Somatic symptoms historically termed “post-concussive” are common in the weeks after sexual assault but unrelated to head injury.

Byron Maltez, Jenyth Sullivan, April Soward, Teresa D’Anza, Kathy Bell, Lynn Galloway, Megan Lechner, Aryn Gieger-Sedgwick, Jennie Buchanan, Jeffrey Ho, Catherine Rossi, Kim Hurst, Ralph Riviello, Amanda Corzine, Theresa Moriarty, Samuel A. McLean

Somatic symptoms frequently occur after traumatic stress exposure:

- Headache
- Light Sensitivity
- Dizziness
- Nausea
- Difficulty concentrating
- Blurred vision
- Restlessness
- Insomnia/difficulty sleeping
- Fatigue

Somatic symptoms occurring after trauma have historically been termed “post-concussive”:

- Term derives from belief that such symptoms caused solely by brain injury (trauma, anoxia)
- “Post-concussive” symptoms common in trauma survivors, may persist for years, and cause substantial morbidity/disability

Somatic Symptoms:

- Increasing evidence suggests that such symptoms may also be caused by stress exposures that do not involve brain trauma (e.g., McLean et al 2009, Auvergne et al 2016, Carroll et al 2004)

Landstuhl Regional Medical Center: Traumatic Brain Injury Screening Program

Wide range of trauma exposure + “Feeling disconnected from the environment” immediately afterward + “post-concussive” symptoms = Diagnosis of minor traumatic brain injury

Association of Epidemiologic Factors and Concomitant Variants Influencing Hypothalamic-Pituitary-Adrenocortical Axis Function With Postconcussive Symptoms After Minor Motor Vehicle Collision

Health status, not head injury, predicts concussion symptoms after minor injury:

Samuel A. McLean MD, MPH*, Neil L. Ersek MD†, Darrell E. Tuchiner PhD, Jonathan L. Ruprecht MD, Shirley Pederson RN, MS, Michael E. Parisi MD, William Termin BSN, RN, and Douglas F. Astephen MD††
Somatic Symptoms

• Increasing evidence suggests that such symptoms may also be caused by stress exposures that do not involve brain trauma—e.g., McLean et al 2009, Auvergne et al 2016, Carroll et al 2004

• Evaluating somatic symptoms in patient population that experiences stress exposure, but in which head injury is uncommon, provides opportunity to evaluate this hypothesis

Study Aims

• Data for this analysis were drawn from the Women's Health Study, the first large-scale, multi-site, prospective study of adult women sexual assault survivors

• In this prospective observational study, we evaluated the incidence of somatic symptoms traditionally termed “post-concussive” after sexual assault

Methodology

Selected Characteristics of Subsample (N=205)

<table>
<thead>
<tr>
<th>Age, mean (SD)</th>
<th>28 (10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnicity, n (%)</td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>39 (19)</td>
</tr>
<tr>
<td>European American</td>
<td>117 (57)</td>
</tr>
<tr>
<td>Multi-ethnic/other</td>
<td>49 (24)</td>
</tr>
<tr>
<td>Hispanic or Latino, n (%)</td>
<td>52 (25)</td>
</tr>
</tbody>
</table>

| Physical Assault | 66 (32) |
| Multiple Assaults | 15 (9) |
| Drug-Facilitated Sexual Assault | 68 (33) |

Assault Characteristics of Subsample (N=205) n (%)

<table>
<thead>
<tr>
<th>Assailant Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Known</td>
</tr>
<tr>
<td>Unknown</td>
</tr>
<tr>
<td>Relative</td>
</tr>
</tbody>
</table>

Penetration of

| Vagina | 141 (70) |
| Areas | 32 (16) |
| Mouth | 46 (22) |
| Multiple forms of Assault | 88 (43) |
Only those participants who were conscious throughout entire assault (to provide complete history of head trauma) were included in analysis.

### Assault Characteristics of Subsample (N=205)

<table>
<thead>
<tr>
<th>Condition</th>
<th>n (% )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conscious throughout entire assault</td>
<td>122 (60)</td>
</tr>
<tr>
<td>No reported head injury or strangulation</td>
<td>94 (47)</td>
</tr>
<tr>
<td>Reported head injury (no LOC)</td>
<td>17 (14)</td>
</tr>
<tr>
<td>Reported strangulation (no LOC)</td>
<td>11 (9)</td>
</tr>
</tbody>
</table>

### Worsening PC Symptom Endorsement

- **Prior to Assault**
  - Headache
  - Dizziness
  - Nausea
  - Noise sensitivity
  - Light sensitivity
  - Difficulty concentrating
  - Fatigue
  - Insomnia
  - Taking longer to think
  - Blurred vision
  - Double vision
  - Restlessness

