LATERAL ACCESS SURGERY
EXPANDED APPLICATIONS

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Disclosures
- Nuvasive consultant

MINIMALLY INVASIVE PERCUTANEOUS MULTILEVEL
360 DEGREE FUSION FOR LUMBAR DEGENERATIVE
SCOLIOSIS - A FEASIBILITY STUDY
Neel Anand, MD, Ty Thayananthan, MD, Kevin Khalsa, BS, Eli M. Baron,
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SNS 2008

First Case ‘08
- 39 yo female
- Back / leg pain
- Progressive deformity
First Case ‘08

L2-3, 3-4, 4-5
L5-S1 TLIF

5 year review

Cases – 110
Levels - 201

Advantages

- No dissection of large vessels
- No dissection of dorsal spinal musculature
- Lateral annular release
- Possible ALL release
- Large graft footprint
- Indirect decompression
- Less invasive thoracic / thoracolumbar access
- Virgin corridor for revision

Access from T5-L5

Retractor technology
  - Lighting
  - Strength

Neuromonitoring sophistication

Biologics / Implants

No access surgeon

What’s new?
Potential Applications

Neural Compromise
- Foraminal narrowing
- Lateral recess stenosis
- Degenerative spondylolisthesis (Gr 1/2)
- Spinal dysraphism
- Thoracic disc herniations
- Adjacent segment issues

Instability
- Traumatic
- Tumor
- Congenital
- Post-spondylodesis deformity

Deformity
- Kyphosis
- Scoliosis

Axial Back Pain
- Degenerative disc disease
- Ventral intradural tumors
- Arthroplasty

Case Examples

- Lumbar
- Revision
- Thoracic
- Thoracolumbar junction
- Deformity
- Arthroplasty
- Ventral intradural tumors

Trans-psoas
Assymetric collapse, foraminal narrowing
79 yo female L4-5
Degenerative Spondylolisthesis

- 71 yo male
- Farmer
- Back and right leg pain
- Grade 1 slightly mobile spondy

Hospital Course

- Minimal EBL
- Ambulatory day of surgery
- Home POD 1

Indirect decompression

Pre

Post
Indirect decompression

Failed interspinous spacer
Post-infectious

REVISION

Virgin corridor
Large surface area
TLIF revision

- 42 yo female
- Remote L5-S1 fusion
- L4-5 TLIF for HNP

10 weeks post-op

Revision – why lateral?

- Avoid hazards of posterior revision
- Substantial interbody graft
- Minimize blood loss, tissue retraction
- Quicker recovery

Revision

- 30 minute procedure
- <25 ml EBL
- Home on POD1
- Resolved LE pain

TDR Revision
TDR Revision

Preop.

Adjacent Level Disease

- 74 yo female
- L4-5 fusion 90’s
- 7 month h/o progressive back pain
  - Pain into hips, no LE pain
  - Wheelchair bound
- L3-4 mobile Grade 1 spondy
- CAD, HTN, + Coumadin
- Claudication / moderate stenosis
  - Amenable to indirect decompression

The Concept - Indirect Decompression

Disc Collapse
Extrusion
Stenosis

Disc height restoration
Ligamentotaxis

Indirect Decompression

Adjacent Level Disease

Adjacent Level Disease

- Standalone Interspinous plate
- Facet screws
- Lateral plate
Adjacent Level Disease
6 month f/u

THORACIC

JNS, March 2012

JNS, March 2012
Localization for Transthoracic Discectomy

Transthoracic
Retropleural possible

Thoracic disc
T10-11
Tumor/Pathologic Fracture

- 47 yo female
- Progressive paraparesis
- Progressive upper thoracic pain
- Exam:
  - Large uterine mass
  - LE weakness
- W/u otherwise negative for primary malignancy
- W/u negative for infection

Pre-op CT
Evaluate endplates

Transthoracic Approach

- Incise along rib – ALL to PLL VB outline
- Rib dissection
  - Preserve neurovascular bundle
- Rib resection
- Pleural cavity entry using blunt dissection

Intra-op

- AP
- Lateral

Post-op CT
Tumor/Path Fx

- Pathology:
  - Endometrial adenocarcinoma
- Inpatient rehab
- Chemo and XRT
- Removal of uterine mass

6 Month f/u
- Minimal pain
- Ambulatory

THORACOLUMBAR

L1 Burst Fx

Access from T5-L5

Retropleural Access - L1 Burst Fracture
- 24 yo male
- MVA
- T12-L1 fracture / dislocation
- Complete SCI

**DEFORMITY**

**Intra-op**

**Adult Scoliosis**

- **Type 1**: Primary degenerative scoliosis (de novo scoliosis)
  - Engendered by deterioration of spinal discs and/or facet joint degeneration.

- **Type 2**: Idiopathic adolescent scoliosis of the thoracic/lumbar spine which has progressed into adulthood.

