Toward Less Invasive Spine Surgery

Donald A. Ross, MD
Medford Neurological Clinic

Copyright 2009
Ways to Less Invasive Spine Surgery

- **Better Diagnostics**
  - MRI, CT
  - Single nerve root blocks
  - Facet blocks
  - ? Discography
  - Occult instability

- **Better Surgery**
  - Less invasive decompressive surgery
  - Less invasive fusion surgery
  - Neurophysiological monitoring
  - Intraoperative scanning
Role of Imaging in Less Invasive Spine Surgery

- Avoid the unsupported conclusion that imaging findings are symptomatic and need correction
- Most common reason for failed spine surgery is wrong indication for surgery
Role of Imaging in Less Invasive Spine Surgery

- Careful inspection for pathology
  - Far lateral disc
  - Foraminal stenosis
  - Conus pathology
  - Peripheral nerve pathology
Role of Imaging in Less Invasive Spine Surgery

- Careful inspection for pathology
  - Far lateral disc
  - Foraminal stenosis
  - Conus pathology
  - Peripheral nerve pathology
Role of Imaging in Less Invasive Spine Surgery

- Careful inspection for pathology
  - Far lateral disc
  - Foraminal stenosis
  - Conus pathology
  - Peripheral nerve pathology
Toward Less Invasive Spine Surgery

- Careful inspection for pathology
  - Far lateral disc
  - Foraminal stenosis
  - Conus pathology
  - Peripheral nerve pathology
    - Entrapment neuropathies
    - Peripheral neuropathies
    - Complex regional pain syndrome
Toward Less Invasive Spine Surgery

- Use imaging wisely
- Correlate with exam findings
- Do not operate on the images, operate on the patient
Ways to Less Invasive Spine Surgery

- Single nerve root blocks
  - Helpful when multiple potential sites of nerve root involvement
  - Very common in elderly or in previous surgery
Ways to Less Invasive Spine Surgery

- Single nerve root blocks
  - Anesthetic phase
  - Steroid phase
Ways to Less Invasive Spine Surgery

- Single nerve root blocks
  - Sedation may lead to erroneous interpretation
Ways to Less Invasive Spine Surgery

- Role of the facet joint in back and leg pain
- 60% volunteers had buttock and thigh pain
- 10% had symptoms in the foot
Ways to Less Invasive Spine Surgery

- Anesthetizing the facet joint
  - Facet block
  - Medial dorsal branch block
Ways to Less Invasive Spine Surgery

- Medial dorsal branch block and rhizolysis
Toward Less Invasive Spine Surgery

- Discography
  - Karasek
  - Carragee
    - Positive findings in asymptomatic volunteers
    - Poor outcome of fusion based upon even ideal discography
Ways to Less Invasive Spine Surgery

- Smaller surgery
  - Parapinuous muscles in postoperative pain and dysfunction
  - Retraction vs. muscle splitting approach
Toward Less Invasive Spine Surgery

- Smaller surgery
- Muscle splitting approach
Toward Less Invasive Spine Surgery

- Muscle splitting approach
Toward Less Invasive Spine Surgery

- Muscle splitting approach
Toward Less Invasive Spine Surgery

- Muscle splitting approach
Toward Less Invasive Spine Surgery

- Muscle splitting approach
Toward Less Invasive Spine Surgery

- Muscle splitting approach
Toward Less Invasive Spine Surgery

- Muscle Splitting Approach
  - Lumbar paramedian discectomy
  - Lumbar far lateral discectomy/foraminotomy
  - Lumbar laminectomy up to three levels-unilateral approach for bilateral decompression
  - Cervical foraminotomy/laminectomy
  - Lumbar intertransverse/interbody fusion
Toward Less Invasive Spine Surgery

- Percutaneous pedicle screw fusion
Toward Less Invasive Spine Surgery

- Bilateral independent pedicle screw fusion
Toward Less Invasive Spine Surgery

- Anterior Lumbar Interbody Fusion
- L5-S1 or L4-5
Toward Less Invasive Spine Surgery

- Anterior Lumbar Interbody Fusion
- Small, paramedian, muscle-splitting incision
- Extra-peritoneal approach
Toward Less Invasive Spine Surgery

- Anterior Lumbar Interbody Fusion
  - Small, parmedian incision
  - Extra-peritoneal approach
  - Lordotic cages- titanium or PEEK
  - Bone morphogenetic protein
Toward Less Invasive Spine Surgery

- Anterior Lumbar Interbody Fusion
  - PEEK Cages
Extreme lateral lumbar interbody fusion (X-LIF or D-LIF)

- Direct lateral interbody fusion done through small flank incision
- Often done on outpatient basis
- Not suitable alone for large listhesis, gross instability, but can be supplemented with plate or posterior fusion
Toward Less Invasive Spine Surgery

- L1-2 to L4-5
- Not L5-S1 due to iliac crest
- Foraminal or canal stenosis
- Pain due to minor instability
Toward Less Invasive Spine Surgery

- Direct approach through the psoas muscle
- Lumbar plexus detected with EMG
Toward Less Invasive Spine Surgery

- EMG at each stage
- Retractor opens anteriorly
Toward Less Invasive Spine Surgery

- Extreme lateral interbody fusion
  - Can be supplemented with a plate for instability
Toward Less Invasive Spine Surgery

- O-Arm Intraoperative CT Scanner
Toward Less Invasive Spine Surgery
Toward Less Invasive Spine Surgery
Toward Less Invasive Spine Surgery
Toward Less Invasive Spine Surgery
Toward Less Invasive Spine Surgery