Minimally Invasive Spine Surgery For Your Patients

Lukas P. Zebala, M.D.
Assistant Professor
Orthopaedic and Neurological Spine Surgery
Department of Orthopaedic Surgery
Washington University School of Medicine
St. Louis, Missouri
Agenda

- Review of relevant Spinal Anatomy and Pathologies
- Overview of MIS Surgical Techniques
- Clinical Outcomes
- Questions
Common Spinal Pathology

- Degenerative Disc Disease (DDD)
  - Occurs naturally as we age
  - Symptomatic in some patients

- Disc Herniation
  - “slipped” or “ruptured” disc
  - Protrusion of IVD from inner core
Common Spinal Pathology

• Spondylolisthesis
  • Slippage of one vertebra on vertebra below
    • Degenerative (L4-L5)
    • Isthmic (L5-S1)
Common Spinal Pathology

- Spinal Stenosis
  - Spinal canal narrowing that results in pressure on spinal cord, cauda equina or nerves
Common Spinal Pathology

- Facet Joint Osteoarthritis
  - Degradation of cartilage
  - Back pain, nerve compression
Nonoperative Treatment

- Physical Therapy
- NSAIDs
- Steroids
- Pain Medication
- Chiropractic care
- Acupuncture
- Bracing
- Behavior Modification
Minimally Invasive Surgical Techniques

- MIS can treat disease throughout the spine:
  - DDD
  - Disc Herniation
  - Stenosis
  - Spondylolisthesis
  - Scoliosis/Degenerative Deformity
  - Trauma
  - Tumor
MIS Surgery Goal

• The goal of minimally invasive surgery is to accomplish the same clinical outcomes as traditional, open surgery through a less traumatic approach
MIS Surgical Candidates

- Patients with clinical symptoms in accordance with preoperative imaging
- Failed course on nonoperative treatment
- Any Age
  - MIS may be of benefit in elderly
- Any Activity Level
MIS Procedures

• MIS techniques can be applied to cervical, thoracic, and lumbar procedures
  • Decompression
    • Discetomy, foraminotomy, laminectomy
  • Fusion
    • Instrumentation, bone grafting
Why Choose MIS Surgery

• Potential Benefits:

  • Less invasive surgery
    • Less soft tissue injury/disruption of normal structures
  • Shorter hospital stay¹
  • Less blood loss²
  • Earlier ambulation³
  • Less post-op medication use⁴

MIS Surgery Risks

• Same potential complications as with conventional open spine surgery
  • Neural injury, infection, nonunion, dural tears

• Learning Curve
  • Initial longer operative times
  • Technique complications
Why MIS

Old Approach

New Technology
MIS Surgery Keys

• Image Guidance
  • Live x-ray or state of the art navigation

• Muscle Dilation
  • Work between natural muscle planes, not cut or strip muscle

• Specialized Instruments
  • Allow for safe techniques through smaller operative windows

• Microscope Assistance
  Magnification - Safer
MIS Surgery Basics

- Soft tissue dilators are used to create a working channel through the musculature
MIS Surgery Basics

- Patient specific tubular retractor is docked onto the area of interest
  - Working portal
MIS Discectomy
MIS Discectomy
MIS Decompression

- Discectomy
- Foraminotomy
- Laminectomy

- Remove pressure from neural structure
MIS Posterior Fusion / Instrumentation

- Fusion Added:
  - Instability
    - DDD
    - Spondylolisthesis
    - Scoliosis
  - Iatrogenic
- Posterior
MIS Lateral Approach

- Spine is approached from the side
  - Avoid major anterior or posterior structures
MIS Lateral Fusion / Decompression
MIS Lateral Fusion / Decompression
MIS Lateral Fusion / Decompression
Case 1

- 53 yo Female
- Back pain and left leg L4/L5 radiculopathy
- Failed nonop tx
Case 1

- Walking POD#1
- Off IV Pain Meds POD#1
- D/C home POD #2
Case 2

- 63-year-old with 2 year history of low back pain, some leg pain
- Loss of disc height
- Loss of normal lordosis
- Coronal instability
Case 3

- 30 yo male
- High speed MVC
- T9 fracture dislocation
- Complete SCI
- Multiple other injuries
Case 3
Postoperative Protocol

- MIS Discectomy/Decompression
  - Usually home on day of surgery or POD#1
  - Activity as tolerated (limit lumbar bending/twisting)
  - PO pain meds/muscle relaxers

- MIS Fusion/Instrumentation
  - Hospital stay 2-5 days
  - Activity as tolerated (limit lumbar bending/twisting)
  - PO pain meds/muscle relaxers
Clinical Outcomes

MIS Decompression


- N = 50
- MIS laminotomy vs. open decompression
- MIS data prospective, open decompression data retrospective.
- Perioperative benefits demonstrated in minimally invasive group
- Difference in clinical outcomes did not achieve statistical significance
Clinical Outcomes

MIS TLIF

<table>
<thead>
<tr>
<th>Perioperative Data</th>
<th>Open</th>
<th>Minimally Invasive</th>
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</thead>
<tbody>
<tr>
<td>Blood loss</td>
<td>1147 ml</td>
<td>226 ml (^1)</td>
</tr>
<tr>
<td>Length of hospital stay</td>
<td>5.1 days</td>
<td>3.4 days (^2)</td>
</tr>
<tr>
<td>Post-op narcotic use (in morphine sulfate equivalent units(^*))</td>
<td>49.5 units/day</td>
<td>37.5 units/day (^3)</td>
</tr>
<tr>
<td>Operative time</td>
<td>4.6 hours</td>
<td>5 hours</td>
</tr>
</tbody>
</table>

\(^1\) \(p=.001\), \(^2\) \(p=.02\), \(^3\) \(p=.015\)

\(^*\) Narcotic usage between patients was normalized to morphine sulfate equivalents.
Clinical Outcomes

MIS TLIF


- MIS TLIF (n=43) vs. Wiltse (open) approach (n=67).

- Mid-term functional outcomes at 8 and 16 months after surgery were equivalent for 2 groups

- Percutaneous group results:
  - Lower intraoperative blood loss
  - Less post-op analgesic use while in hospital
Clinical Outcomes

MIS Lateral


• Major adverse events approximated 8.6% with approach-related complaints of nerve irritation nearing 3.4%.
• Minimally invasive approach minimized blood loss, as compared to historical open cohort
Questions