Advances In Spine Care

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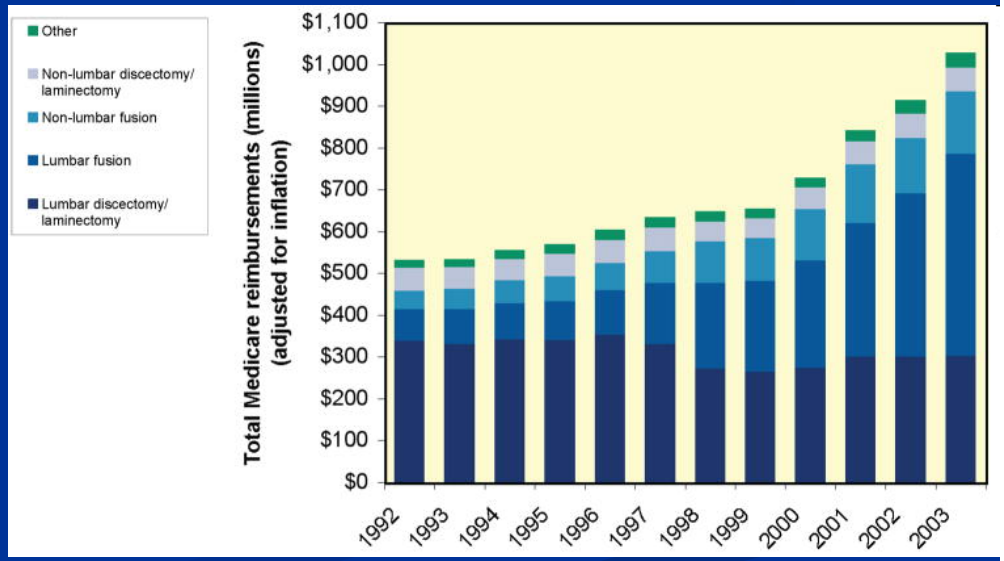
Introduction

- The Spine - A common source of problems
  - Back pain is the #2 presenting complaint to primary care provider
    - 19 million visits
  - Prevalence increases with age
  - High acuity and disability
  - High cost of acute and chronic care
    - $89.5 B annual US direct cost
      - JAMA - 2005
    - $10-20 B lost productivity cost

- **Science News**

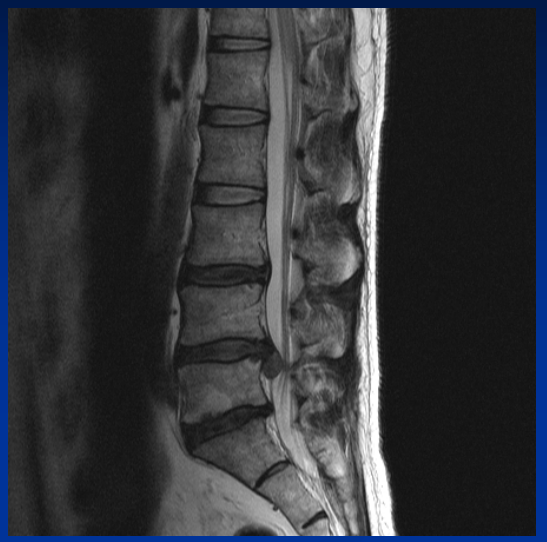
  Patient Spending for Spinal Care in U.S. Has Nearly Doubled Over Past Decade

  ScienceDaily (Sep. 5, 2012)



