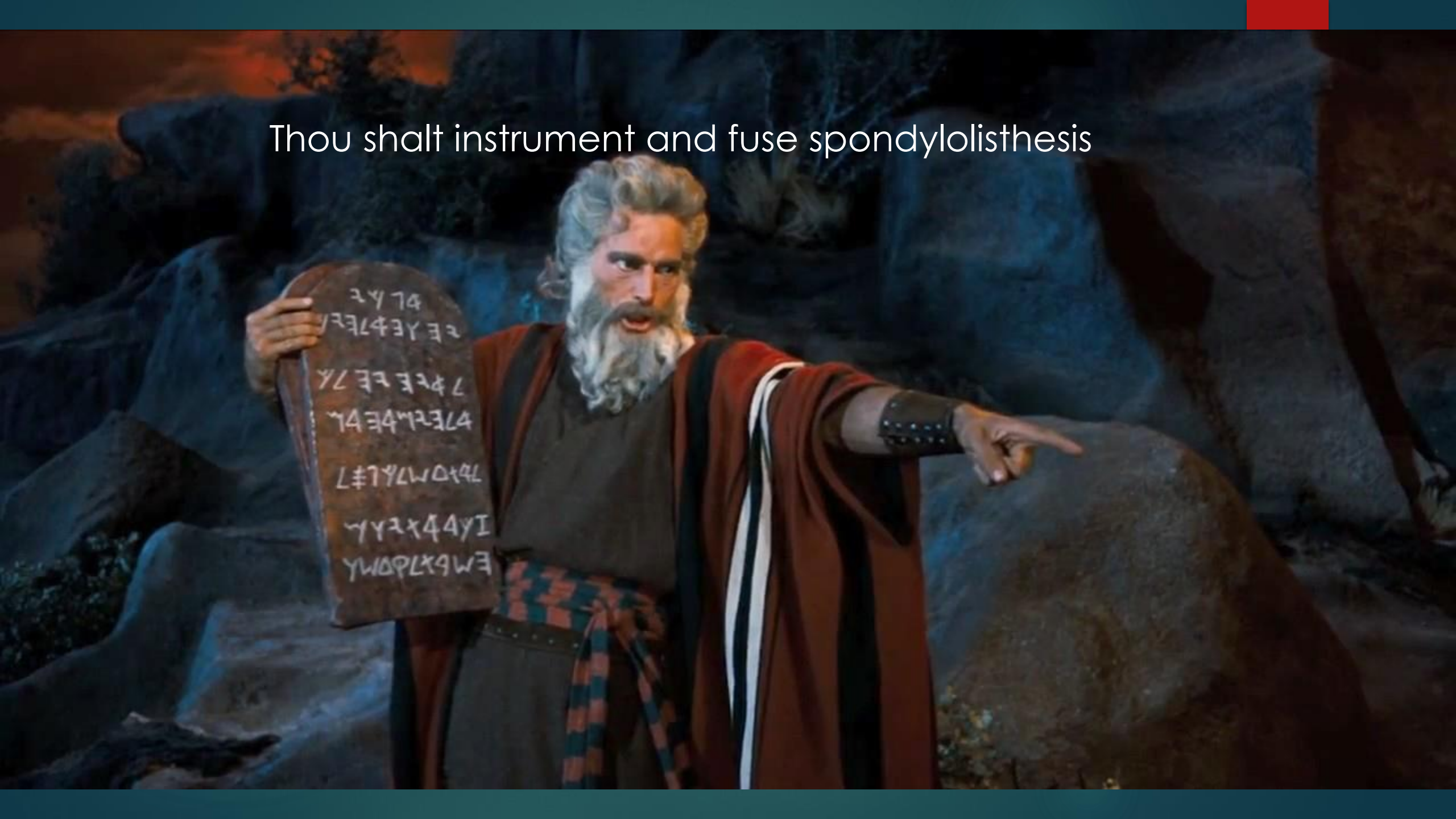
ASSOCIATE PROFESSOR

UNIVERSITY OF VIRGINIA

They are coming for us



Thou shalt instrument and fuse spondylolisthesis



7434\*2314

Thou shalt instrument and fuse spondylolisthesis

## Degenerative I

WITH D

BY HARRY N. HER

From the Section of S

**Table 2. Factors Affecting Fusion Rate**

	Successful Arthrodesis	Pseudarthrosis
Instrumentation	29 (83%)	6 (18%)
No instrumentation	15 (45%)	18 (55%)
Preoperative		
Olisthesis (mm)	8	7
Angulation (°)	8	11
Motion (mm)	3	4
Postoperative		
Olisthesis (mm)	7	7
Angulation (°)	1	8
Motion (mm)	1	3

