Decision Making in Cervical Myelopathy: Anterior vs. Posterior Approaches

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Spine Fellowship Director
Hospital for Special Surgery

Disclosures

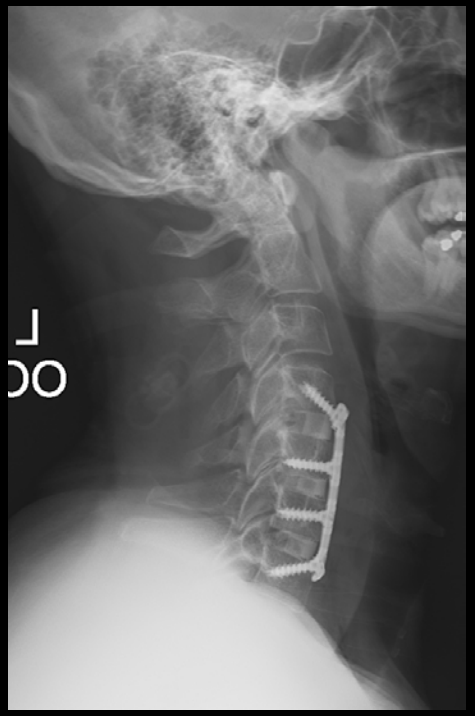
- Consultant/Royalty – K2M, ZimmerBiomet
- Board Membership – AO SPINE
- Research Support – ISSGF

Cervical Spondylotic Myelopathy

- Compression of Spinal Cord due to
  - Osteophytes
  - Disc
  - Ligamentum Hypertrophy
- Can have concurrent
  - Congenital Stenosis
  - OPLL

Multiple Approaches to Treatment

- Anterior
  - ACDF
  - ACCF (Corpectomy)
- Posterior
  - Laminoplasty
  - Laminectomy and Fusion



Anterior Approach

- Advantages
  - Direct Removal of Compressive Pathology
  - Correction of Deformity
  - Uncinate decompression
- Disadvantages
  - Higher complication rates
    - Dysphagia, pseudarthrosis, dysphonia
  - Range of Motion

Posterior Approach

- No Fusion with Laminoplasty
  - Maintained ROM
  - Lower Healthcare Costs
- Lami + Fusion
  - Good outcomes
  - Equivocal Neurologic Recovery?
  - No Dysphagia
  - Good Fusion Rates

Spine

SPINE Volume 38, Number 26, pp 2247-2252

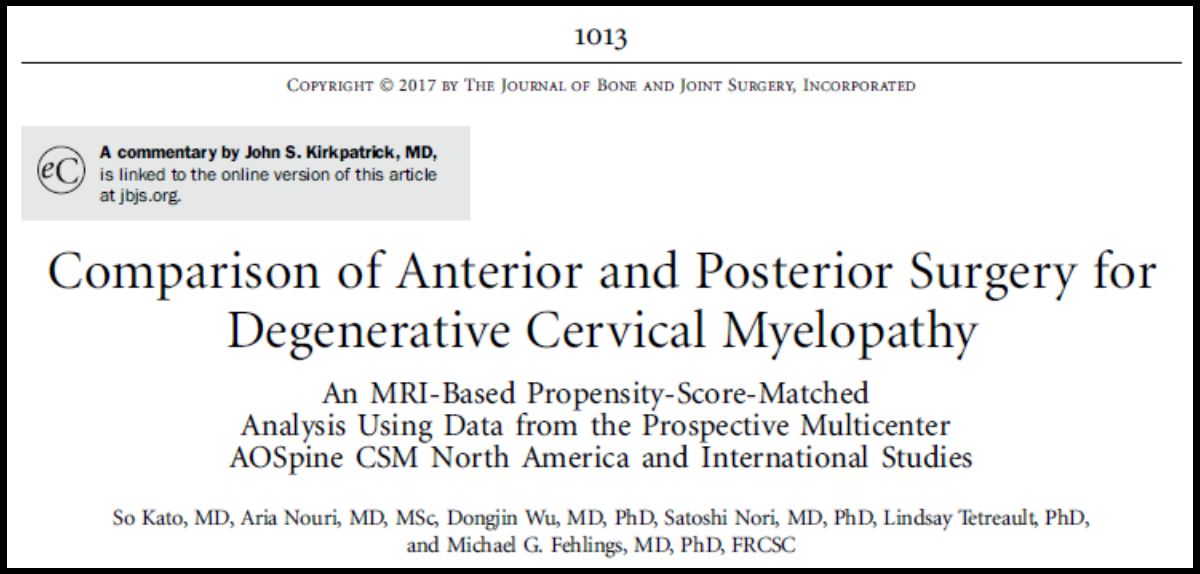
CERVICAL SPINE

Anterior *Versus* Posterior Surgical Approaches to Treat Cervical Spondylotic Myelopathy

Outcomes of the Prospective Multicenter AOSpine North America CSM Study in 264 Patients

Michael G. Fehlings, MD, PhD,* Sean Barry, MD,* Branko Kopjar, MD,† Sangwook Tim Yoon, MD,‡ Paul Arnold, MD,§ Eric M. Massicotte, MD,* Alexander Vaccaro, MD, PhD,¶ Darrel S. Brodke, MD,‖ Christopher Shaffrey, MD,** Justin S. Smith, MD,** Eric Woodard, MD,†† Robert J. Banco, MD,‡‡ Jens Chapman, MD,† Michael Janssen, DO,§§ Christopher Bono, MD,¶¶ Rick Sasso, MD,‖‖ Mark Dekutoski, MD,*** and Ziya L. Gokaslan, MD†††

- 264 patients, 12 month f/u
- Complication rate Similar
  - 11.8% (Anterior) vs. 17.9% (Posterior)
- No Differences in C5 Palsy



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A commentary by John S. Kirkpatrick, MD, is linked to the online version of this article at jbjs.org.

Comparison of Anterior and Posterior Surgery for Degenerative Cervical Myelopathy

An MRI-Based Propensity-Score-Matched Analysis Using Data from the Prospective Multicenter AOSpine CSM North America and International Studies

So Kato, MD, Aria Nouri, MD, MSc, Dongjin Wu, MD, PhD, Satoshi Nori, MD, PhD, Lindsay Tetreault, PhD, and Michael G. Fehlings, MD, PhD, FRCSC

- 80 matched 1:1 pairs in **757** patients
  - No dysphagia/dysphonia in Posterior Group
    - 10% in Anterior Group
  - Same Complication Rate (16% vs. 11%, p =0.48)
  - Same LOS (11.6 vs. 8.9, p=0.86)
  - Same Outcomes (mJOA, NDI, Recovery Rate)

