3.3 The Spine

(Pages 94-135)
Two methodologies

- Injury model based on classifications with Diagnosis Related Estimates (DRE): based on structural inclusions & differentiators - Table 70 (p. 108)

- Range of Motion model based on Specific Disorders, ROM, and neurologic deficit. Range of motion model used only as a differentiator
3.3a The Spine History

• Chief complaint
• Pain description
• Associated problems
• Causal Analysis
• Impact on ADLs
• Red and Yellow Flags
• Review of Imaging for loss of structural integrity
3.3b The Spine Examination (p. 95-99)

- Inspection
- Palpation
- Neurological examination
  - Motor, Sensory, Reflexes
- Sciatic nerve tension
- Vascular examination
- Non-Physiological Findings
- Validity Testing
Inclinometers
Goniometers
Loss of Motion Segment Integrity

• Abnormal segmental translation or angular motion (RARE)

• Abnormal segmental translation (i.e. slipping of one vertebra over another)
  > 3.5 mm for a cervical vertebra,
  > 5 mm for a vertebra in the thoracic or lumbar spine

• Abnormal angular motion between two adjacent motion segments > 11 degrees. Exception: L5-S1 > 15 degrees
Loss of Motion Segment Integrity: Translation

Figure 62 (98)
Loss of Motion Segment Integrity: Angular Motion

Figure 63 (p. 98)
The Differentiators (P.99)

In using the Injury Model, one may use certain clinical procedures or determinations “differentiators” to place the impairment in the proper category.

The proper DRE category is the one having the impairment percent that is closest to the impairment percent determined with the Range of Motion Model.
Differentiators

1. Guarding
2. Loss of reflex(es)
3. Decreased muscle circumference
4. Electrodiagnosis
5. Lateral motion roentgenograms
6. Loss of bowel or bladder control
7. Bladder studies

And the Range of Motion Model
1. Guarding

- Paravertebral muscle guarding or spasm
- Nonuniform loss of range of motion
- Dysmetria
- Radicular complaints that follow anatomic pathways
- Present or documented by a physician
2. Loss of reflexes

• Spine injury related loss
• Verified by electrodiagnostic evidence
3. Decreased circumference, atrophy

- Loss of girth of 2 cm or more
- Not explained by non-spine related problems
4. Electrodiagnostic Evidence

• “Unequivocal”
• Acute - multiple positive sharp waves or fibrillation potentials
• Chronic - polyphasic waves in peripheral muscles
5. Loss of motion segment integrity

• Injury-related AP translation
• Injury-related angular motion
6. Loss of bowel or bladder control

• Loss of sphincter tone
• Loss of bladder control requiring use of an assistive device
7. Bladder studies

- Cystometrograms show unequivocal neurological compromise with resulting incontinence
Structural Inclusions (p. 99)

- Fractures, dislocation and/or neurologic motor compromise
- Negatively impact long term anatomic or functional prognosis
- Take precedence over differentiators
3.3c Impressions, Diagnoses, and Impairment Estimates

• Expressed in a logical fashion
• Estimates based on history, objective findings, data, impression and other information
• Explain any qualifications or inconsistencies
3.3d The Injury or Diagnosis-Related Estimates Model (DRE)

- Attempts to document physiologic and structural impairments.
- Relies on evidence of neurological deficits and uncommon, adverse structural changes.
3.3e General Approach & Directions

• Start with Table 70 (p. 108) to determine most appropriate category
• Utilize Table 71 (p. 109) to clarify DRE Impairment Category Differentiators
3.3f Specific Procedures and Directions

• Take history, perform examination, review records
• Review special studies
• Select region that is primarily involved
  • Lumbosacral (3.3g, p. 101-103)
  • Cervicothoracic (3.3h, p. 103-105)
  • Thoracolumbar (3.3i, p. 106-107)
Specific Procedures and Directions

- Consider the permanency of the impairment
- If one spine region is primarily involved, determine spine-related whole person impairment
- If cannot place in category, use ROM model as a differentiator
- If long tract signs present, consider combining other impairment
Specific Procedures and Directions

- Combine impairment of other involved regions
- Determine if preexisting impairment, and apportion
- Use the report form on spine impairment (Fig. 80, p. 135) and standard Guides Report of Medical Evaluation (p. 11) to report
3.3g Lumbosacral Spine Impairment

- First consult:
  - Table 70. Spine Impairment Categories (p. 108)
  - Table 72. DRE Lumbosacral Spine Impairment Categories (p. 110)
- Figure 71. DRE Impairment Category Differentiators (p. 109)
DRE Lumbosacral Categories

• **Category I**: Complaints or Symptoms: 0% whole person

• **Category II**: Minor Impairment (findings, without objective evidence of radiculopathy): 5% whole person

• **Category III**: Radiculopathy: 10% whole person

These 3 cover the vast majority of what we see in clinic.
DRE Lumbosacral Categories

• **Category IV**: Loss of Motion Segment Integrity (20%)
• **Category V**: Radiculopathy and Loss of Motion Segment Integrity (25%)
• **Category VI**: Cauda Equina-like Syndrome Without Bowel or Bladder Signs (40%)
• **Category VII**: Cauda Equina Syndrome with Bowel or Bladder Impairment (60%)
• **Category VIII**: Paraplegia, Total Loss of Lumbosacral Spine Cord Function (75%)
3.3h Cervicothoracic Spine Impairment

The Spine (p. 103-105)
DRE Cervicothoracic Categories

I: Complaints or Symptoms (0%)
II: Minor Impairment (5%)
III: Radiculopathy (15%)
IV: Loss of Integrity or Multilevel Neurologic Compromise (25%)
V: Severe Upper Extremity Neurologic Compromise (35%)
DRE Cervicothoracic Categories