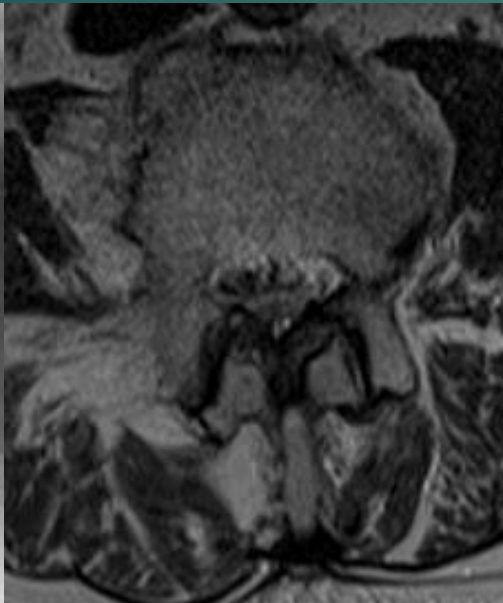
Overall, successful fusion did not influence patient outcome ( $P = 0.435$ ).

‡  $P = 0.002$  (Student t test).

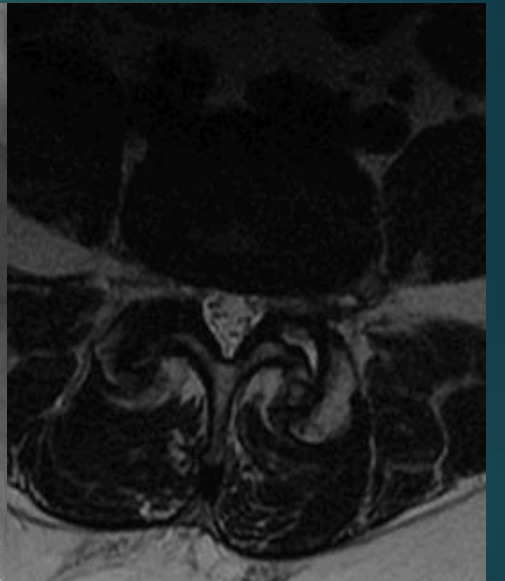


... of Nature, and of Nature's God, on title there, a decent respect to the opinion  
of the People, that secure these rights, Governments are instituted  
among Men, whose just and honest purpose is to secure these rights, that  
whenever any Form of Government becomes destructive of these ends, it is the Right of the People to alter or to abolish it, and to institute new Government, laying its foundation on such principles and organizing its powers in such form, as to them shall seem most likely to effect their Safety and Happiness. Prudence, indeed, will dictate that Governments long established should not be changed for light and transient causes; and accordingly all experience has shown that the abuse or misuse of Power never extends to the whole of the Society; it is the Misconduct of a few Men, not the Fault of the whole People, that excites the People to alter or abolish their Government; and it is the Right of the People to alter or to abolish it, and to institute new Government, laying its foundation on such principles and organizing its powers in such form, as to them shall seem most likely to effect their Safety and Happiness.

But are all degenerative spondylolisthesis created equal?



≠



# Radiographic predictors of delayed instability following decompression without fusion for degenerative Grade I lumbar spondylolisthesis

CLAIRE BLUMENTHAL,<sup>1,2</sup> JILL CURRAN, M.S.,<sup>2</sup> EDWARD C. BENZEL, M.D.,<sup>3</sup>  
RACHEL POTTER, B.A.,<sup>2</sup> SUBU N. MAGGE, M.D.,<sup>4</sup> J. FREDERICK HARRINGTON JR., M.D.,<sup>5</sup>  
JEAN-VALERY COUMANS, M.D.,<sup>6</sup> AND ZOHER GHOGAWALA, M.D.<sup>2,4</sup>