- **Trauma**
  - Headache
  - Dizziness
  - Nausea
  - Noise sensitivity
  - Light sensitivity
  - Difficulty concentrating
  - Fatigue
  - Insomnia
  - Taking longer to think
  - Blurred vision
  - Double vision
  - Restlessness

- **Current**
  - Headache
  - Dizziness
  - Nausea
  - Noise sensitivity
  - Light sensitivity
  - Difficulty concentrating
  - Fatigue
  - Insomnia

### “Post-Concussive” Syndrome (PCS) defined as 3 or more worsening PC symptoms (greater than or equal to 2-point increase in symptom severity)

- **Prior to Assault**
  - Headache
  - Dizziness
  - Nausea
  - Noise sensitivity
  - Light sensitivity
  - Difficulty concentrating
  - Fatigue
  - Insomnia
  - Taking longer to think
  - Blurred vision
  - Double vision
  - Restlessness

- **Trauma**
  - Headache
  - Dizziness
  - Nausea
  - Noise sensitivity
  - Light sensitivity
  - Difficulty concentrating
  - Fatigue
  - Insomnia
  - Taking longer to think
  - Blurred vision
  - Double vision
  - Restlessness

- **Current**
  - Headache
  - Dizziness
  - Nausea
  - Noise sensitivity
  - Light sensitivity
  - Difficulty concentrating
  - Fatigue
  - Insomnia

### Breakdown of Subsample with PCS at 1 Week (n=110)

- **110/122 (90%)** reported ≥3 worsening somatic symptoms at 1 week

### Percent of Cohort with PCS at 1 Week (N=122)

- **No Head Injury (n=94)**
  - 89%
- **Head Injury (n=28)**
  - 93%

### Mean Number of Worsening PC Symptoms at 1 Week

- **No Head Injury (n=94)**: 7.0
- **Head Injury (n=28)**: 7.9

### Distribution of Worsening PC Symptoms at 1 Week (n=122)

<table>
<thead>
<tr>
<th>Number of Worsening Symptoms</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>(0-2)</td>
<td>10</td>
</tr>
<tr>
<td>(3-5)</td>
<td>20</td>
</tr>
<tr>
<td>(6-8)</td>
<td>30</td>
</tr>
<tr>
<td>(9-12)</td>
<td>50</td>
</tr>
</tbody>
</table>

### Percent of Cohort with PCS at 1 Week

- **No Head Injury (n=94)**: 89%
- **Head Injury (n=28)**: 93%

### Distribution of Worsening PC Symptoms at 1 Week (n=122)

- **No Head Injury/Strangulation (n=94)**
- **Head Injury/Strangulation (n=28)**
Breakdown of Subsample with PCS at 6 Weeks (n=77)

77/102 (76%) reported ≥3 worsening somatic symptoms at 6 weeks

- No Head Injury or Strangulation
- Head Injury or Strangulation

Percent of Cohort with PCS at 6 Weeks (N=102)

- No Head Injury (n=79) 71%
- Head Injury (n=23) 91%

P = 0.051

Mean Number of Worsening PC Symptoms at 6 Weeks

- No Head Injury (n=79) 5.2
- Head Injury (n=23) 7.3

P = 0.048

Distribution of Worsening PC Symptoms at 6 Weeks (n=102)

Number of Worsening Symptoms

- (0-2) 50%
- (3-5) 30%
- (6-8) 10%
- (9-12) 10%

PC Symptom Endorsement at 1 Week

- Taking longer to think
- Restlessness
- Fatigue
- Trouble concentrating
- Insomnia

PC Symptom Endorsement at 6 Weeks

- Taking longer to think
- Restlessness
- Fatigue
- Trouble concentrating
- Insomnia

* p-value < 0.05

Symptom Severity

Symptom Assessment

No Head Injury (n=94) vs. Head Injury/Strangulation (n=28)
Conclusions

• “Post-concussive” syndrome common in sexual assault survivors (90% at 1 Week, 76% at 6 Weeks)

• Majority of patients meeting “post-concussive” syndrome criteria had no reported head injury (76% at 1 Week, 73% at 6 Weeks)

• Same “post-concussive” symptoms were commonly endorsed in those with and without head injury

Limitations

• 40% of recruited participants were excluded due to loss of consciousness during assault

• Rivermead Post-Concussion Symptoms Questionnaire is self-report, and established baseline is retrospectively determined

Future Directions

• Perform additional analyses with full cohort at conclusion of study

• Assess outcomes at 6 months and 1 year post-assault

Final Takeaways

• Provides further evidence that head trauma is not necessary for the onset of “post concussive” symptoms

• Use of these symptoms to denote minor traumatic brain injury is problematic

Acknowledgements

Questions?