Oblique Injuries In Professional Baseball

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Conte Injury Analytics
Baseball Sports Medicine: Game Changing Concepts
November 3-4, 2016

The New York Times
Vexing Rise in Oblique Injuries, and Little Explanation

Abdominal Muscle Strains in Professional Baseball: 1991-2010
Conte, S. Thompson, M, Marks, M, Dines, J.

<table>
<thead>
<tr>
<th>Population</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Oblique (internal or external) strain</td>
<td>• 393 players were placed on the Disabled List from 1991-2010 with abdominal muscle strains, constituting 5% of all baseball injuries</td>
</tr>
<tr>
<td>2. Abdominal muscle strain</td>
<td>• 92% of these injuries were internal/external oblique or intercostal muscle strains</td>
</tr>
<tr>
<td>3. Rib cage/rib muscle strain</td>
<td>• 44% of injuries were sustained by pitchers</td>
</tr>
<tr>
<td>4. Intercostal muscle strain</td>
<td>• An upward trend was seen from 1991-2010, and overall the injury rate was 22% higher in the 2000s than the 1990s</td>
</tr>
<tr>
<td>5. Rectus abdominis strain</td>
<td>• 78% of pitchers and 70% of hitters sustained contralateral injuries</td>
</tr>
</tbody>
</table>
Epidemiology and Impact of Abdominal Oblique Injuries in Major and Minor League Baseball

Christopher L. Camp, MD Stan Conte, PT, DPT, ATC Steven B. Cohen, MD Matthew Thompson, MD John D’Angelo, BS Joseph T. Nguyen, MPH Joshua S. Dines, MD

- Used the HITS Database
- Major and Minor League Players
- Demographics: Age; Position/Role; Handness.
- DOI; Missed Days; MOI; Side; Treatment, and Re-injury status
Study Results

• 1,515 Injuries but excluded Intercostal (393); Abd Wall (65) and Diaphragmatic Spasm (12)
• 996 Total Oblique Injuries (199.2/year)
• Major (259; 26%), Minor (737; 74%)
• 22,064 Days Missed (4,413/yr)
• 22.2 days missed per injury
• 77% of injuries were on the contralateral side (excluded switch hitters)

Functional Results

• Avg Days Missed: MLB days = 23.6 days; Minor = 21.6 days
• Re-Injury Rate: 8.15% (MLB=10.48; Minor=7.37)
• Batting vs Pitching: Pitching = 45.7%; Hitting = 34.9%; Throwing (non-pitcher) = 5.8%
• Timing: Season = 78.4%; ST = 19.7%; Post Season = 1.9%
• Timing: March to May = 54.6%; June to August = 46.3

Evaluation and Injection Results

• MRI = 18.4% (183)
• Ultrasound = 1.1% (11)
• Cortisone or PRP Injection = 7.9% (79)
• Only Cortisone = 5.6% (56)
• Only PRP = 2.3% (23)

Players undergoing going any injection returned in 32.3 days versus no injection who returned in 21.3 days
Cortisone Injection only returned 29.0 days compared to 40.3 days for PRP injection
Conclusions

• This study is much more granular but with similar results than the previous DL study.
• Includes Minor League as well as Major League players over 5 season
• Shows a decrease in Major League injuries and a steady even trend in the minor league injuries. 2016 Data not yet available but DL shows increase 2016 at MLB level.
• Hitting is the MOI for the majority of these injuries
• Some intercostal muscle strains may be “Oblique” injuries.
• MRI and Dx US is not a common test on these injuries especially in the minor leagues.
• The majority of injuries occur early in the season

Causes and Prevention

• Kinetic Theory of Etiology
  • Increase forces up the Kinetic Chain
  • Each segment must be able to efficiently transfer the forces
  • Each subsequent segment requires strength and flexibility to be able to handle the forces and then transfer upward
  • Legs to Abdominal to Scapula to Shoulder to Elbow and to bat or ball.
  • If one segment cannot handle the increase force, strain and injury can occur.
  • Contralateral Oblique is the most active abdominal muscle.
  • Therefore puts it at risk.