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A Meta-Analysis

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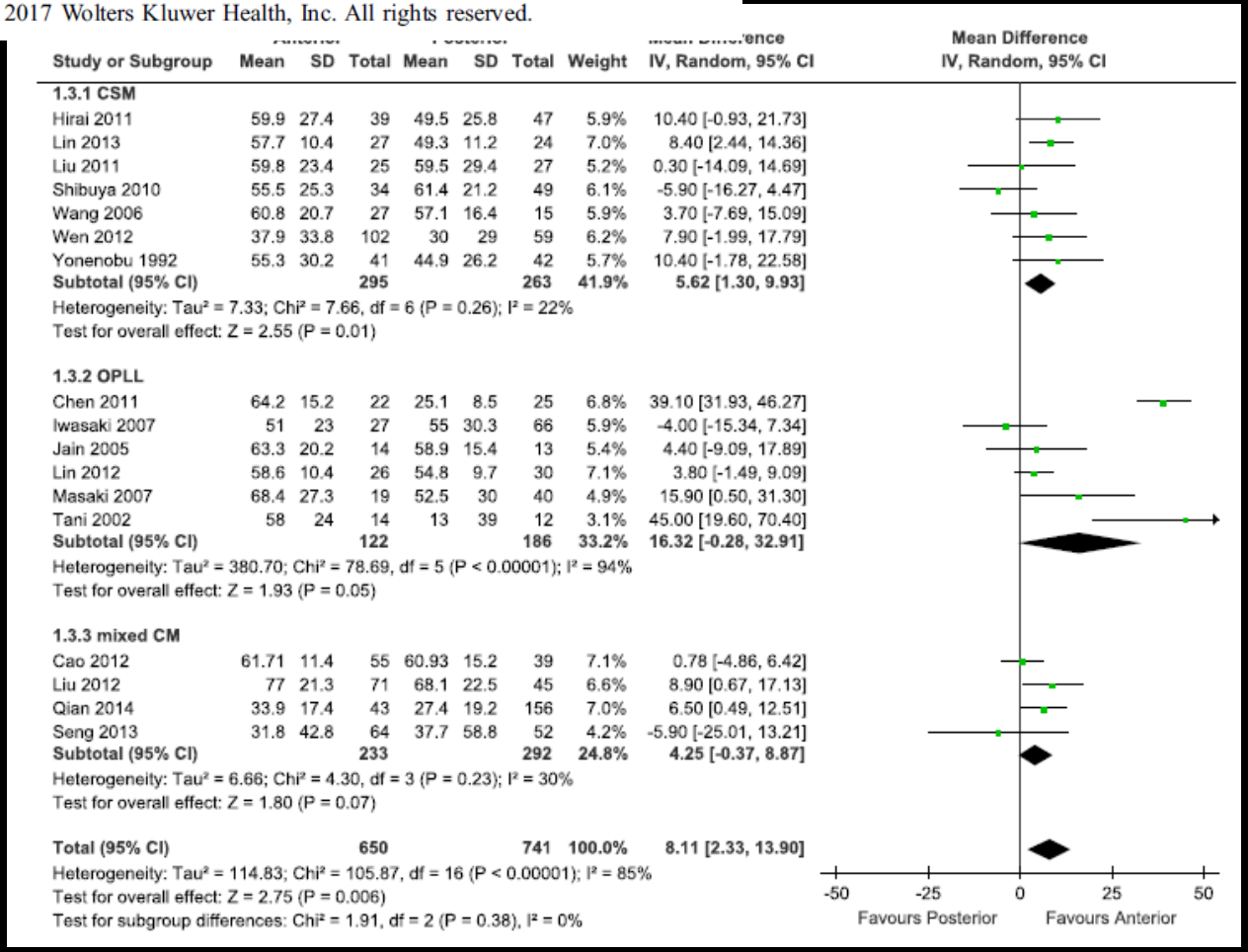
Clin Spine Surg • Volume 30, Number 2, March 2017

CSM



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Yonenobu 1992	55.3	30.2	41	44.9	26.2	42	5.7%	10.40 [-1.78, 22.58]
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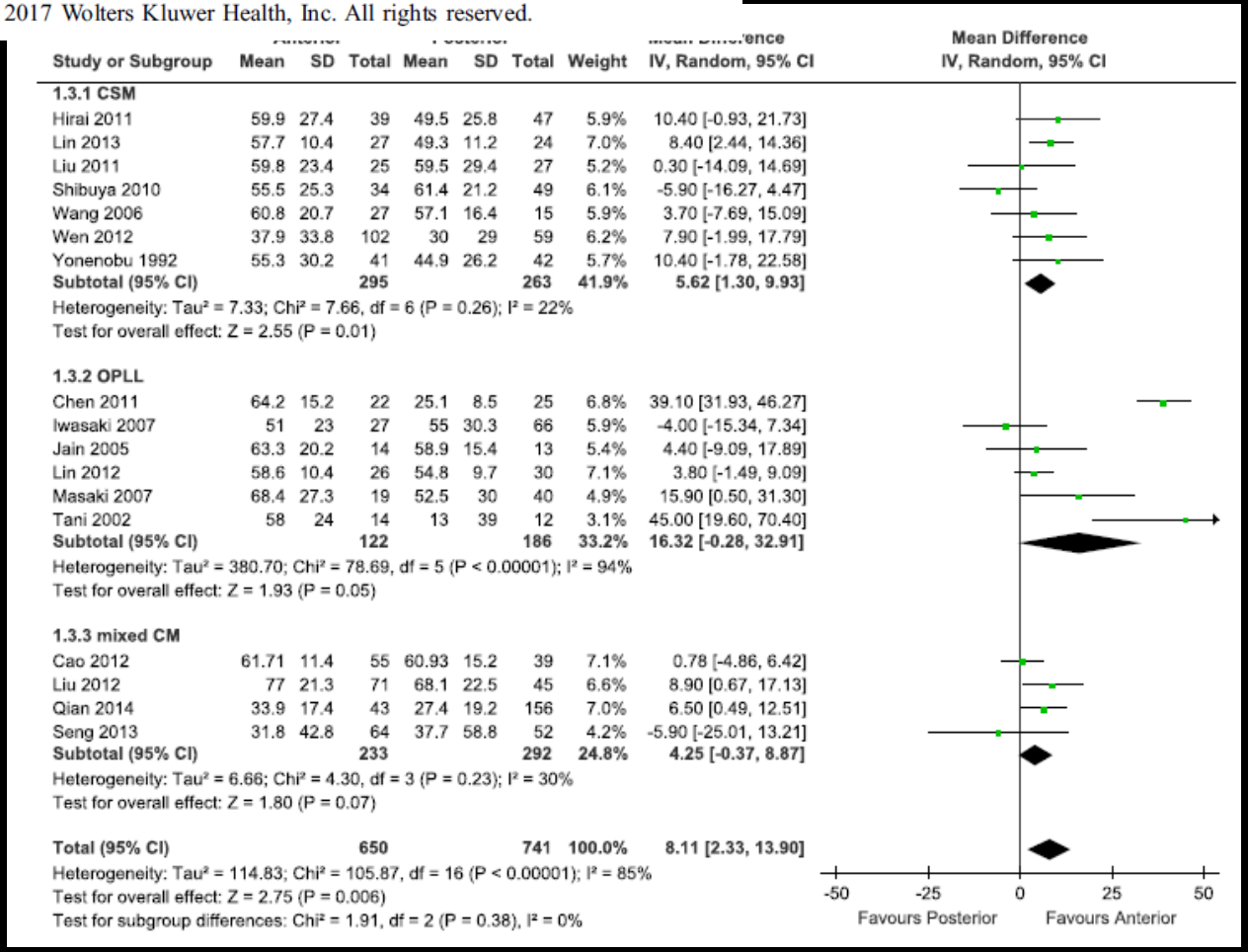
OPLL