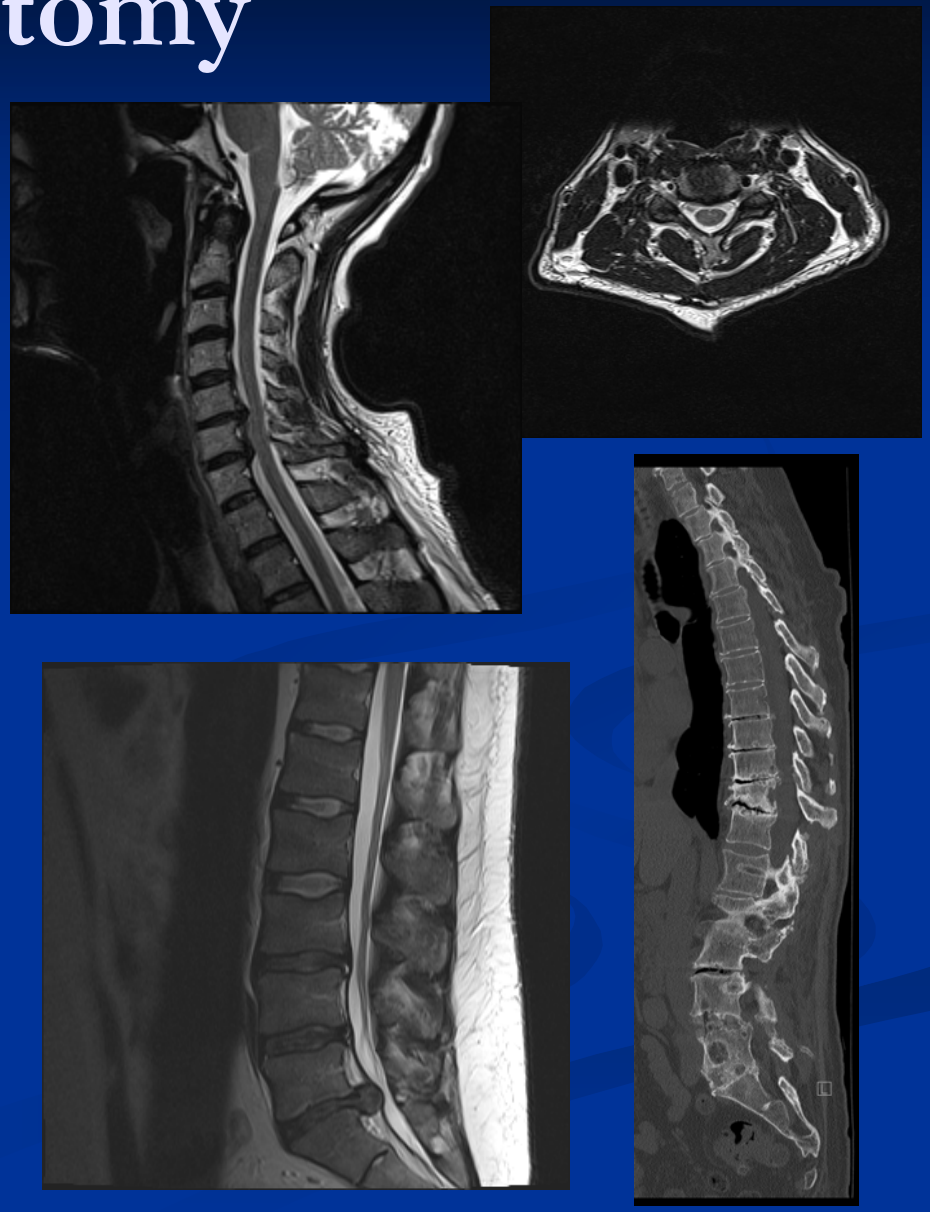
Introduction

- Complex Issues
  - Structural
  - Neurologic
  - Psychologic
  - Functional
- Treatments also complicated
  - Aging patients
  - Medical co-morbidities
  - Return to function
    - Higher demands
    - Longer life expectancy



Anatomy

- Anatomical differences in spinal regions create different challenges
  - Cervical
    - Spinal cord immobile
    - High segmental mobility
  - Thoracic
    - Relative immobility of segments
    - Cord issues
  - Lumbar
    - Root levels
    - Moderate mobility
    - High stress on segments
    - Junction to the immobile pelvis



Pathology

- Disease Conditions
  - Degenerative
    - Age-related changes of disc and articular cartilage structure
  - Deformity
  - Traumatic
  - Systemic
    - Osteoporosis
    - Tumor
    - Infection
  - The failure of the spinal motion segment or structure to maintain shape, stability, or neurologic protection, generating pain or dysfunction

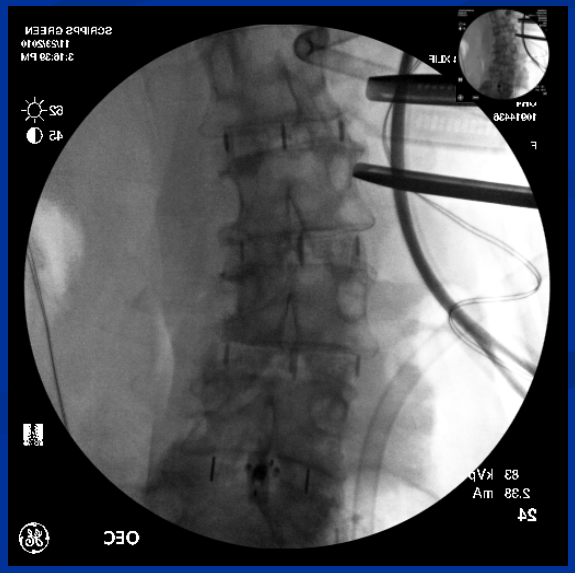
Treatments

- Non-Surgical Care
  - Rest/Time
  - Exercise/Strengthening
    - PT is largest $ cost for spine care
  - Antiinflammatories
    - NSAID's
    - Corticosteroids
  - Narcotics
    - >100% increase in opioid use for spine pain from 1997 to 2004
  - Injections
    - Epidurals
    - Pain target blocks
  - Systemic treatments
    - Osteoclast inhibitors
      - Fosamax
      - Actonel

- Advancements
  - PTH analog
    - Forteo
  - Flouroscopy for injections
    - Allows specificity and improved efficacy
  - Long-acting opioids