- ▶ 40 patients (3-14 mm with <3mm dynamic change)
- ▶ Back pain predominance excluded
- ▶ Reop rate overall of 37.5%
- ▶ Risk factors for instability after lami
  - ▶ Motion >1.25 mm (54% reop rate)
  - ▶ Disc height > 6.5 mm (45%)
  - ▶ Facet angle > 50 degrees (39%)
- ▶ **All 3 risks factors 75% reop rate**
- ▶ **No risk factors 0% reop rate**

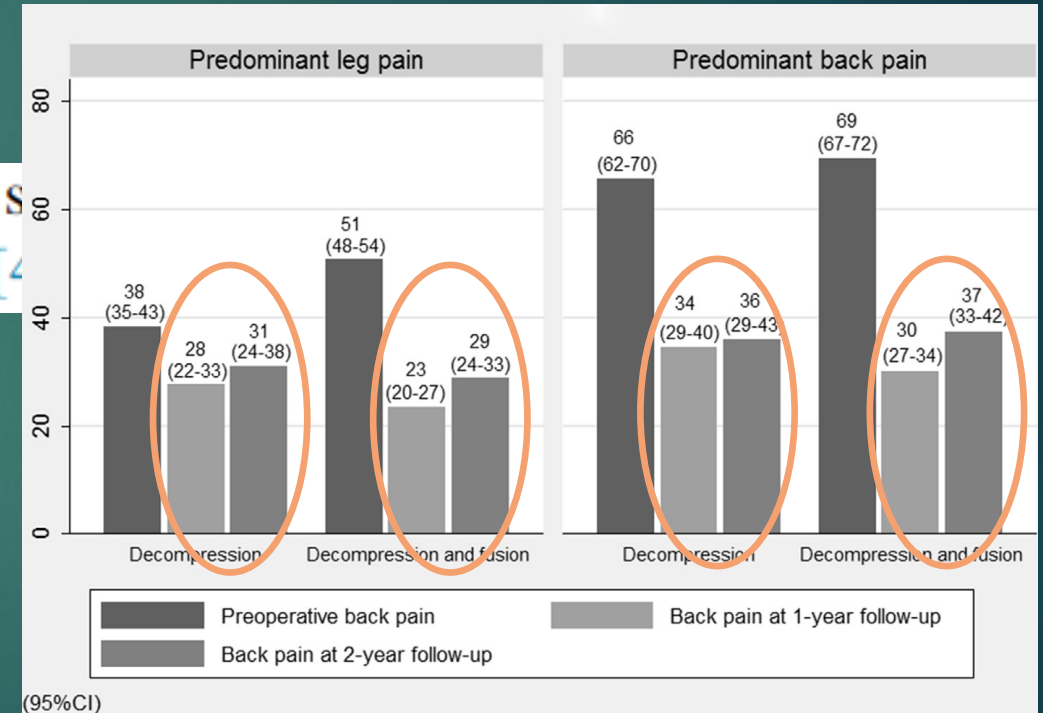


Outcome of decompression with and without fusion in spinal stenosis with degenerative spondylolisthesis in relation to preoperative pain pattern: a register study of 1,624 patients

Freyr G. Sigmundsson, MD\*, Bo Jönsson, MD, PhD, Björn Strömqvist, MD, PhD

- ▶ 1,624 patients from Swedish Spine Registry with DS at L4-5 (1- and 2 yr f/u)
- ▶ VAS leg, VAS back, EQ-5D, SF-36 PC, SF-36 MC, ODI
- ▶ Treated with either Decompression (DF) or Decompression and fusion (DF+)
- ▶ Patients with PBP benefitted from DF at 1 yr from all outcome measures although may not reach MCID
- ▶ PLP patients had more improvement in BP in the DF group
- ▶ **No statistical difference in any outcome at 2 yrs.**

Randomized controlled trials support the decompressive procedure [4]



# Laminectomy plus Fusion versus Laminectomy Alone for Lumbar Spondylolisthesis

Zoher Ghogawala, M.D., James Dziura, Ph.D., William E. Butler, M.D.,  
Feng Dai, Ph.D., Norma Terrin, Ph.D., Subu N. Magge, M.D.,  
Jean-Valery C.E. Coumans, M.D., J. Fred Harrington, M.D.,  
Sepideh Amin-Hanjani, M.D., J. Sanford Schwartz, M.D., Volker K.H. Sonntag, M.D.,  
Fred G. Barker, II, M.D., and Edward C. Benzel, M.D.