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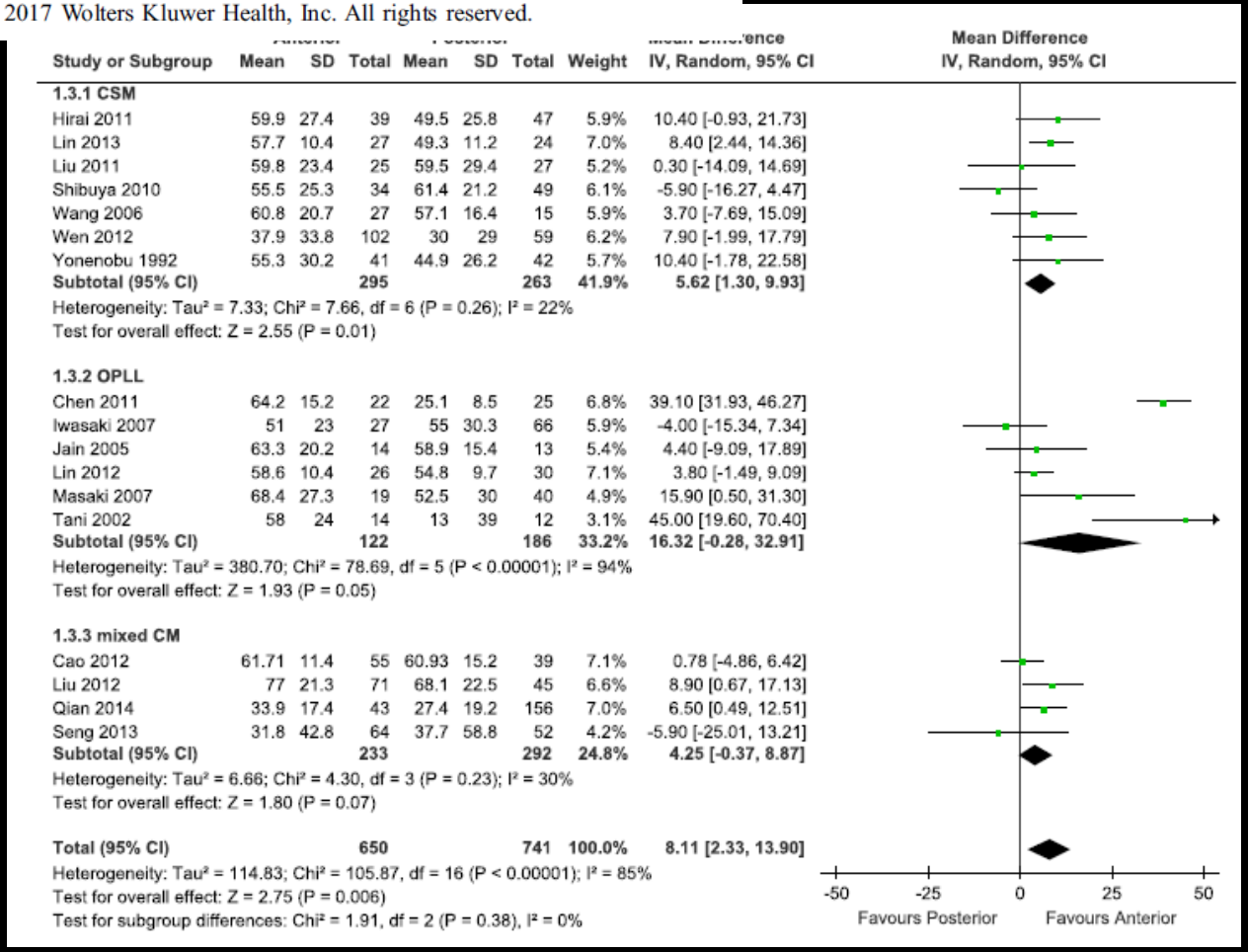

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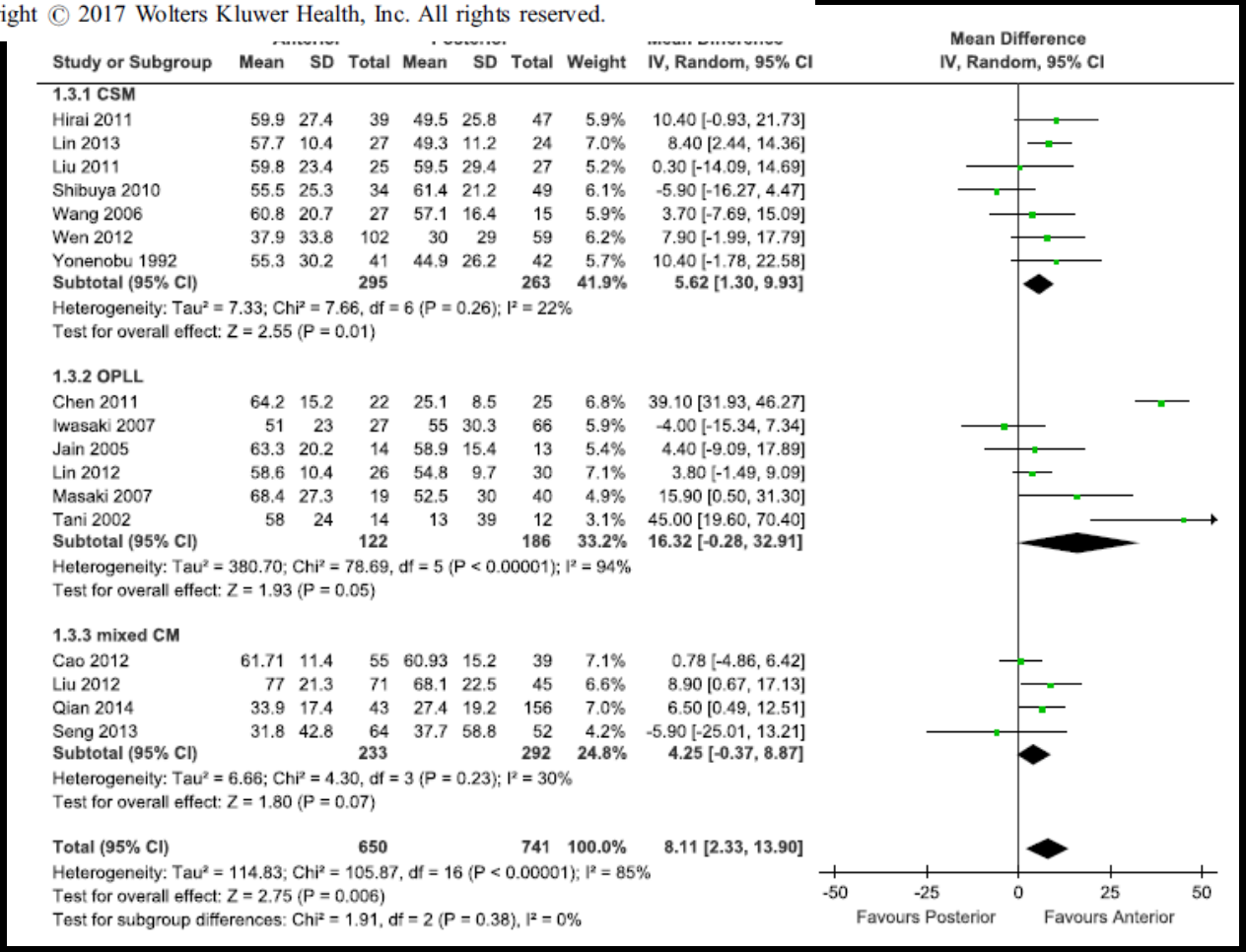