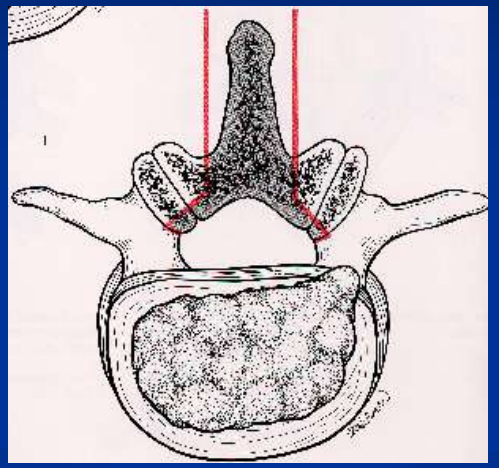
Surgical Treatment

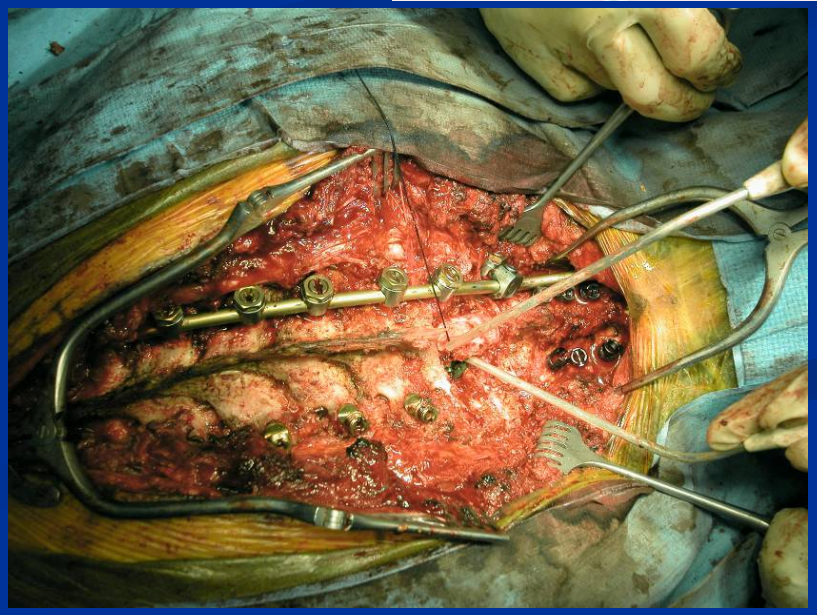
- Surgical Care
  - Principles
    - Neurologic decompression
    - Structural stabilization
    - Deformity correction
    - Motion/function preservation
    - Minimize iatrogenic injury
    - Allow for long term spinal function



Surgical Treatment

- Traditional approaches
  - Allow for visualization of spine to achieve treatment
    - Posterior
      - Laminectomy
      - Fusion
        - +/- instrumentation
    - Anterior
      - Corpectomy/discectomy
      - Fusion
        - +/- instrumentation
  - Approach related morbidity
    - Wide exposures
    - Blood loss
    - Prolonged recovery



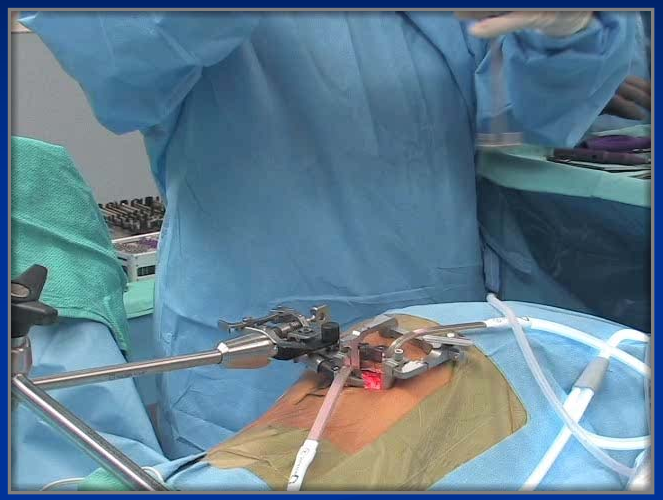


Minimally Invasive Spine Surgery

- The Hype
  - Little or no incisions
  - No blood loss
  - Rapid recovery
  - The laser cures all!

Minimally Invasive Spine Surgery

- The Reality
  - Incisions are smaller
  - Blood loss is less
  - Recovery is quicker
  - The laser can be utilized as a tool for treatment
- However…..
  - Technology must be used appropriately
    - Maintain efficacy of traditional surgery
    - Cannot create new complications
    - Equal or improved costs of procedures

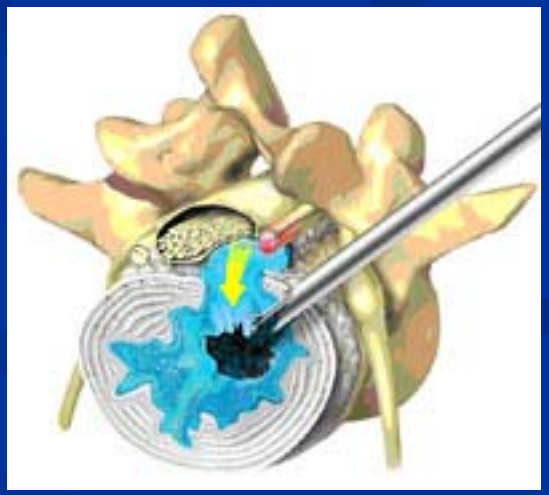


MISS – Common Applications

- Techniques of MISS can be applied to almost all spinal pathologies
  - Disc herniations / neurologic impingement
  - Instability
  - Deformity
  - Trauma
  - Systemic disease
    - Osteoporosis related fragility fractures

