NATURAL HISTORY OF PAINFUL SPINE RELATED DISORDERS

Shane Burch MD
Assistant Professor in Residence

2013 UCSF SPINE SYMPOSIUM

RICHARD DEYO, MD MPH

• OHSU Professor and the Kaiser-Permanente Endowed Professor of Evidence-Based Medicine in the Department of Family Medicine at Oregon Health and Science University
• Deputy Editor of Spine and a member of the Editorial Board of the Back Review Group of the Cochrane Collaboration
• Interest in measuring patient function, involving patients in clinical decisions, and managing low back pain

MICHAEL GROFF, MD

• Chief of spine service and co-director of the Spine Center at Beth Israel Deaconess Medical Center
• Specializing in spinal oncology and degenerative disease
**DISCLOSURES**

- Medtronic - consultant
- Lilly - research support

**OVERVIEW**

- identify the spectrum of painful spinal disorders
- highlight the importance of understanding the natural history of common spinal conditions
- identify the challenges to understanding the natural history of spinal disorders
ETIOLOGY OF PAIN OF SPINAL ORIGIN

GENERAL
- Degenerative
- Inflammatory
- Infection
- Neoplastic
- Traumatic
- Deformity
- Neurogenic
- Congenital

NON-SPECIFIC BACK PAIN

SYMPTOMATOLOGY
- BACK PAIN
- LEG PAIN
- COMBINATION
RADIOGRAPHY

- **single level disease**
  - disc herniation
  - spondylolisthesis
  - degenerative disc
  - stenosis
- **multilevel disease**
  - spinal stenosis
- **multi-level degenerative disease**
- **systemic disease**
  - osteoporosis
  - osteomalacia
  - vasculopathy - smoker

**DDD**

- 45 Y MALE
- BASIC SCIENTIST
- 1.5 YR BACK PAIN
- POSITIVE L5/S1 DISCOGRAM

**DDD ++**

- 22 Y MALE
- SKI RACER
- BACK PAIN FOR 3 YRS
- POSITIVE L5/S1 DISCOGRAM
**DISC HERNIATION**

**LEG PAIN**
- Radiculopathy:
  - Compression of lumbar nerve roots
  - Central
  - Peripheral
- Neurogenic claudication
- Vascular claudication
- Peripheral nerve compression

**ADULT DEGENERATIVE SCOLIOSIS**
What is the outcome if we treat without surgery?
What is the outcome if we treat with surgery?
What is the outcome with a complication?

RAPIDLY PROGRESSIVE SCOLIOSIS
IATROGENIC BACK PAIN
SYMPTOM NOT A DIAGNOSIS

OUTCOMES ASSESSMENT: HISTORICAL PERSPECTIVE

The End-Result Idea

“The common sense notion that every hospital should follow every patient it treats, long enough to determine whether or not the treatment has been successful, and then to inquire, ‘If not, why not?’ with a view to preventing similar failures in the future.”

-E.A. Codman

Ernest Amory Codman
1869-1940

Ernest Amory Codman
1869-1940
MEASURES OF VALUE

QALY = \frac{\text{change in health status (utility)}}{\text{duration of change}}

ICER = \frac{\Delta \text{Treatment A} - \Delta \text{Treatment B}}{\text{Cost Treatment A} - \text{Cost Treatment B}}
DO SPINAL DISORDERS LIE ON A CONTINUUM?

EVOLUTION OF SPINE DISEASE

- Herniated Disc
- DDD – loss of lordosis
- Facet arthropathy
- Spinal Stenosis: central and foraminal
- Adjacent Segment Disease


COMPENSATION - PELVIC RETROVERSION

SYMPTOM: BACK PAIN

- 45 Y MALE
- BASIC SCIENTIST
- 1.5 YR BACK PAIN
- POSITIVE L5/S1 DISCOGRAM
FUSION FOR BACK PAIN?

Adjacent segment disease following lumbar/thoracolumbar fusion with pedicle screw instrumentation: a minimum 5-year follow-up.

188 patients with minimum 5-year follow-up who had lumbar/thoracolumbar fusion with pedicle screw instrumentation for degenerative disorders were included

Radiographic ASD occurred in 42.6% (80 of 188) of patients

Age at surgery over 50 years and length of fusion were significant risk factors for the development of ASD in the lumbar spine.

Fusion to L1-L3 proximally increased the risk of ASD when compared with L4 and L5.

A prospective randomised study on the long-term effect of lumbar fusion on adjacent disc degeneration.
Eur Spine J. 2009 Aug;18(8):1175-86

111 patients, aged 18-55, with isthmic spondylolisthesis were randomised to exercise (EX, n = 34) or posterolateral fusion (PLF, n = 77), with (n = 37) or without pedicle screw instrumentation (n = 40)

Radiographic analysis showed normal discs in 100% of patients in the EX group, compared to 62% in the PLF group (p = 0.026)

Adjacent segment degeneration in the lumbar spine.
Ghiselli et al.

Two hundred and fifteen patients who had undergone posterior lumbar arthrodesis were included

(27.4%) of the 215 patients had evidence of degeneration at the adjacent levels and elected to have an additional decompression (fifteen patients) or arthrodesis (forty-four patients)

The rate of symptomatic degeneration at an adjacent segment warranting either decompression or arthrodesis was predicted to be 16.5% at five years and 36.1% at ten years
Different survival function of the adjacent segment according to age. The 120 month survival function was 98% for < 61 year-old age group and 88% for equal or above the 61 year-old age group ($p = 0.000$).

REALIGNMENT OBJECTIVES

Table 2. Data from a 125 Patient Retrospective Review of Clinical Outcomes Correlated With Clinically Relevant Radiographic Values for 3 Key Parameters

<table>
<thead>
<tr>
<th>SVA</th>
<th>PT &gt;20</th>
<th>PI-LL</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;50</td>
<td>&lt;50</td>
<td>&gt;9</td>
</tr>
<tr>
<td>134.9</td>
<td>1.7</td>
<td>31.8</td>
</tr>
</tbody>
</table>

Mean radiographic parameter value
Mean ODI scores
Unpaired t tests on ODI scores
ODI indicates Oswestry Disability Index.
RAPIDLY PROGRESSIVE SCOLIOSIS
IATROGENIC

NATURAL HISTORY OF MULTILEVEL DISEASE
Treating a deformity, creating a deformity, preventing a deformity

CHALLENGE OF CLINICAL OUTCOMES: SPINE
• multiple levels
• multiple etiologies
• multiple regions
• multiple co-morbidities

CHALLENGES
• Point of Care Capture
• Survey Completion
• Longitudinal Collection
RCT VS. REGISTRY

• **Clinical trials focus on efficacy**
  - inclusion criteria
  - homogeneous population
  - control for differences by randomization
  - do not track patient factors
  - expensive

• **Registries look at effectiveness**
  - data from a generalized practice-setting
  - heterogeneous population
  - control for differences during analysis

SUMMARY

• Natural history of spinal disorders are difficult to study due to the combination of symptoms, etiologies, treatments, follow up

• Adopt a perception of spinal disease as a continuum vs static entity: treat now for the future delivers greatest value

• Sagittal balance is paramount

Thank You