VI: Cauda Equina without Bowel / Bladder (40%)
VII: Cauda Equina with Bowel / Bladder (60%)
VIII: Paraplegia, Total Loss of Lower-Extremity Function (75%)

In presence of long tract signs, may combine Categories II - V, with categories VI - VIII.
3.3i Thoracolumbar Spine

The Spine (p. 106-109)
DRE Thoracolumbar Categories

I: Complaints or Symptoms (0%)
II: Minor Impairment (5%)
III: Radiculopathy (15%)
IV: Loss of Integrity or Multilevel Neurologic Compromise (20%)
V: Radiculopathy and Loss of Integrity (25%)
DRE Thoracolumbar Categories

VI: Cauda Equina without Bowel / Bladder (35%)
VII: Cauda Equina with Bowel / Bladder (55%)
VIII: Paraplegia, Total Loss of Lower-Extremity Function (70%)

Categories VI - VIII should be combined with appropriate impairment from Category II - VI.
3.3j The Range of Motion Method

The Spine (112-130)
3.3j Range of Motion Method (112-130)

Utilize only as a differentiator, unless process is atraumatic
How is measurement made?

• Must be stable, not acute
• Inclinometer used
• Reproducibility required
  3 consecutive measures must fall within 5 degrees of the mean (if mean > 50 degrees, must be within 10 degrees)
• Must have medical evidence of a documented injury or illness with physiologic residue
Inclinometers

- Attempt to measure “true” motion of segment
- Types: Mechanical & Electronic
- Lumbar Validity Test  P.127
  Invalid if tighter SLR angle exceeds the sum of the sacral flexion and extension angles by more than 15 degrees, the lumbosacral flexion test is invalid.
Estimating whole-person impairment

• Select primarily impaired region
• Use Table 75 (p. 113) to determine the estimated specific spine disorder impairment
Table 75. WPI Percents Due to Specific Spine Disorders  p. 113

I - Fractures
II - Intervertebral disk or other soft tissue lesion
III - Spondylolysis and spondylolisthesis, not operated on
IV - Spinal stenosis, segmental instability, spondylolisthesis, fracture or dislocated, operated on
What does medically documented, injury, pain and rigidity mean?

Imply not only that an injury or illness has occurred, but also that the condition is stable, as shown by the evaluator’s history, examination, and other data, and that a permanent impairment exists, which is at least partly due to a condition being evaluated and not only due to pre-existing disease (Footnote, Table 75, p. 114)
WPI Estimates Steps  (p. 115)

• Test range of motion
• Determine that impairment is stable
• Carry out at least three sets of measurements, check reproducibility
• Perform additional tests up to maximum of six to achieve reproducibility
• Use the maximum angle of a valid set
• Determine any impairment due to neurologic deficits, and convert to whole person
• Combine spine disorder and range of motion impairment
• Repeat steps for either of the other two regions with significant involvement
• Combine regional impairments into a single whole person impairment
• Combine whole person spinal impairment with neurologic impairment
• Record the results on the Spine Impairment Summary Form (Fig 80 p. 134)
3.3k Determining Regional Spine Impairment

The Spine (p. 131)
Summary

• Perform careful spinal assessment
• Utilize “Injury Model” method
• Utilize inclinometer for range of motion determinations
3.4 The Pelvis

(P. 131)

Healed Fractures
Without displacement or residual signs = 0%
With displacement without residual signs = 0-5%
With displacement, deformity and residuals = 0-15%
3.4 The Pelvis

The following shows impairment values associated with selected disorders of the pelvis:

<table>
<thead>
<tr>
<th>Disorder</th>
<th>% Impairment of the whole person</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Healed fracture <em>without</em> displacement or residual sign(s)</td>
<td>0</td>
</tr>
<tr>
<td>2. Healed fracture <em>with</em> displacement and <em>without</em> residual sign(s)</td>
<td></td>
</tr>
<tr>
<td>a. Single ramus</td>
<td>0</td>
</tr>
<tr>
<td>b. Rami, bilateral</td>
<td>0</td>
</tr>
<tr>
<td>c. Ilium</td>
<td>0</td>
</tr>
<tr>
<td>d. Ischiur</td>
<td>0</td>
</tr>
<tr>
<td>e. Symphysis pubis, without separation</td>
<td>5</td>
</tr>
<tr>
<td>f. Sacrum</td>
<td>5</td>
</tr>
<tr>
<td>g. Coccyx</td>
<td>0</td>
</tr>
<tr>
<td>3. Healed fracture (s) <em>with</em> displacement, deformity, and residuals</td>
<td></td>
</tr>
<tr>
<td>sign(s) involving:</td>
<td></td>
</tr>
<tr>
<td>a. Single ramus</td>
<td>0</td>
</tr>
<tr>
<td>b. Rami, bilateral</td>
<td>5</td>
</tr>
<tr>
<td>c. Ilium</td>
<td>2</td>
</tr>
<tr>
<td>d. Ischiur, displaced 1 inch or more</td>
<td>10</td>
</tr>
<tr>
<td>e. Symphysis pubis, displaced or separated</td>
<td>15</td>
</tr>
<tr>
<td>f. Sacrum, into sacroiliac joint</td>
<td>10</td>
</tr>
<tr>
<td>g. Coccyx, nonunion or excision</td>
<td>5</td>
</tr>
<tr>
<td>h. Fracture into acetabulum</td>
<td>Evaluate on basis of restricted motion of hip joint</td>
</tr>
</tbody>
</table>

The impairment estimate for hemipelvectomy is 50% of the whole person (Table 63, p. 83, lower extremity).