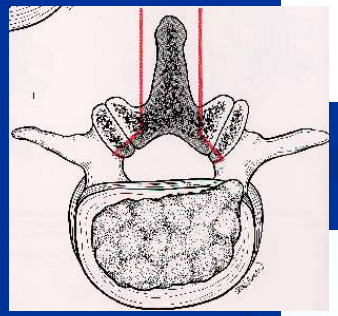
MI Decompression

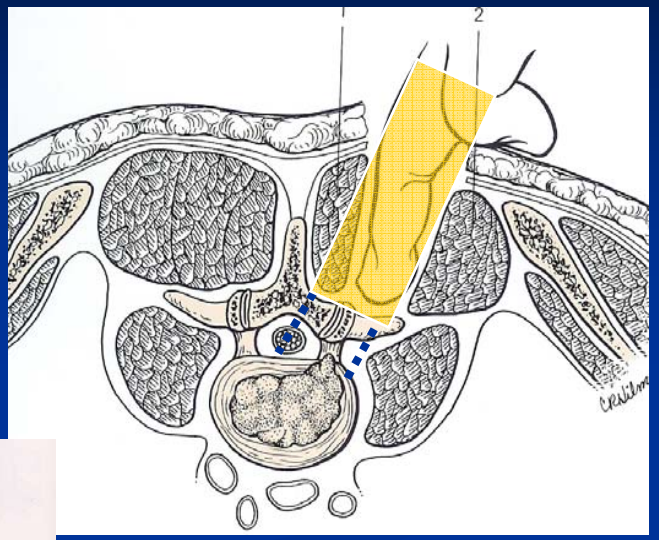
- Endoscopic
  - Uses a camera to visualize pathology
    - Smaller incisions
    - Potentially more rapid recovery
    - Outpatient settings
  - Limited application due to anatomic restraints
    - Potential for limitation of efficacy
      - Indirect access to pathology
    - Unique complications

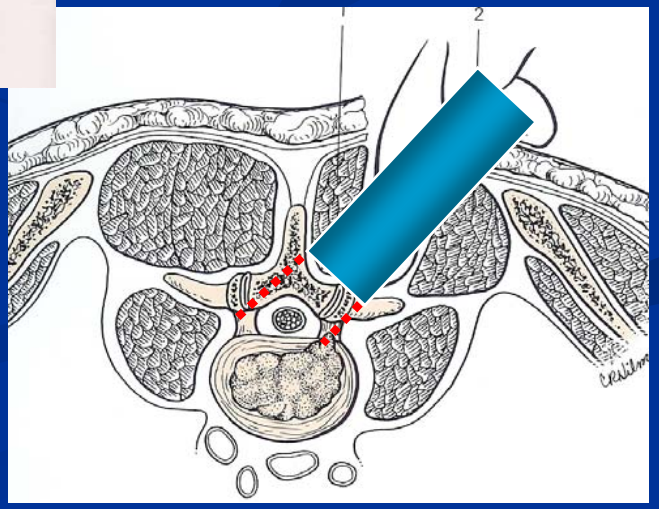


MI Decompression

- Tubular based systems
  - Benefits of MI plus visualization of traditional surgery
    - Same benefits as endoscopic
    - Same efficacy as open procedures
      - Easily converted to standard open operation if needed
      - Similar complications to standard procedures
  - Gold standard for most decompressive surgery in US