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ANTERIOR Better For Neurologic Recovery

Eur Spine J (2015) 24:1621–1630
DOI 10.1007/s00586-015-3911-4

ORIGINAL ARTICLE

Comparison of anterior approach versus posterior approach for the treatment of multilevel cervical spondylotic myelopathy

Jiaquan Luo[1] · Kai Cao[2] · Sheng Huang[1] · Liangping Li[1] · Ting Yu[1] · Cong Cao[1] · Rui Zhong[1] · Ming Gong[1] · Zhiyu Zhou[1] · Xuenong Zou[1]

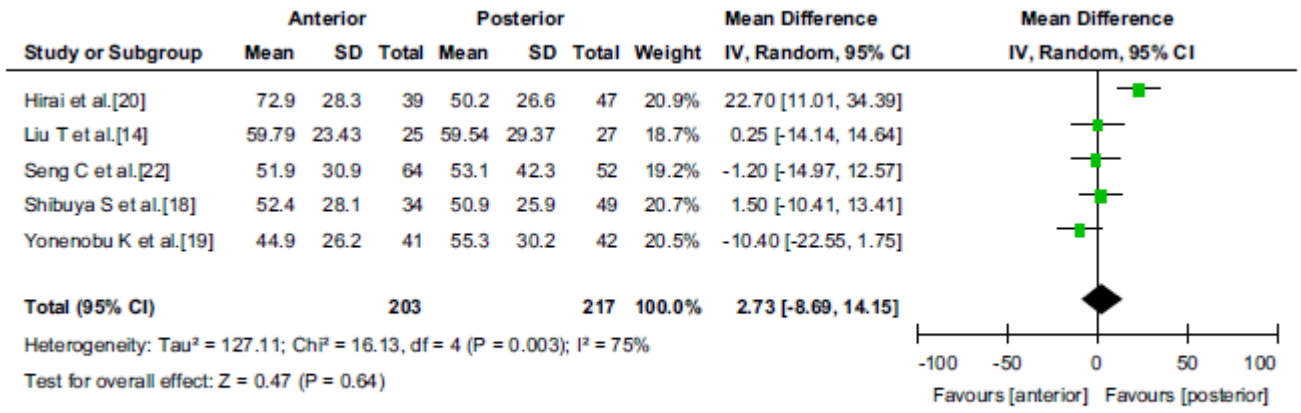
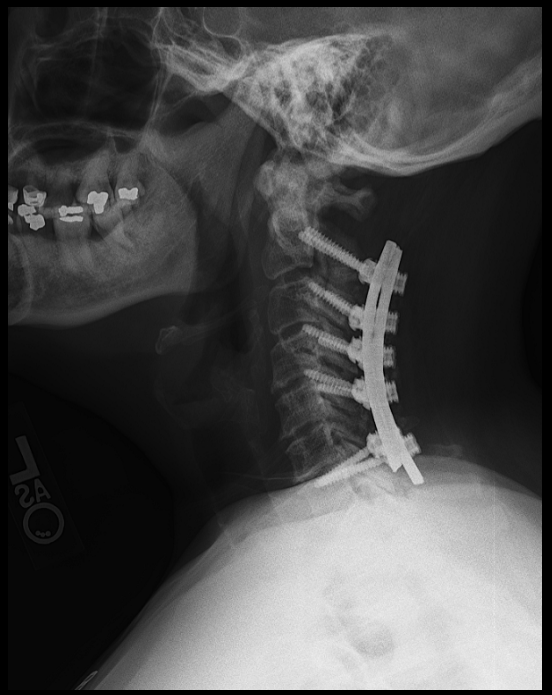


Fig. 4 Forest plot of recovery rate between the anterior surgery group and the posterior group at 24 months postoperatively. *CI* confidence interval, *M-H* Mantel–Haenszel, *SD* standard deviation

Same Neurologic Outcomes

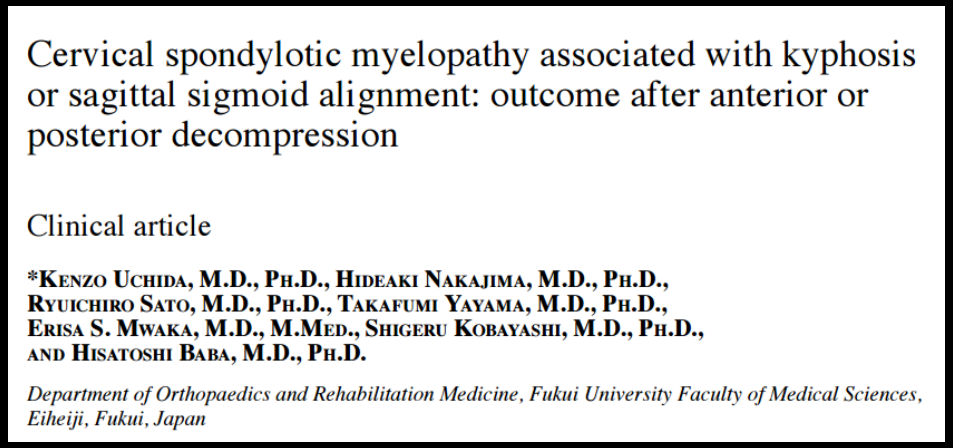
Considerations

- Cervical Spine Sagittal Alignment
- Location of Pathology
- Number of Levels
- Instability
- Osteoporosis
- Neck pain
- Patient History (prior surgery)



Cervical Sagittal Alignment

- No Cervical Lordosis -or- >10 degrees of Kyphosis
- Anterior Approach Preferred
- **NO LAMINOPLASTY or LAMINECTOMY ALONE**