- ▶ SLIP trial (spinal laminectomy vs Instrumented Pedicle screw)
- ▶ 66 randomized with 68% follow-up at 4 years
- ▶ Fusion with statistically better SF-36 PC at 2- and 4-year
- ▶ No difference in ODI
- ▶ Fusion with more blood loss and longer hospital stay
- ▶ Cumulative reoperation rate 34% decompression and 14% fusion



# A Randomized, Controlled Trial of Fusion Surgery for Lumbar Spinal Stenosis

Peter Försth, M.D., Ph.D., Gylfi Ólafsson, M.Sc., Thomas Carlsson, M.D., Anders Frost, M.D., Ph.D., Fredrik Borgström, Ph.D., Peter Fritzell, M.D., Ph.D., Patrik Öhagen, Karl Michaëlsson, M.D., Ph.D., and Bengt Sandén, M.D., Ph.D.

- ▶ 247 patients, prospective, randomized, 135 with DS
- ▶ 2- and 5-year follow up. **ONLY 5 lost to follow up**
- ▶ EQ-5D, Zurich claudication questionnaire, ODI, 6-minute walk test
- ▶ The mean length of hospitalization was 7.4 days in the fusion group and 4.1 days in the decompression-alone group, more blood loss, more expensive
- ▶ 22% reop rate in fusion group and 21% reop rate in decompression group
- ▶ **Among patients with LSS, with or without DS, decompression surgery plus fusion surgery did not result in better clinical outcomes at 2 years and 5 years than did decompression surgery alone.**

# The outcome of decompression alone for lumbar spinal stenosis with degenerative spondylolisthesis

Sarfraz Ahmad<sup>1</sup> · Abdulkader Hamad<sup>1</sup> · Amit Bhalla<sup>1</sup> · Sarah Turner<sup>1</sup> ·  
Birender Balain<sup>1</sup> · David Jaffray<sup>1</sup>

▶ Prospective, 83 patients

▶ Slips 4 radio added to the procedure. Some state that a fusion should be combined with a lumbar decompression in the setting of a DS [3–5]. Post-operative spinal instability is a major con-

▶ EQ-5D, Other studies S back, ODI [3, 24] have found much better results with an arthrodesis with decompression as compared with decompression alone. These results have been supported by a randomised

▶ 10% reop rate at 3 years

# The effectiveness of decompression alone compared with additional fusion for lumbar spinal stenosis with degenerative spondylolisthesis: a pragmatic comparative non-inferiority observational study from the Norwegian Registry for Spine Surgery

Ivar M. Austevoll<sup>1</sup> · Rolf Gjestad<sup>4,5</sup> · Jens Ivar Brox<sup>6</sup> · Tore K. Solberg<sup>3,7</sup> · Kjersti Storheim<sup>8</sup> · Frode Rokeland<sup>1</sup> · Erlend Hermansen<sup>1,2,9</sup> · Kari Indrekvam<sup>1,2</sup> · Christian H

The evidence for fusion in guidelines and meta-analyses [1, 7, 8] is often based on Herkowitz et al.'s paper from 1991 [26], which is considered to be of low quality according to the GRADE system [27]. Fifty consecutive patients were assigned to decompression with or without non-instrumented fusion. Pain reduction was greater in the fusion group. There were 24 out of 25 good or excellent in the fusion group compared to 9 out of 25 in the decompression alone group.

- ▶ Matched
- ▶ 294 fusion
- ▶ Fusion res
  - ▶ Number
- ▶ No statist
- ▶ Fusion cost more, no sig difference in complications
- ▶ There is an ongoing prospective Norwegian trial for degen spondy between decompression alone and fusion

## **Lumbar Degenerative Spondylolisthesis: Changes in Surgical Indications and Comparison of Instrumented Fusion with Two Surgical Decompression Procedures**

Toshihiko Inui, MD\*, Masahiro Murakami, MD, Noriaki Nagao, MD, Kouichi Miyazaki, MD, Kou Matsuda, MD, Yoshiko Tominaga, MD, Masahiko Kitano, MD, PhD, Hiroshi Hasegawa, MD, PhD and Shinsuke Tominaga, MD, PhD