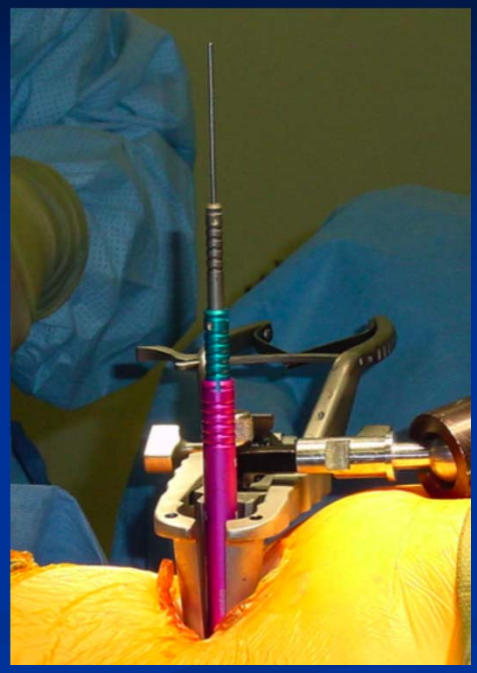


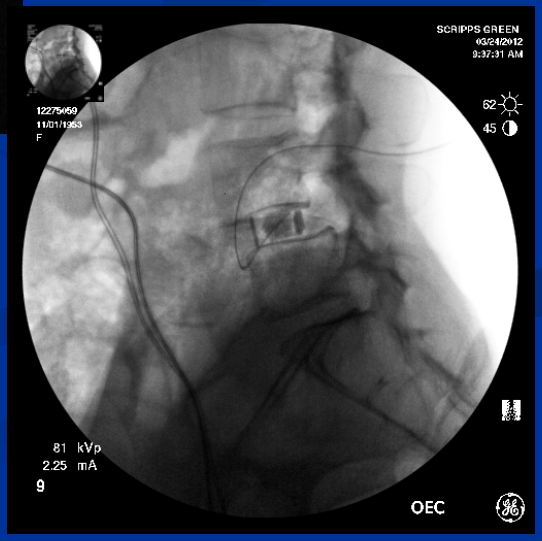




MI Stabilization

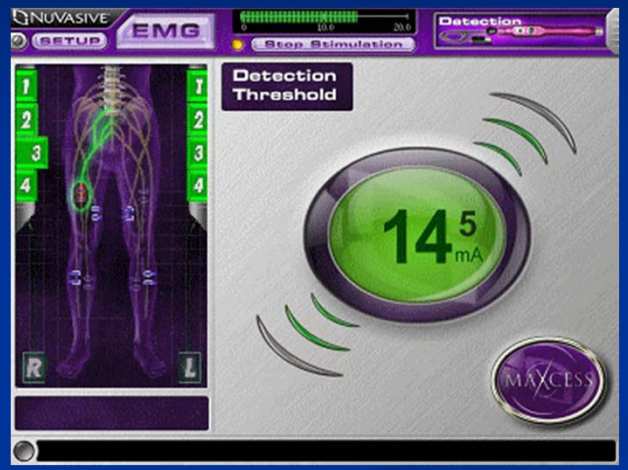
- Operations for fusion
  - Alphabet soup!!
    - TLIF
    - XLIF
    - DLIF
    - ALIF
    - AxialLIF
    - MIDLIF
  - The common theme
    - MI techniques that allow appropriate access to pathology to allow for placement of instrumentation and grafting implements
    - An expansion of decompression techniques

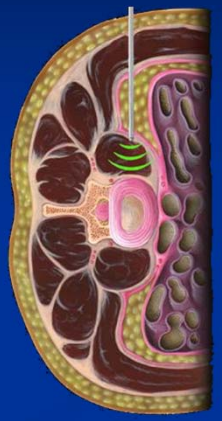




MI Stabilization

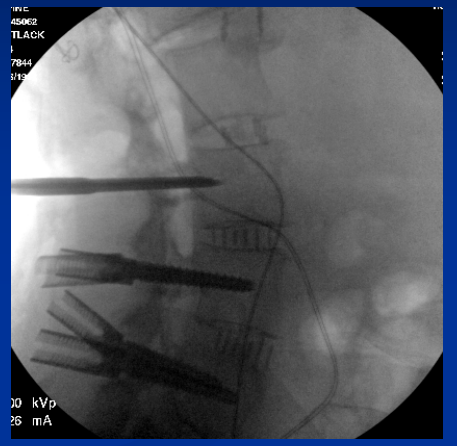
- Advancements in care
  - Access systems
    - Retractors
    - Neuromonitoring tools
    - Instrument systems
  - Implants
    - Specific shapes
    - Features that allow access regardless of anatomic restraints
      - Expandable
      - Rotating

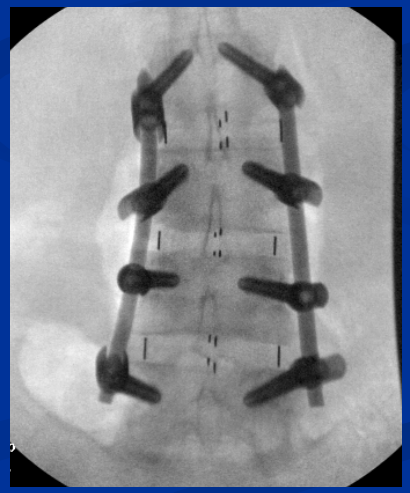




MI Stabilization

- Advancements in care
  - Fixation systems
    - Flouroscopically placed
    - Guidewires to improve accuracy
    - Connection systems that allow for percutaneous placement of screws and still allow connectivity and deformity correction
  - Intraoperative imaging
    - CT
    - Improved flouroscopy
    - Image guidance