Thank You

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### Table 2

<table>
<thead>
<tr>
<th>Level</th>
<th>N (%)</th>
<th>% of Total</th>
<th>Min Max</th>
<th>Mean</th>
<th>SD</th>
<th>Mean Age at Injury</th>
<th>Days Missed Per Injury</th>
<th>Perjury Rate</th>
<th>Days Missed per Season</th>
<th>Mean</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Players</td>
<td>996 (100%)</td>
<td>22,064</td>
<td>18 - 95</td>
<td>22.2</td>
<td>19.5</td>
<td>25.8</td>
<td>19.5</td>
<td>9.31%</td>
<td>18.0</td>
<td>4,413</td>
<td>26.6</td>
<td>0.919 to 8.13</td>
</tr>
<tr>
<td>MLB</td>
<td>259 (26.0%)</td>
<td>6,132</td>
<td>20 - 154</td>
<td>23.7</td>
<td>21.2</td>
<td>29.2</td>
<td>21.0</td>
<td>10.48%</td>
<td>17.9</td>
<td>1,226</td>
<td>230.8</td>
<td>1.22 to 7.88</td>
</tr>
<tr>
<td>MiLB</td>
<td>737 (74.0%)</td>
<td>3,186</td>
<td>18 - 160</td>
<td>21.6</td>
<td>18.9</td>
<td>24.3</td>
<td>18.4</td>
<td>7.37%</td>
<td>17.5</td>
<td>3,186</td>
<td>336.9</td>
<td>1.22 to 7.88</td>
</tr>
<tr>
<td>Batting Injuries</td>
<td>455 (45.7%)</td>
<td>9,561</td>
<td>17 - 139</td>
<td>21.0</td>
<td>19.6</td>
<td>26.4</td>
<td>19.5</td>
<td>8.72%</td>
<td>17.4</td>
<td>1,912</td>
<td>271.5</td>
<td>1.22 to 7.88</td>
</tr>
<tr>
<td>Pitching Injuries</td>
<td>348 (34.9%)</td>
<td>9,070</td>
<td>23 - 160</td>
<td>26.1</td>
<td>21.0</td>
<td>25.2</td>
<td>21.0</td>
<td>6.58%</td>
<td>22.1</td>
<td>1,814</td>
<td>258.6</td>
<td>1.22 to 7.88</td>
</tr>
<tr>
<td>Starting Pitchers</td>
<td>218 (62.6%)</td>
<td>5,973</td>
<td>23 - 160</td>
<td>27.4</td>
<td>23.2</td>
<td>24.6</td>
<td>23.0</td>
<td>4.90%</td>
<td>22.0</td>
<td>1,195</td>
<td>213.0</td>
<td>1.22 to 7.88</td>
</tr>
<tr>
<td>Relief Pitchers</td>
<td>130 (37.4%)</td>
<td>3,097</td>
<td>21 - 81</td>
<td>23.8</td>
<td>16.4</td>
<td>26.1</td>
<td>16.3</td>
<td>9.57%</td>
<td>22.1</td>
<td>619</td>
<td>113.3</td>
<td>1.22 to 7.88</td>
</tr>
</tbody>
</table>

### Figures

**Figure 1:** Flowchart of injuries

- All Abdominal/Crural Injuries (n=135)
  - Hip/Abdominal Wall Trauma (n=13)
  - Bladder Trauma (n=13)
- Oblique Injuries (n=9)
  - External: Oblique Wall Injuries (n=4)
- Oblique Wall Injury (n=5)
<table>
<thead>
<tr>
<th>Mechanism</th>
<th>N (%)</th>
<th>Total Days Missed</th>
<th>Missed Per Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>BATTING</td>
<td>455</td>
<td>9,561</td>
<td>21.0</td>
</tr>
<tr>
<td>PITCHING (non-pitcher)</td>
<td>348</td>
<td>9,070</td>
<td>26.1</td>
</tr>
<tr>
<td>THROWING (non-pitcher)</td>
<td>188</td>
<td>3,066</td>
<td>16.3</td>
</tr>
<tr>
<td>FIELDING</td>
<td>69</td>
<td>1,903</td>
<td>18.4</td>
</tr>
<tr>
<td>RUNNINg</td>
<td>31</td>
<td>899</td>
<td>18.7</td>
</tr>
<tr>
<td>BASE RUNNING</td>
<td>21</td>
<td>33</td>
<td>16.6</td>
</tr>
<tr>
<td>WEIGHT LIFTING/CONDITIONING</td>
<td>13</td>
<td>136</td>
<td>9.6</td>
</tr>
<tr>
<td>OTHER</td>
<td>14</td>
<td>134</td>
<td>9.6</td>
</tr>
<tr>
<td>SLIDING</td>
<td>7</td>
<td>122</td>
<td>17.4</td>
</tr>
<tr>
<td>TOTAl</td>
<td>996</td>
<td>22,064</td>
<td>22.2</td>
</tr>
</tbody>
</table>

Note: N = Number of Injuries, % = Percentage of Total Injuries, Total Days Missed, Missed Per Injury.