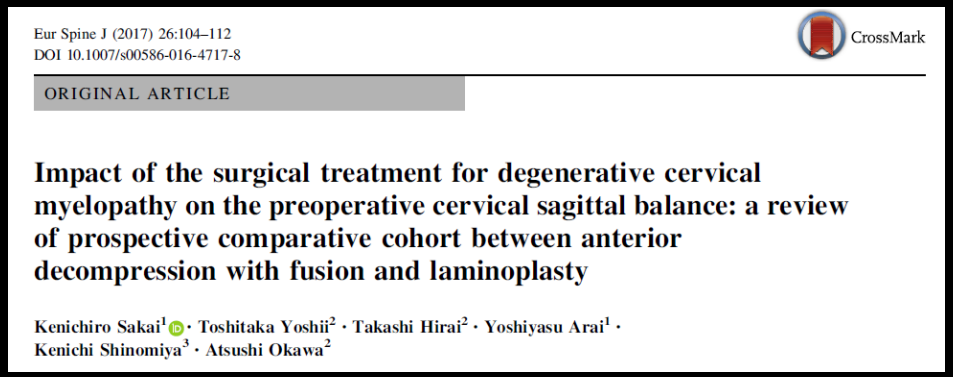


Cervical spondylotic myelopathy associated with kyphosis or sagittal sigmoid alignment: outcome after anterior or posterior decompression

Clinical article

*Kenzo Uchida, M.D., Ph.D., Hideaki Nakajima, M.D., Ph.D., Ryuichiro Sato, M.D., Ph.D., Takafumi Yayama, M.D., Ph.D., Erisa S. Mwaka, M.D., M.Med., Shigeru Kobayashi, M.D., Ph.D., and Hisatoshi Baba, M.D., Ph.D.

Department of Orthopaedics and Rehabilitation Medicine, Fukui University Faculty of Medical Sciences, Eiheiji, Fukui, Japan



Eur Spine J (2017) 26:104–112
DOI 10.1007/s00586-016-4717-8

CrossMark

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Impact of the surgical treatment for degenerative cervical myelopathy on the preoperative cervical sagittal balance: a review of prospective comparative cohort between anterior decompression with fusion and laminoplasty

Kenichiro Sakai[1] · Toshitaka Yoshii[2] · Takashi Hirai[2] · Yoshiyasu Arai[1] · Kenichi Shinomiya[3] · Atsushi Okawa[2]

Location of Pathology

- Anterior Compression
  - OPLL
  - Hill Shaped Lesions
- Posterior Compression
  - Ligamentous buckling

Number of Levels

- 3 or more level ACDF → Pseudarthrosis Risk
- Consideration for posterior approach

J Neurosurg Spine 6:298–303, 2007

Anterior approaches to fusion of the cervical spine: a metaanalysis of fusion rates

JUSTIN F. FRASER, M.D., AND ROGER HÄRTL, M.D.

Department of Neurological Surgery, Weill Medical College of Cornell University, New York Presbyterian Hospital, New York, New York

SPINE Volume 35, Number 5, pp 537–543

Systematic Review of Cohort Studies Comparing Surgical Treatments for Cervical Spondylotic Myelopathy

Mary R. A. Cunningham, MD,* Stuart Hershman, MD,† and John Bendo, MD†

Pseudarthrosis

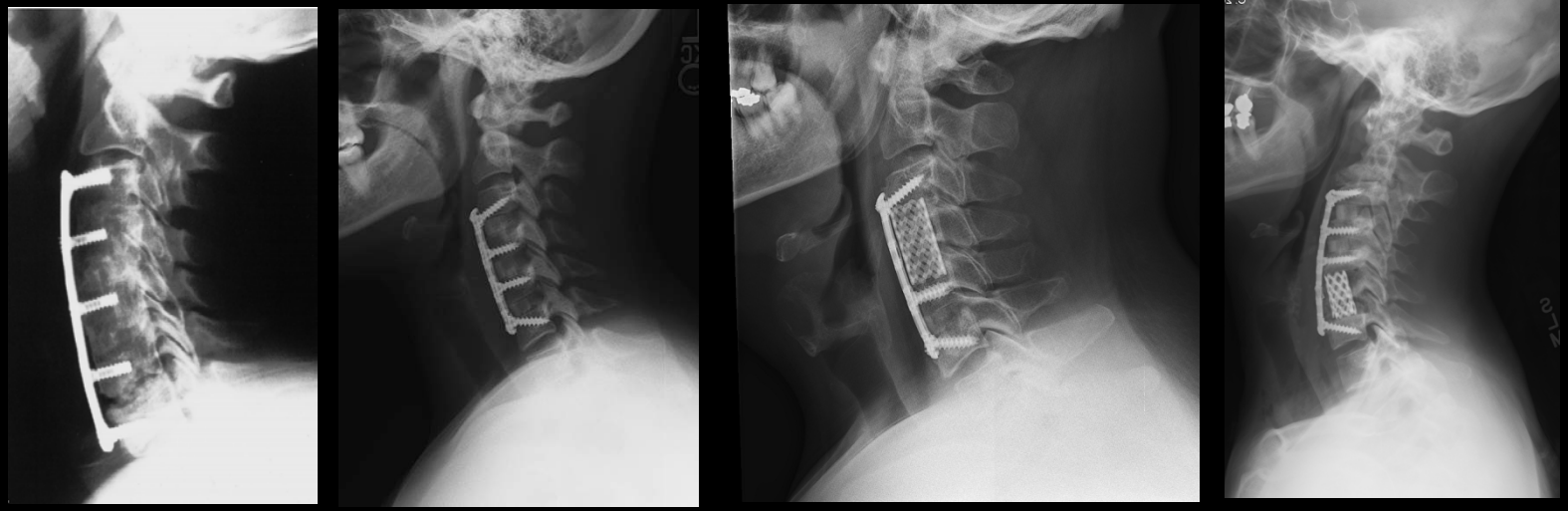
- 47% with non-union of at least 1 Level

SPINE Volume 25, Number 16, pp 2040–2046

Three- and Four-Level Anterior Cervical Discectomy and Fusion With Plate Fixation