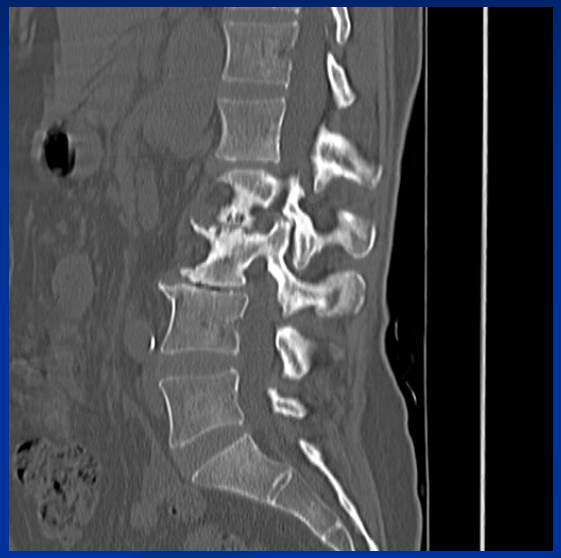


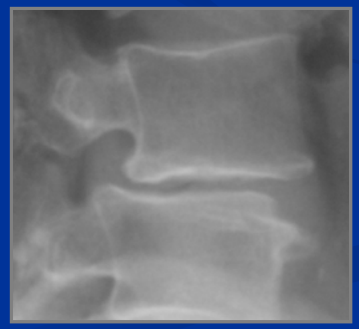
MI Surgical Case

- 61 yo female
  - Historically very active
    - Running
    - skiing
  - 1 year history of progressively worsening back pain and left leg and thigh pain
    - Significant disability
    - Failed all conservative treatments
    - Postural change over time

MI Surgical Case

- Diagnosis
  - Progressive DDD leading to worsening degenerative scoliosis
    - Severe neuroforaminal stenosis on concave (left) side of curve causing leg pain



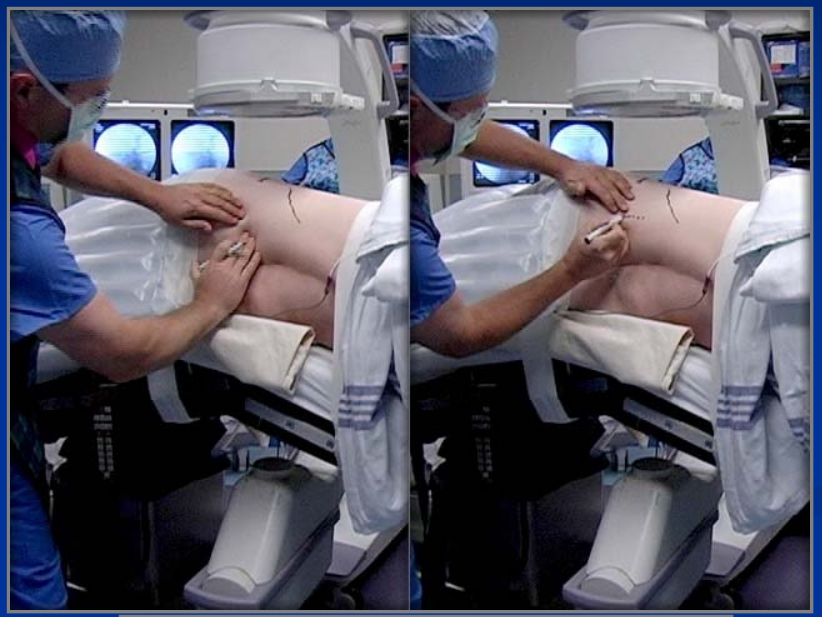


MI Surgical Case

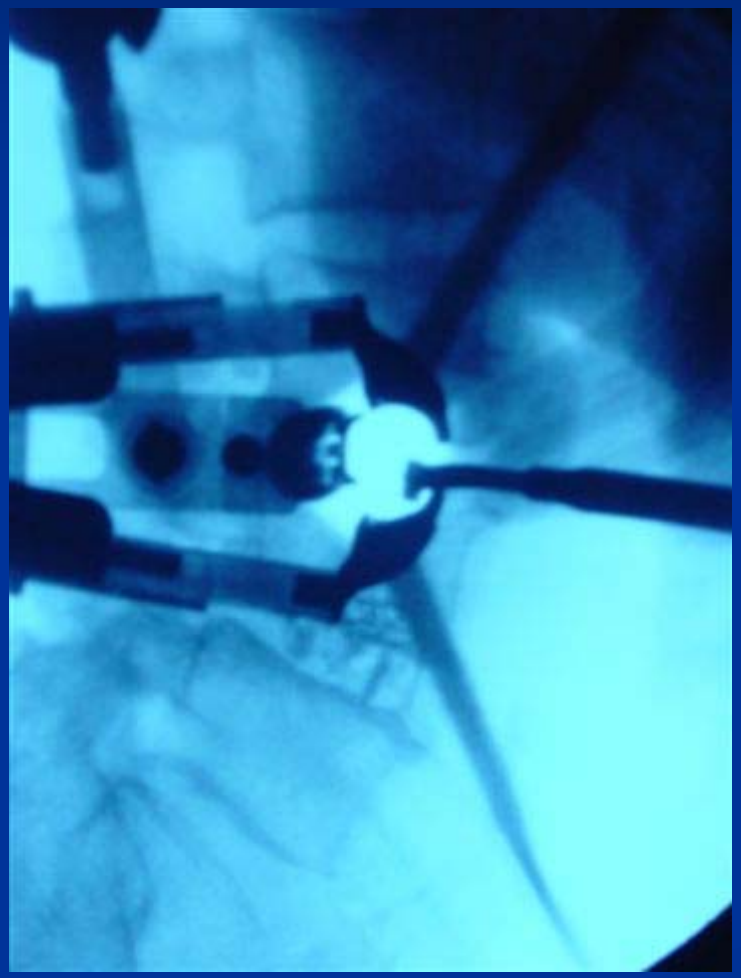
- Treatment Planning
  - Issues
    - Neurologic impingement
      - Decompression
    - Degenerative progression
      - Pain increase over time
    - Deformity progression
      - Indicates lack of stability
        - Due to progression of the degeneration
- Options
  - Decompression alone
    - Will fail due to instability
  - Standard open anterior and/or posterior instrumentation and fusion
    - Difficult to address neuroforaminal disease posteriorly
    - High morbidity
  - MI anterior interbody fusion
    - Indirect neural decompression
    - Deformity correction
    - Stabilization
      - +/- percutaneous screw fixation

