CLASSIFICATION OF PELVIC RING FRACTURES

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Orthopaedic SpR Training Day
Queen Alexandra Hospital
July 17th 2009
Pelvis and Ligaments, Front View, Male
CLASSIFICATION SYSTEMS

- Pennal et al.\textsuperscript{1}
- Bucholz\textsuperscript{2}
- Tile\textsuperscript{3,4}
- Young and Burgess\textsuperscript{5}
Young and Burgess classification

Based on mechanism of injury:

- Lateral compression (LC I-III)
- AP compression (APC I-III)
- Vertical shear
- Combined mechanism
LATERAL COMPRESSION

Young-Burgess A
LC – Type I

- commonest LC injury, low energy
- transverse pubic rami #
- ipsilateral sacral compression
- stable
LC – Type II

- pubic rami #
- ipsilateral posterior iliac wing # (crescent #)
- potentially unstable
LC – Type III

- LC – I or LC – II injury
- contralateral AP compression injury
- unstable
- “windswept pelvis”
ANTERIOR POSTERIOR COMPRESSION

Young-Burgess B
APC – Type I

- pubic symphysis diastasis (<2cm)
- +/- vertical pubic rami #
- stretching of anterior ligaments
- stable
APC – Type II

- pubic symphysis diastasis (>2.5cm)
- SIJ diastasis
- unstable
- “open book” pelvis
APC – Type III

- complete SIJ, anterior and posterior ligament disruption
- extremely unstable
- neurovascular injury
VERTICAL SHEAR
VERTICAL SHEAR

- anterior and posterior vertical displacement
- unstable
COMBINED MECHANISM

- combination of other injury patterns
- LC/VS commonest
Tile Classification

Based on stability:

- Type A – stable
- Type B – vertically stable, rotationally unstable
- Type C – vertically unstable, rotationally unstable
TYPE A – stable

- A1 - # pelvis not involving ring
  - ischial spine
  - ischial tuberosity
  - isolated iliac wing #

- A2 - minimally displaced pelvic ring #

- A3 - transverse # of sacrum or coccyx
TYPE B – vertically stable, rotationally unstable

- **B1** - “open book” pelvis
  - external rotational instability
  - 3 stages
- **B2** - lateral compression injury
  - internal rotational instability
  - ipsilateral
- **B3** - lateral compression injury
  - internal rotational instability
  - contralateral (bucket handle)
TYPE C – vertically and rotationally unstable

- C1 - unilateral injury
- C2 - bilateral injury
- C3 - bilateral injury, associated acetabular #
## Burgess-Young Classification

<table>
<thead>
<tr>
<th>Category</th>
<th>Common Characteristic</th>
<th>Differentiating Characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC-I</td>
<td>Anterior transverse Fx (pubic rami)</td>
<td>Sacral compression on side of impact</td>
</tr>
<tr>
<td>LC-II</td>
<td>Anterior transverse Fx (pubic rami)</td>
<td>Crescent (iliac wing) Fx</td>
</tr>
<tr>
<td>LC-III</td>
<td>Anterior transverse Fx (pubic rami)</td>
<td>Contralateral open-book (APC) injury</td>
</tr>
<tr>
<td>APC-I</td>
<td>Symphyseal diastasis</td>
<td>Slight widening of pubic symphysis and/or SI joint; stretched but intact anterior and posterior ligaments</td>
</tr>
<tr>
<td>APC-II</td>
<td>Symphyseal diastasis or anterior vertical Fx</td>
<td>Widened SI joint; disrupted anterior ligaments; intact posterior ligaments</td>
</tr>
<tr>
<td>APC-III</td>
<td>Symphyseal diastasis or anterior vertical Fx</td>
<td>Complete hemipelvis separation, but no vertical displacement; complete SI joint disruption; complete anterior and posterior ligament disruption</td>
</tr>
<tr>
<td>VS</td>
<td>Symphyseal diastasis or anterior vertical Fx</td>
<td>Vertical displacement anteriorly and posteriorly, usually through SI joint, occasionally through iliac wing and/or sacrum</td>
</tr>
<tr>
<td>CM</td>
<td>Anterior and/or posterior, vertical and/or transverse components</td>
<td>Combination of other injury patterns: LC/VS or LC/APC</td>
</tr>
</tbody>
</table>

### TABLE 3. Classification of Pelvic Ring Disruption Comparison

<table>
<thead>
<tr>
<th>Comprehensive Tile Classification</th>
<th>Young and Burgess Classification</th>
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</thead>
<tbody>
<tr>
<td>Type A: Stable pelvic ring injury</td>
<td>No equivalent</td>
</tr>
<tr>
<td>A1: Avulsion of the innominate bone</td>
<td>No equivalent</td>
</tr>
<tr>
<td>A2: Stable iliac wing fracture or stable minimally displaced ring fractures</td>
<td>No equivalent</td>
</tr>
<tr>
<td>A3: Transverse fractures of the sacrum and coccyx</td>
<td>No equivalent</td>
</tr>
<tr>
<td>Type B: Partially stable</td>
<td></td>
</tr>
<tr>
<td>B1: Open-book injury</td>
<td>APC-I, APC-II</td>
</tr>
<tr>
<td>B2: The lateral compression injury</td>
<td>LC-I, LC-II, crescent fracture</td>
</tr>
<tr>
<td>B3: Bilateral B injuries</td>
<td>Windswept, complex</td>
</tr>
<tr>
<td>Type C: Completely unstable</td>
<td></td>
</tr>
<tr>
<td>C1: Unilateral</td>
<td>APC-III, vertical shear</td>
</tr>
<tr>
<td>C2: Bilateral, one side B, one side C</td>
<td>Complex</td>
</tr>
<tr>
<td>C3: Bilateral, C lesions</td>
<td>Complex</td>
</tr>
</tbody>
</table>


Useful Websites

- http://www.orthoteers.org/(S(s15ap332az5vzm45qipgihve))/index.aspx
- http://www.wheelelessonline.com/ortho/pelvic_fractures