- ▶ 80 fusion, 60 decompression, retrospective cohort, one surgeon
- ▶ Two different decomp techniques
  - ▶ Laminoplasty from unilateral approach and bilateral approach
- ▶ JOA outcome measure same in all groups
- ▶ In the decompression groups, preoperative slip distance, instability, and postoperative slip progression or development of instability, did not correlate significantly with clinical outcome.
- ▶ Slip progression occurred in 8/10 levels in patients with preoperative translation  $\geq 5$  mm, but these patients showed no increase in instability, defined as translation  $\geq 2$  mm, at final follow-up.
- ▶ \*facet joint preservation difficult on ipsilateral side



# We get paid for what we do

Treatment of single level pathology RVUs  
Decompression  
63047

Decompression and noninstrumented PL  
arthrodesis  
22612  
63047  
20937

Decompression and instrumented PL arthrodesis  
22612  
63047  
22840  
20937

Posterior circumferential Arthrodesis  
22633 (payors have been bundling decomp  
codes)  
22851  
22840  
20937

ALIF/Transpsoas direct lateral with posterior  
instrumented fusion and decompression (360  
degree)  
Stage on separate days for a bonus!!!  
22588  
22851  
22612  
63047  
22840  
20937

# Instrumentation is not free

- ▶ Pedicle screws
- ▶ Caps
- ▶ Rods
- ▶ Interbody cage
- ▶ Neuromonitoring?
- ▶ Biologics



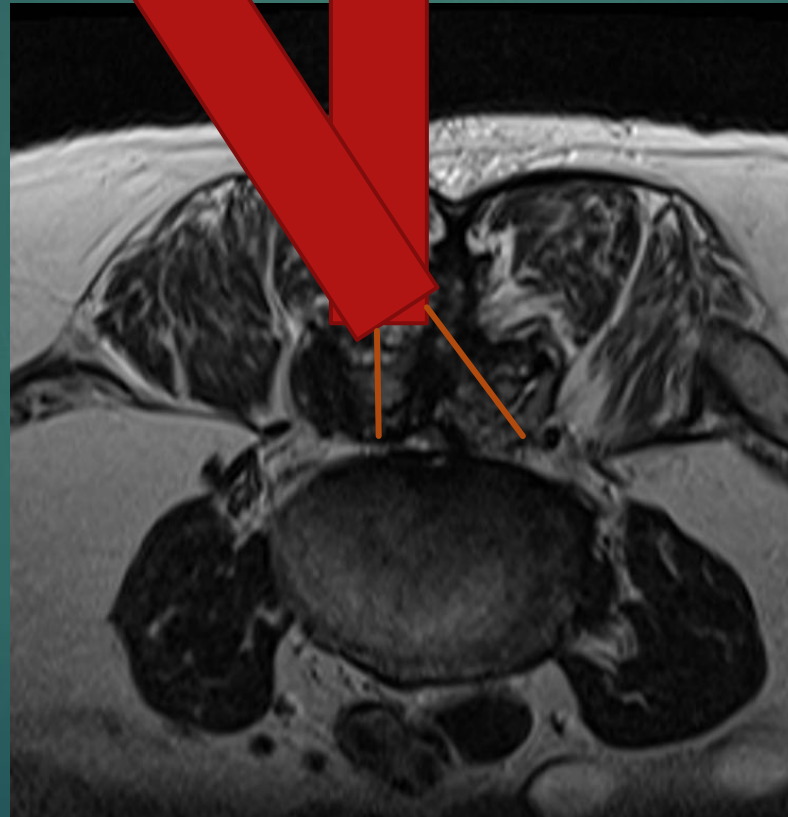
Decompression alone for Grade I  
DS sounds reasonable but how best  
to perform?