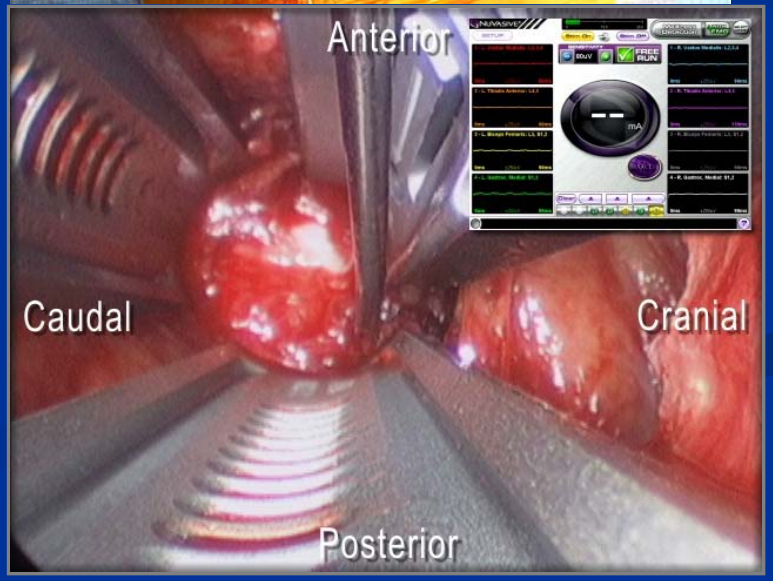
MI Surgical Case

- Treatment
  - MI anterior interbody fusion
    - Operative technique
      - Lateral approach to allow anterior spinal exposure
        - Transpsoas
        - Graft placements correct deformity, provide stability, indirectly decompress the neurologic compression via foraminal height restoration



MI Surgical Case





MI Surgical Case

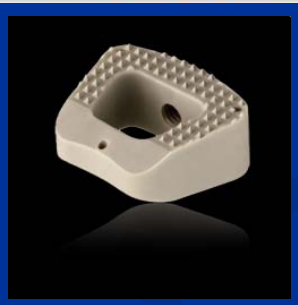
- Outcome
  - Complete relief of preop symptoms
  - Fusion solid at one year
  - Has returned to activities without restriction

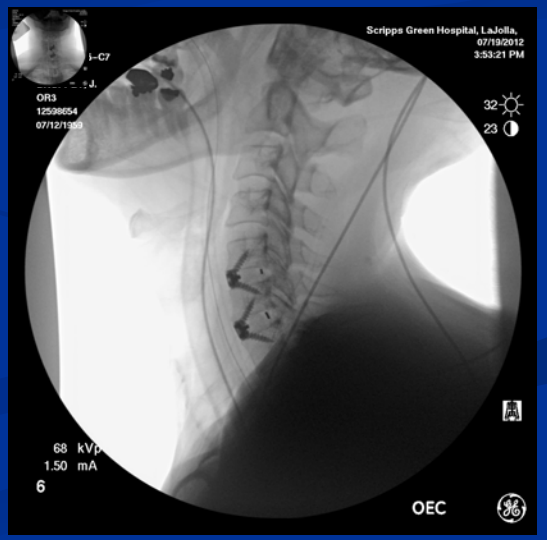
MI Fracture Care

- Percutaneous fracture stabilization
  - Vertebroplasty
  - Kyphoplasty
  - For more complex fractures
    - Implants and retractors designed specifically for these applications
    - Variations from MI stabilization systems and techniques

Future Directions

- Robotics/Image guidance improvements
  - More precision
  - Less patient and surgeon radiation
    - Smaller incisions
    - Less surgical morbidity
- Implant designs
  - Anatomic shapes
  - Ease of placement
  - Ease of fixation
  - Improved materials
    - Biocompatibility
  - Motion preservation





Future Directions

- Systemic treatments to prevent disease
  - Osteoporosis treatments
  - Disc disease modification agents
- Biomaterials
  - Bone graft substitutes
  - Bone graft extenders
  - Artificial discs
  - Biocompatible implants
    - No hardware long term