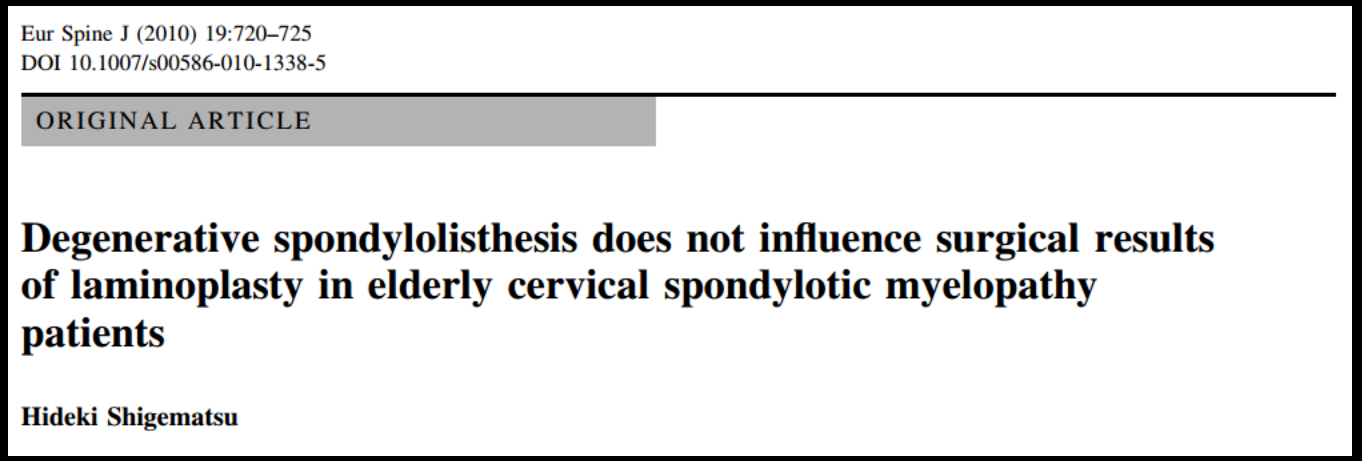
A Prospective Study

Michael J. Bolesta, MD,* Glenn R. Rechtine, II, MD,* and Ann Marie Chrin, ARNP†



Instability

- Spondylolisthesis ≠ Instability
- >4mm motion in Flex/Ext



Eur Spine J (2010) 19:720–725
DOI 10.1007/s00586-010-1338-5

ORIGINAL ARTICLE

Degenerative spondylolisthesis does not influence surgical results of laminoplasty in elderly cervical spondylotic myelopathy patients

Hideki Shigematsu

Laminoplasty still successful in Spondylolisthesis (3.1mm +/- 0.6)

Osteoporosis

- Difficulty with Screw Purchase
- Excessive Graft Settling

SPINE Volume 31, Number 17, pp 1911–1915

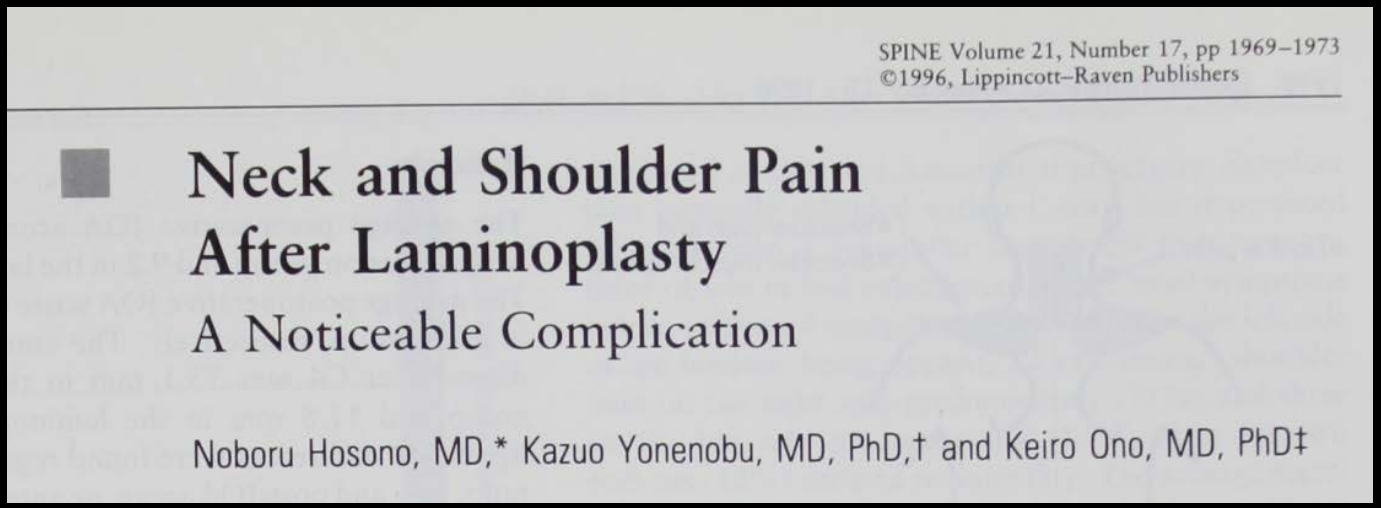
Settling of Fibula Strut Grafts Following Multilevel Anterior Cervical Corpectomy

A Radiographic Evaluation

Steven S. Hughes, MD,* Timothy Pringle, MD,† Frank Phillips, MD,‡ and Sanford Emery, MD, MBA§

Avoid multilevel anterior alone, prefer Laminoplasty or Combined Approaches

Consideration for Neck Pain



SPINE Volume 21, Number 17, pp 1969–1973

Neck and Shoulder Pain After Laminoplasty

A Noticeable Complication

Noboru Hosono, MD,* Kazuo Yonenobu, MD, PhD,† and Keiro Ono, MD, PhD‡

SPINE 1996 – Hosono

25% neck pain (n=72)
0% in Anterior (n=25)

Concern for Neck Pain Old Techniques?

Axial Symptoms After Cervical Laminoplasty With C3 Laminectomy Compared With Conventional C3–C7 Laminoplasty

A Modified Laminoplasty Preserving the Semispinalis Cervicis Inserted into Axis

Kazunari Takeuchi, MD,* Toru Yokoyama, MD,* Shuichi Aburakawa, MD,* Akira Saito, MD,* Takuya Numasawa, MD,* Tetsuya Iwasaki, MD,* Taito Itabashi, MD,* Akihiro Okada, MD,* Junji Ito, MD,† Kazumasa Ueyama, MD,‡ and Satoshi Toh, MD*

SPINE 2005
Takeuchi et al.

50% →17% with worsened neck pain after surgery

Eur Spine J (2007) 16:1417–1422
DOI 10.1007/s00586-007-0352-8

ORIGINAL ARTICLE

Importance of preserving the C7 spinous process and attached nuchal ligament in French-door laminoplasty to reduce postoperative axial symptoms

Tatsuto Takeuchi · Yasuhiro Shono

Euro Spine J 2007
Takeuchi et al.

Preservation of C7 Muscle attachments, improved neck pain at 1 and 2 yr

Concern for Neck Pain Old Techniques?

