Epidemiology of Post-Traumatic Brain Injury-Induced Hypothalamic Pituitary Dysfunction in Arizona AHCCCS Patients

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Introduction

- Traumatic brain injuries (TBIs) are a major public health burden due to the high incidence and potential for long-term impact on patient health. Total combined rates for TBI-related emergency department (ED) visits, hospitalizations, and deaths have increased over the past decade. The increasing incidence and simultaneous decreases in deaths due to TBI increases the possibility for post-injury physical, psychological, cognitive, and emotional disorders.
- Endocrine disorders secondary to post-TBI hypopituitarism are potential consequences, as evidenced in publications regarding adult endocrine dysfunction after TBI1-3.
- However, post-TBI hypopituitarism in children is understudied.
- We present 2797 AHCCCS patients who were diagnosed with one of 40 ICD-9 TBI codes and subsequently diagnosed with one of 116 ICD-9 idiopathic endocrine diagnoses. We determined prevalence, relative risk, odds ratio, attributable risk, and number needed to harm, based on age, race, and gender.

Hypothesis

Pediatric patients who were diagnosed with a TBI were at a higher risk of being diagnosed with a central endocrinopathy than those without a prior diagnosis of TBI.

Methods

- We conducted a retrospective analysis of AHCCCS patients enrolled from 2007-2014.
- Patient cohorts included 4 categories: Patients who were diagnosed with a TBI and subsequently developed new-onset central endocrinopathies (cohort A), only diagnosed with a TBI (cohort B), only diagnosed with a central endocrinopathy (cohort C), or who were diagnosed with neither (cohort D), for each year from 2007-2014.
- From these 4 cohorts, we were able to calculate prevalence, relative risk, odds ratio, attributable risk, and number needed to harm, stratified by age, race, and gender.

Patient demographics for those with a central endocrinopathy after TBI

<table>
<thead>
<tr>
<th>Cohort</th>
<th>TBI+</th>
<th>Endo+</th>
<th>TBI-</th>
<th>Endo-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cohort A</td>
<td>511</td>
<td>5</td>
<td>110</td>
<td>311</td>
</tr>
<tr>
<td>Cohort B</td>
<td>145,413</td>
<td>1,450</td>
<td>856,680</td>
<td>3,586</td>
</tr>
</tbody>
</table>

Figure 2: Patient cohorts

Onset of central endocrinopathy after TBI

- Comparing ages at TBI event with subsequent onset of Endo.
- Time gap between TBI and endo by gender

Conclusion and Future Directions

- This study is the first to determine the epidemiology of new-onset central endocrinopathies after TBI in the pediatric population in the Arizona Medicaid System from 2008-2014.
- We determined that TBI victims were 3.18-times higher risk of developing a central endocrinopathy compared with the general population (CI=0.266).
- We determined pediatric AHCCCS patients with a central endocrinopathy had a 6-fold higher odds of a history with TBI than without a central endocrinopathy, 1.6% of the central endocrinopathy in TBI victims is attributable to the TBI, and the number of patients who need to be exposed to a TBI for 1 patient to develop an endocrinopathy was 63.9.

Acknowledgements

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References


Biostatistics

Figure 4: Female TBI victims are more likely to be diagnosed with central endocrinopathies at an earlier age than males with TBIs. (A) Patients on Y-axis, age (years) on x-axis, solid lines in red (female) and blue (male) representing age at TBI diagnosis depicting age at each central endocrinopathy diagnosis. (B) Quantity of patients on the x-axis for males and females.

Conclusions and Future Directions

- Patients can present with central, new-onset endocrinopathies days to years after TBI; physicians must be aware of endocrine symptoms after TBI and add TBI-induced central endocrinopathies to their differential diagnosis when treating a patient with a history of TBI.
- Further prospective studies are needed to better determine correlation between TBI severity and endocrinopathies.