# What is MIS decompression?

- ▶ Mid line incision bilateral exposure?
- ▶ Mccollough unilateral exposure?
- ▶ Tube (16, 18, 22mm)?
- ▶ Endoscopic?
- ▶ Percutaneous (mild, laser nucleoplasty)



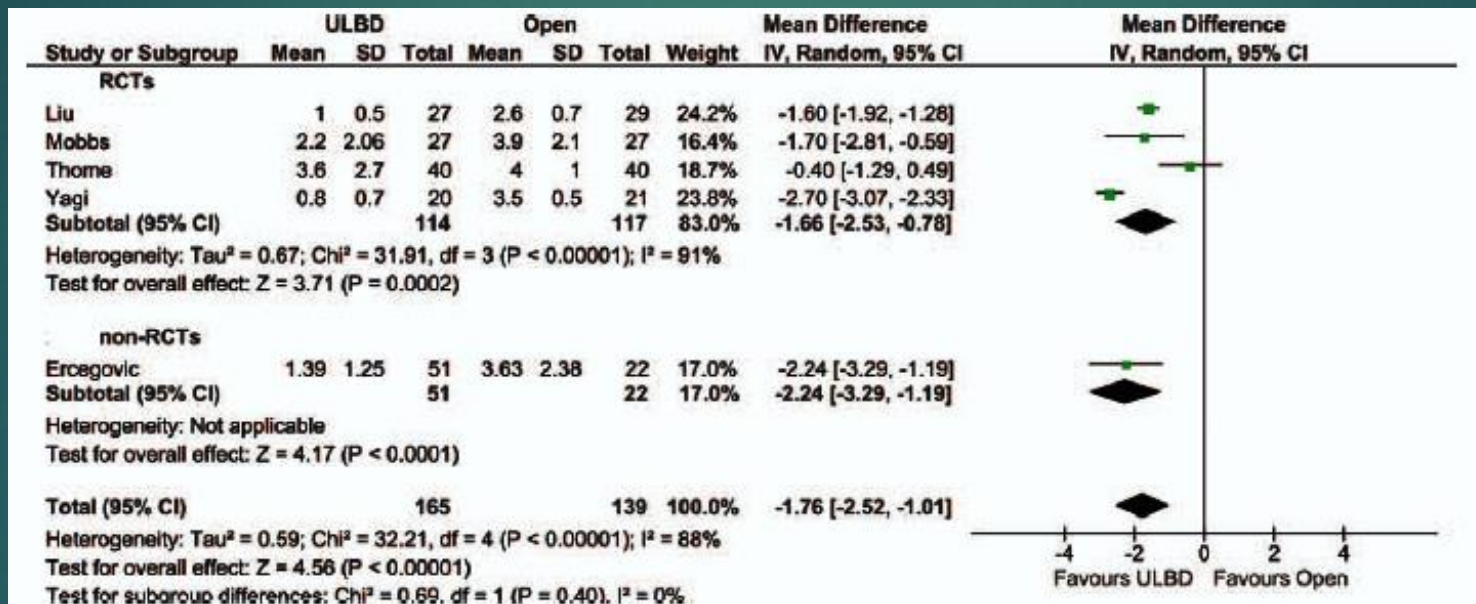
# Unilateral Laminectomy for Bilateral Decompression (ULBD)




# Minimally Invasive *Versus* Open Laminectomy for Lumbar Stenosis

*A Systematic Review and Meta-Analysis*

Kevin Phan, BSc (adv)<sup>\*††</sup> and Ralph J. Mobbs, BSc, MBBS, FRACS<sup>\*††</sup>