- **Type 3**: Secondary degenerative scoliosis
  - (a) Scoliosis following idiopathic or other forms of scoliosis, or has occurred due to a leg length discrepancy that has created pelvic obliquity, hip pathology, or lumbosacral transitional anomaly.
  - (b) Scoliosis secondary to a metabolic bone disease, along with asymmetric arthritis disease and vertebral fractures

**Degenerative scoliosis**

Type 1

'04

'07
- Intra-op

360° Percutaneous Fusion

Subsequent L5-S1 degeneration

Pre-op

2 yrs post-op
Degenerative Scoliosis Type 2
Kyphoscoliosis

Trans-psoas + T12 PSO

Anterior Elongation
An alternative or adjunct to PSO for sagittal correction?

Photos courtesy of: Greg Mundis, MD
Lateral Total Disc Replacement

AP View

Lateral View

Lateral Total Disc Replacement

Dr. Allan Goodrich, Augusta

46 y/o man, lower back pain, unresponsive to medical treatment for 8 months

Lateral Total Disc Replacement

24 h Postoperative

Ventral intradural tumors

Surgical management of ventral intradural spinal lesions

Clinical article

Conclusion

- An additional approach option with some unique & valuable attributes
- Variety of potential applications
- Expands the thought process with which we approach complex spine issues
Thank You

INDEX OF TOPICS COVERED:
- MIS Definition
- Anesthesia Considerations
- Anatomical Considerations
- MIS Decompression
- MIS TLIF
- Economics of MIS
- MIS Lateral Review (XLIF)
- XLIF Indirect Decompression
- MIS Adult Scoliosis Study
- MIS Tumor Resection (XLIF)
- MIS Trauma (XLIF)
- Neuromonitoring
- Octogenarians (XLIF v PLIF)
- Biomechanics

**Clinical Literature**

**Spine Journal** December, 2010 MIS FOCUS

**Youssef & McAfee, et al. Spine 2010**
- Fusion rates in peer-reviewed literature range from 80% to 100%
  - **Average: 94.9%**
- Rodgers et al, SAS J 2010
  - 66 patients treated with 1-3 level XLIF
  - Local autograft + DBM + cancellous allograft, and iliac crest BMA
  - Prospective, computed tomography study at 12 months
  - **97% fusion rate**

**XLIF® Fusion Rates**

**Literature Results**

**Youssef & McAfee, et al. Spine 2010**
- Review of lateral approach literature (14 peer-reviewed articles)
  - Included Degenerative (8) and Deformity (6) papers
  - Minor complications: 6.7% - 20%
  - Major complications: 0% - 8.6%
  - Transient thigh symptoms: 8.6% - 30.4%
  - Two outliers reporting 60.1% and 75%
  - Small samples (8 and 28 cases)
  - Early experience
  - Not all XLIF, technique considerations
  - Reoperations: 0% - 4.3%

**XLIF® Complications**

**Literature Results**

**Youssef & McAfee, et al. Spine 2010**
- Patients typically walk same day; discharged next day
- Expected side effects:
  - 8-10% psoas weakness (resolves within 1-2 weeks)
  - 3-5% anterior thigh numbness (resolves within 1-2 weeks)
  - 0.3% thigh pain / dysesthesia (takes longer to resolve: 2-3 mos)
- To mitigate side effects, avoid:
  - Wanding too much
  - Poor patient positioning
  - Bleeding in psoas
  - Use of mono bipolar cautery
- Recommended treatment:
  - Post-op exercises
  - Neurontin (*)
  - Imipramine or other anti-depressant

**Postoperative Period**

**What to Expect**

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**Value and cost in less invasive spinal fusion surgery: lessons from a community hospital**

- **K.J. Deluzio et al.**
  - Value and cost in less invasive spinal fusion surgery: lessons from a community hospital
- **Background**
  - Mid-sized community hospital, Jefferson City, MO
  - Minimally invasive vs. Open
  - XLIF® for L1-2 through L4-5; MIS TLIF at L4-5 – 109 patients
  - PLIF = 102 patients
- **Outcome summary**
  - 49% shorter stay
  - 6% lower initial cost
  - 76% decrease in residual events
  - Total perioperative savings of 9.6%, $2,563/patient
**XLIF® Outcomes**

Indirect Decompression

- Oliveira, et al. Spine 2010
- Prospective Study
- Consecutive Series of 20 Patients
- Inclusion Criteria: DDD with Central and/or Lateral Stenosis
- Clinical Outcomes: VAS, ODI, ZCO, Treatment Intensity Score
- Images: X-Ray (AP, Lateral, Flexion, Extension) and MRI
- Follow-up: Preop, POP Early, and 3 months

**Statistical Analysis**

- Lateral X-ray Measurements
  - Anterior Disc Height
  - Posterior Disc Height
  - Foraminal Height
  - Foraminal Area (x10)

- Axial MRI Measurements
  - Canal Diameter
  - Canal Area (x10)
  - Right Subarticular Diameter
  - Left Subarticular Diameter

**Editorial**

- "Minimally invasive or mini-open approaches are likely to have the greatest potential benefit when the approach is the main source of morbidity."

- Peter Angevine, MD, MPH, and Paul McCormick, MD, MPH
- JNS: Spine editorial, March 2012
- Rib head removal
- Standard discectomy performed before PLL resection

Anterior elongation
Junctional Kyphosis

L1
L2