News Release

Spinal Restoration, Inc. Completes Enrollment of the Phase III Study of the Biostat® System

Placebo Controlled Trial Assesses the Biostat System for the Treatment of Discogenic Low Back Pain

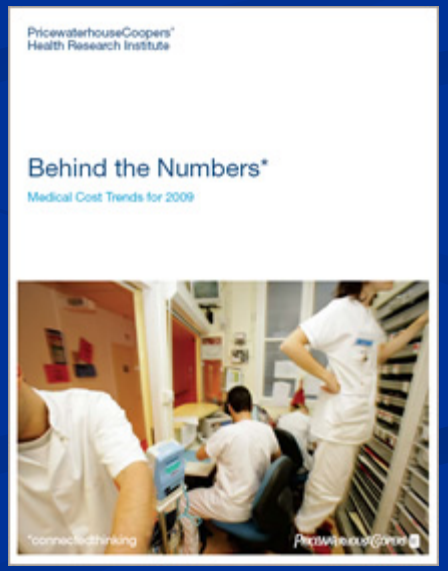
Future Directions

- Health Care system issues
  - Demographics
    - Aging population
      - Increased demand and complexity of problems
  - Insurance/payment systems
    - Finite resources for all care
    - Trend towards cost reductions
      - Care limits?
    - Accountable Care Organizations
      - Disease prevention
      - Comprehensive disease management
        - Specialized centers?
      - Bundled payments
        - Will this model work?

Spine J. 2011 Sep;11(9):807-15. Epub 2011 Aug 15.
Accountable disease management of spine pain.
Smith MJ.

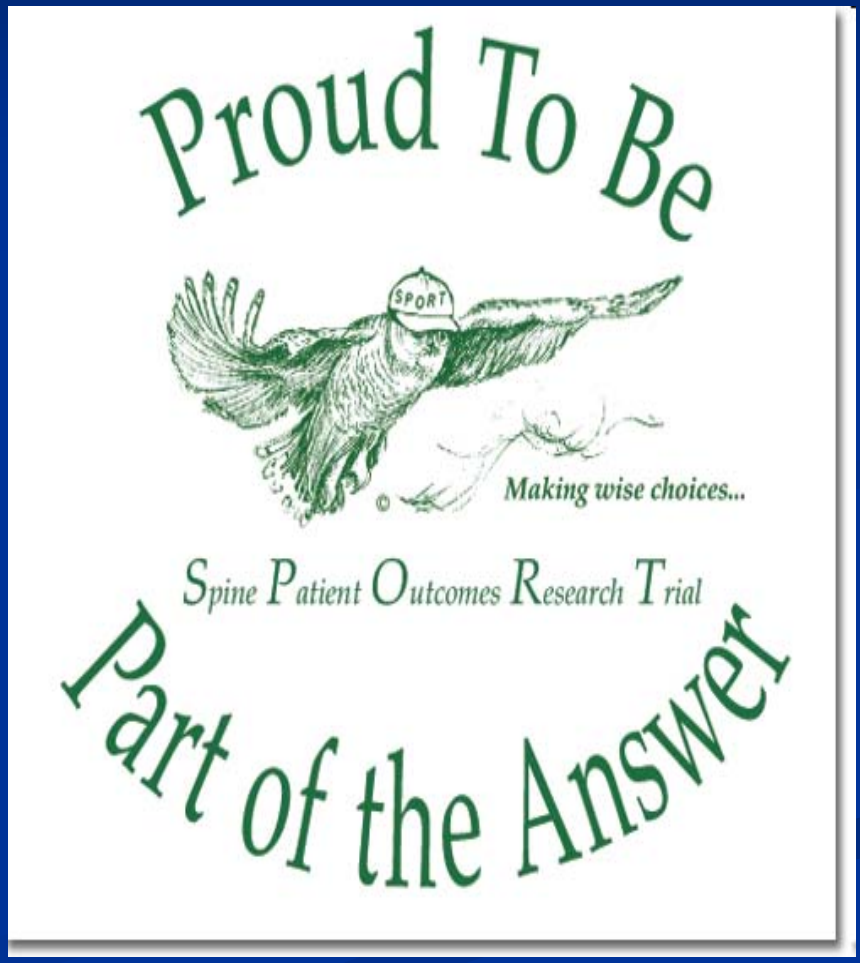
Source

East Greenwich Spine & Sport Inc., East Greenwich, RI 02818, USA. smith@egss.us



Future Directions

- Health Care System Issues
  - Outcomes research
    - Will determine:
      - Who gets paid
      - What gets paid for
      - How much gets paid
      - What gets excluded
      - New technology development and adoption
    - We need to validate the results of what we are doing to justify its cost



Summary

- Spine care, like all of medicine, is changing
  - Minimally invasive procedures, offering less morbidity and equal or better efficacy, will become the norm
  - MI techniques will improve and applications will broaden
- Cost is an issue, and will be heavily scrutinized
- Outcomes research will determine future care and technology incorporation
- The disease conditions themselves, due to their acuity and disability, will drive patient demand for care
- The aging patient will increase the complexity of care

Thank You