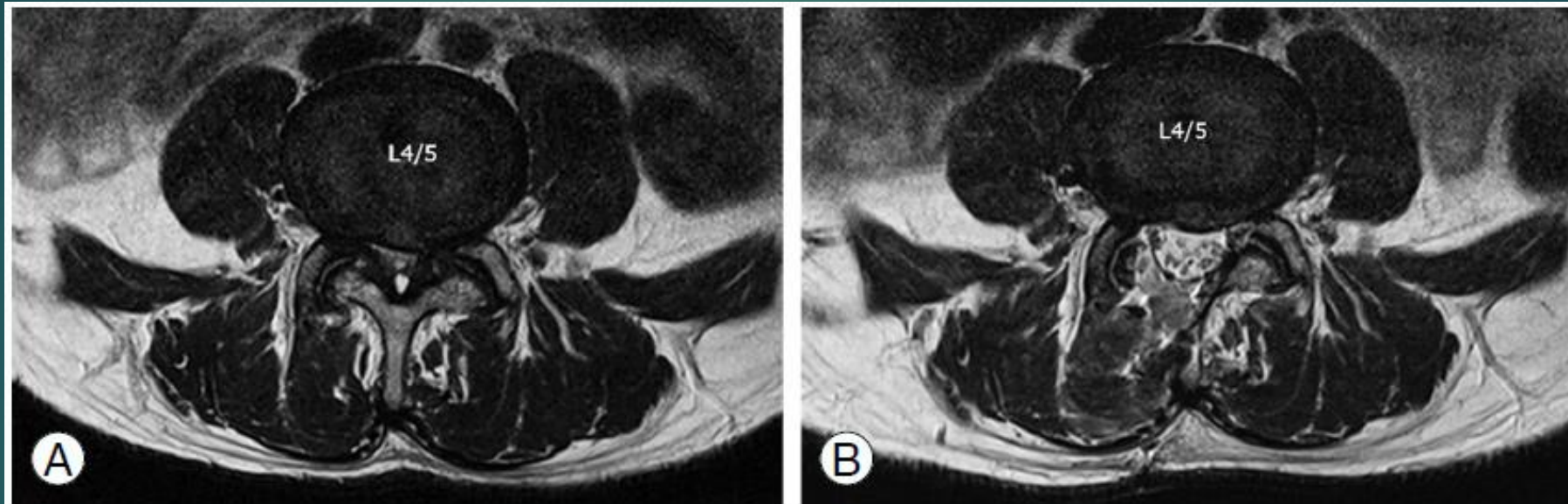
## Minimally invasive spinal decompression surgery in diabetic patients: perioperative risks, complications and clinical outcomes compared with non-diabetic patients' cohort

G. J. Regev<sup>1,2</sup>  · R. Lador<sup>1,2</sup> · K. Salame<sup>1,2</sup> · L. Mangel<sup>1,2</sup> · A. Cohen<sup>1,2</sup> · Z. Lidar<sup>1,2</sup>

- Retrospective 48 diabetic patients, 151 control patient
- All MIS, tubular ULBD
- No complications in either group
- Similar blood loss, hospital stays, improvement of VAS/ EQ-5D

# Minimally Invasive Lumbar Spinal Decompression in Elderly Patients with Magnetic Resonance Imaging Morphological Analysis

Seungman Ha<sup>1</sup>, Youngho Hong<sup>2</sup>, Seungcheol Lee<sup>2</sup>



**Fig. 3.** Representative preoperative (A) and postoperative (B) magnetic resonance imaging images of a patient.

MacNab's grade				0.525 <sup>91</sup>
Excellent	11	8	3	
Good	31	21	10	
Fair	33	18	15	
Poor	10	5	5	



# Unilateral Laminectomy for Bilateral Decompression (ULBD)



# Why do we instrument and fuse fixed Grade 1 spondylolisthesis?

- ▶ It's what we were taught (we are all trained by spine surgeons from the hayday of instrumentation)
- **Because we think that they do and should do better as compared with decompression alone, It is intuitively attractive**
  - ▶ We are American!
  - ▶ We get paid more for doing more (codes, codes, codes)
  - ▶ No bundled payments (yet!) for LSS and DS.
- **It speaks to us as orthopedist to stabilize instability and reduce deformity.**
  - ▶ I guarantee it's coming
  - ▶ Will you use, or will the hospital allow, 20K in implants and 5K in biologics
- **Our experience tells us that patients do well.**
  - ▶ Current evidence suggests that patients may do better (in some outcome measures) with more durable results although not overwhelmingly so.

# Some things to think about...

- ▶ Degenerative spondylolisthesis starts at 4 mm (most studies use 4-14mm)
- ▶ Reasonable debate about the validity of dynamic radiographs ("flex ex views) but I still use them
  - ▶ Listhesis IS NOT instability. Instability is usually defined as >3mm change of slip on dynamic radiographs
- ▶ Benzel study suggests using facet angle > 50 deg, Disk height >6.5mm and instability greater than 1.25mm as risk factor for slip progression with decomp alone
- ▶ Maybe put the idea of PBP vs PLP in the back of your head.
  - ▶ Perhaps PBP would benefit more from fusion
- ▶ Where does that leave us?....

# Some things to think about...

- ▶ L4-5 degenerative spondylolisthesis with stable slip between 4-13 mm with predominantly leg symptoms (radic or claudication) may be candidates for decompression alone.
- ▶ Please go back and look at your last 20 fusions for L4-5 degen spondy and see how many meet this criteria.



Thank you