SPINE Volume 32, Number 26, pp 2985–2988

The Source of Axial Pain After Cervical Laminoplasty-C7 Is More Crucial Than Deep Extensor Muscles

Noboru Hosono, MD, PhD,* Hironobu Sakaura, MD, PhD,† Yoshihiro Mukai, MD, PhD,* and Hideki Yoshikawa, MD, PhD†

SPINE 2007
Hosono et al.
49%→15%with C7 preservation

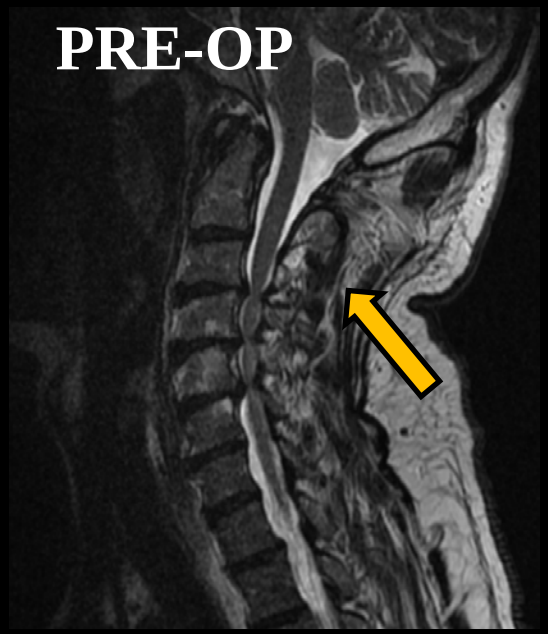
Eur Spine J (2006) 15: 1375–1379
DOI 10.1007/s00586-006-0089-9

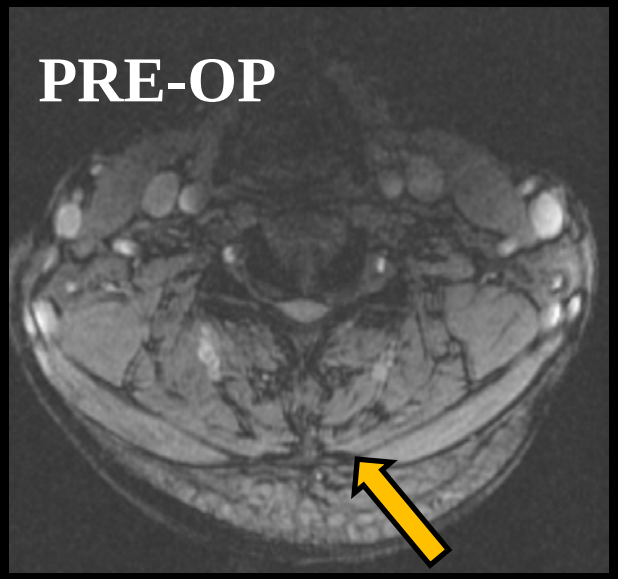
ORIGINAL ARTICLE

N. Hosono
H. Sakaura
Y. Mukai
R. Fujii
H. Yoshikawa

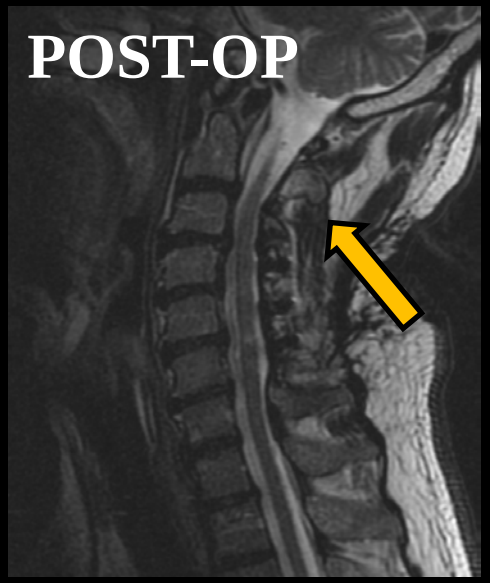
C3-6 laminoplasty takes over C3-7 laminoplasty with significantly lower incidence of axial neck pain

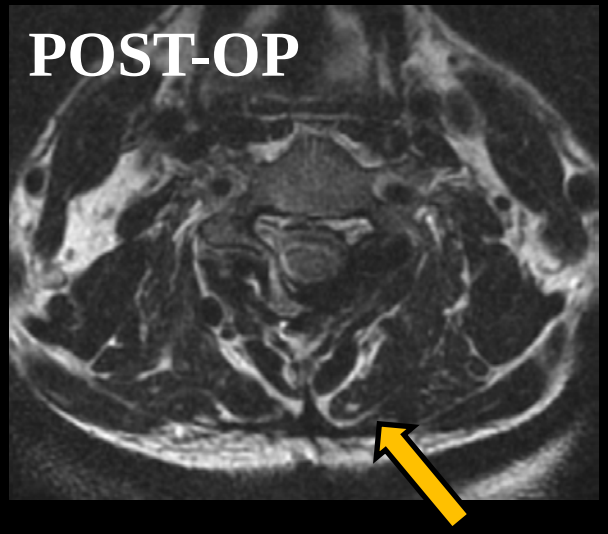
Euro Spine J 2006
Hosono et al.
C3-6 better than C3-7 same Neurologic Improvements



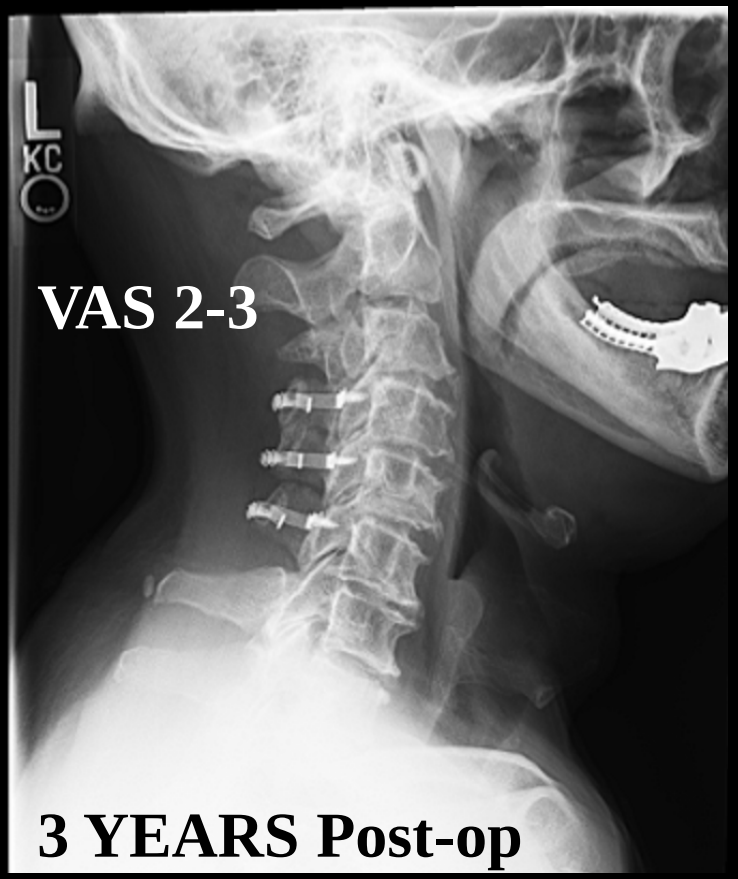


3 YEARS






VAS 2-3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KC
VAS 2-3
3 YEARS Post-op

No effect on Neck Pain

Systematic Review

Neck Pain Following Cervical Laminoplasty: Does Preservation of the C2 Muscle Attachments and/or C7 Matter?

