Traumatic Brain Injury 101: An overview

PRESENTED BY
Danielle M. Ploetz, PhD
Pediatric Neuropsychologist

Big Picture Outline

I. Neuroanatomy and neurophysiology
II. Defining Brain Injury
   i. Acquired Brain Injury (ABI) versus Traumatic Brain Injury (TBI)
   ii. Severity of injury classification
   iii. Mechanism of injury
   iv. Primary and secondary injuries
III. Common Sequelae after TBI and trajectory
IV. mTBI (Concussion) – myth versus fact

III. Common Sequelae after TBI and Trajectory
General Patterns of Dysfunction by Location of Injury

<table>
<thead>
<tr>
<th>Right Side of Brain</th>
<th>Left Side of Brain</th>
<th>Diffuse Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impairments in visual-spatial perception</td>
<td>Difficulties in understanding language (receptive language)</td>
<td>Reduced thinking speed</td>
</tr>
<tr>
<td>Left-neglect, or inattention to the left side of space or body</td>
<td>Difficulties in speaking or verbal output (expressive language)</td>
<td>Increased confusion</td>
</tr>
<tr>
<td>Decreased awareness of deficits</td>
<td>Catastrophic reactions (depression, anxiety)</td>
<td>Reduced attention and concentration</td>
</tr>
<tr>
<td>Altered creativity and music perception</td>
<td>Verbal memory deficits</td>
<td>Increased fatigue</td>
</tr>
<tr>
<td>Loss of the gestalt, or “big picture”</td>
<td>Decreased control over right-sided movements</td>
<td>Impaired cognitive functions across all areas</td>
</tr>
<tr>
<td>Visual memory deficits</td>
<td>Impaired logic</td>
<td></td>
</tr>
<tr>
<td>Decreased control over left-sided movements</td>
<td>Sequencing difficulties</td>
<td></td>
</tr>
</tbody>
</table>

No injury is the same

- Brain injuries are individual and diverse
  - There are some commonalities but each one is unique
- Fastest recovery occurs early (i.e., first 6 months) on during the injury
  - There is continued recovery but it is at a much slower pace

Hypothetical Cognitive Recovery Paths for TBI

TBI in children and adolescents

- Functional Impact
  - Children are not little adults – the brain is continuing to develop

  ![Overall Function diagram]

- Example
  - At age 5 or 6, supports put in place for all children (general education) may be enough
  - In middle or high school, demands and expectations increase. Therefore, the same supports may not be enough and struggles the child experiences may be more apparent to others

Factors affecting outcome

- TBI Outcome
- Age at time of injury
- Severity of injury
- Management of following TBI
- Co-occurring medical or developmental conditions
- Pre-injury functioning
- Socioeconomic status
- Family factors
- Outcomes
Sequelae of TBI

- Reminder every injury is unique
- Make sure to have information from a healthcare professional about the individuals strengths and weaknesses.

Physical Changes
- Fatigue
- Seizures
- Balance, mobility & coordination
- Muscle strength, tone, control
- Senses (Hearing, Vision, Smell, Touch & Taste)
- Swallowing

Perceptual Changes
- Unilateral Neglect
- Visual Field Cut
- Spatial Relations
Communication Changes

- Initiating conversation
- Following conversation
- Taking turns in conversation
- Problem with intelligibility
- Non-verbal communication

Thinking Changes

- Confusion
- Difficulty with initiation
- Difficulty with carrying out a plan of action
- Attention problems
- Difficulty with reasoning
Attention Problems

- An attention deficit might look like trouble paying attention or it might look like...
  - (Capuco & Freeman-Woolpert)

- He keeps changing the subject.
- She doesn't complete tasks.
- He has a million things going on and none of them ever gets completed (for example...).
- When she tries to do two things at once she gets confused and upset.

Memory Problems

- A memory deficit might look like trouble remembering or it might look like......
  - (Capuco & Freeman-Woolpert)

- She frequently misses appointments avoidance, irresponsibility.
- He says he'll do something but doesn't get around to it.
- She talks about the same thing or asks the same question over and over annoying perseveration.
- He invents plausible sounding answers so you won't know he doesn't remember.

Executive Functioning

- A deficit in executive skills might look like the inability to plan and organize or it might look like...
  - (Capuco & Freeman-Woolpert)

- "Uncooperative"
- "Stubborn"
- "Lack of follow through"
- "Laziness"
- "Irresponsibility"
Emotional Regulation

- Emotional regulation difficulties might look like overreacting or they may look like...
- She cried for no apparent reason.
- He was disproportionately upset when he was told to put his paper away.
- “mismatch between context and emotional display”

In Summary

- A TBI of any severity can result in changes that affect the child’s daily life
- TBI research is ongoing to help provide better information on recovery
  - Currently, research suggests most rapid recovery occurs early after injury
- Every injury is different, every individual is different
  - We need information to help us understand the unique pattern of strengths and difficulties

In Summary

- Finally, TBI in children has added complexity as it affects the brain as it is developing