K. Daniel Riew[1] Annie L. Raich[3] Joseph R. Dettori[3] John G. Heller[2]

Global Spine Journal Original Article 17

Neck Pain following Laminoplasty

Addisu Mesfin[1] Moon-Soo Park[2] Chaiwat Piyaskulkaew[2] Tapanut Chuntarapas[2] Kwang Sup Song[2] Han Jo Kim[2] K. Daniel Riew[2]

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[2] Department of Orthopaedics, Washington University in Saint Louis, Saint Louis, Missouri, United States

Address for correspondence Addisu Mesfin, MD, Assistant Professor of Orthopaedics and Cancer Center, 601 Elmwood Avenue, Box 665, Rochester, NY 14620, United States (e-mail: addisu_mesfin@urmc.rochester.edu).

Global Spine J 2015;5:17–22.

Neck Pain following Laminoplasty

Addisu Mesfin[1] Moon-Soo Park[2] Chaiwat Piyaskulkaew[2] Tapanut Chuntarapas[2] Kwang Sup Song[2] Han Jo Kim[2] K. Daniel Riew[2]

[1] Department of Orthopaedics, University of Rochester, Rochester, New York, United States
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Global Spine J 2015;5:17–22.

Table 3 NDI score and NDI pain subscore preoperatively and 6 weeks and 1 year postoperatively

	Preoperative score (points)	6 wk postoperative score (points)	*p* Value	1 y postoperative score (points)	*p* Value
NDI total score	12.5	10.1	0.109	8.5	<0.002
NDI pain subscore	1.29	0.87	<0.028	0.71	<0.007

NDI, Neck Disability Index.

Patient History

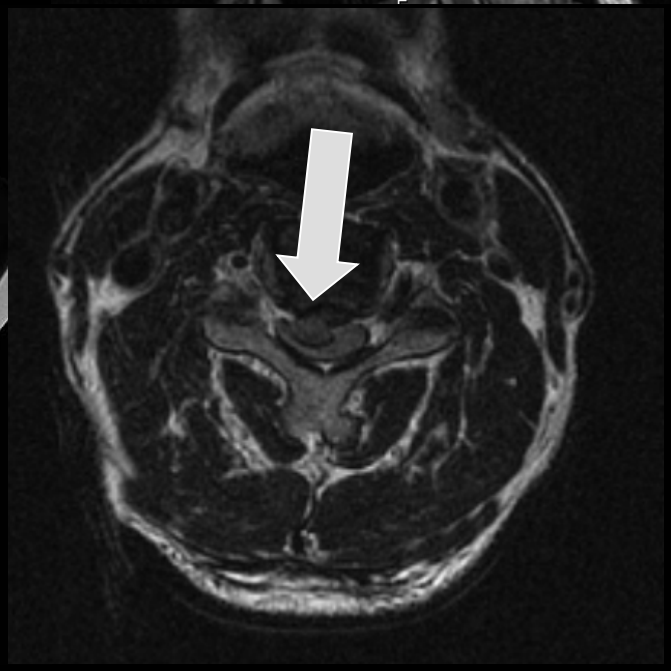
- Prior Anterior Surgery
  - Recurrent Laryngeal N.
  - Bell’s Palsy
- Prior Posterior Surgery
- Anatomical Considerations
  - Vertebral Artery
  - Achieving Fixation
- Special Medical History

Myelopathy Case

- 62F progressive loss of ambulatory capacity, balance, coordination
- VAS Neck 4
- NDI 38
- Exam: myelopathy


1/16/2015, 3:52:59 PM


C: 2047.5, W: 4095.0
L
FL



Focal Cervical Kyphosis

Cervical Alignment

Neck pain at Baseline

No Significant Radiculopathy

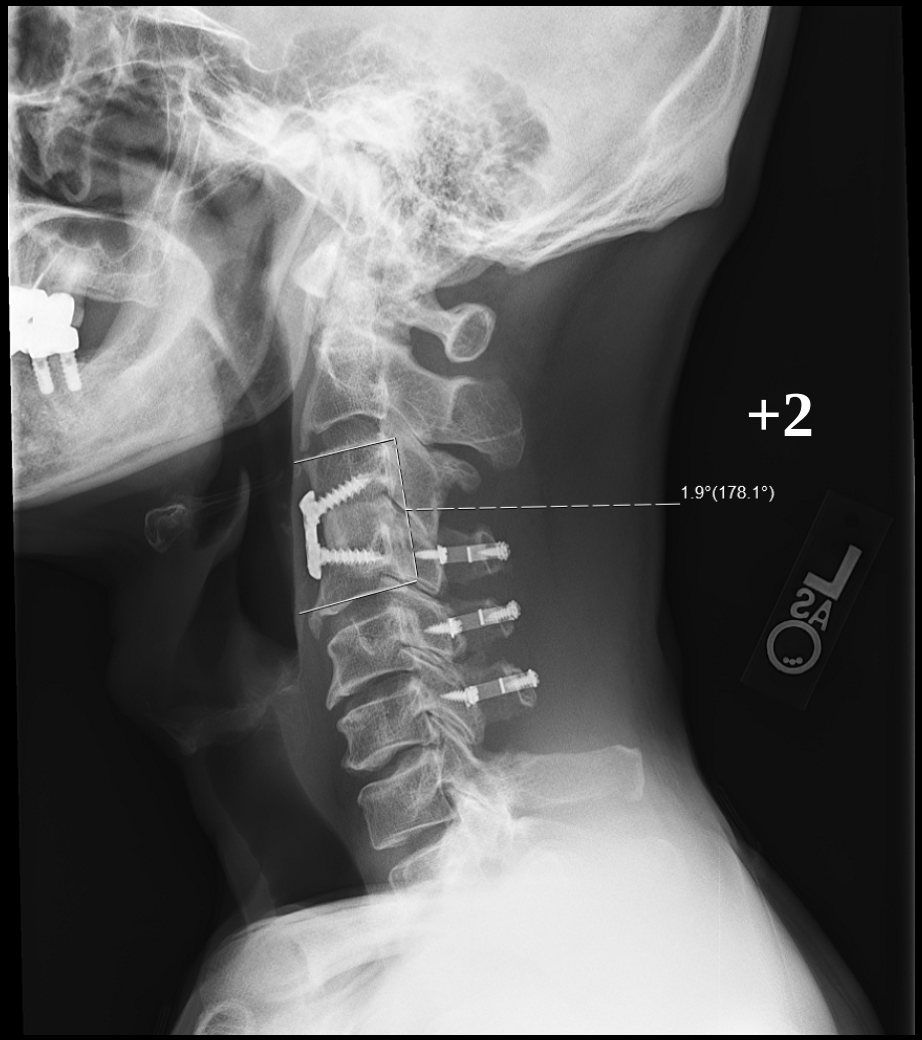
Restore Cervical Alignment

Opportunity to Make Posterior Procedure more Successful

2-yr follow up

VAS Neck 0

NDI 2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