TRAUMATIC BRAIN INJURY EVALUATION: TOOLS, REHAB, & TREATMENT

OGDEN SURGICAL MEDICAL SOCIETY
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CLINICAL NEUROPSYCHOLOGY
BRAIN INJURY CLINIC AT TANNER

DISCLOSURES

• No relevant disclosures financial or otherwise are associated with this presentation

PROFESSIONAL AFFILIATIONS

• American Psychological Association
• Utah Psychological Association
• National Academy of Neuropsychology
• American Academy of Clinical Neuropsychology
• International Neuropsychological Society
• International Brain Injury Association
• International Paediatric Brain Injury Association
• Sports Neuropsychology Society
• Medical Staff
  - Davis Hospital & Medical Center
  - McKay Dee Hospital
  - Ogden Regional Medical Center
OBJECTIVES:

- A review of current research, practice and protocol
- Completing a thorough initial assessment and implementing an appropriate concussive protocol
- A update of the new "Return-to-Play" protocol
- What to do when they don't improve (referrals and rehab)

DEFINITION

"Traumatic brain injury (TBI) occurs when there is a blow or jolt to the head due to rapid acceleration or deceleration or a direct impact. It can also be caused by direct penetrating injury to the brain. Brain function is temporarily or permanently impaired and structural damage may or may not be detectable. Not all blows, bumps, or injuries cause TBI, and the severity of the injury may vary widely."

Manual of Traumatic Brain Injury: Assessment and Management, 2nd Ed.
Felise S. Zollman

DEMOGRAPHICS

Causes
- Falls (35.2%)
- MVAs (16.5%)
- Struck by object (16.5%)
- Assault (10%)

Risk factors
- Age (extremes of ages)
- Gender (young males)
- SES (lower socioeconomic status)
ONGOING CONCUSSION PATHOPHYSIOLOGY

REPEAT CONCUSSION PATHOPHYSIOLOGY

AXONAL INJURY & "MICRO-SHEARING"
SPORTS-RELATED CONCUSSION

- Sport related concussion is a traumatic brain injury induced by biomechanical forces. Several common features that may be utilized in clinically defining the nature of a concussive head injury include:
  - SRC may be caused either by a direct blow to the head, face, neck or elsewhere on the body with an impulsive force transmitted to the head.
  - SRC typically results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously. However, in some cases, symptoms may persist for weeks or months.
  - SRC may result in neuropathological changes, but the acute clinical signs and symptoms largely reflect a functional disturbance rather than a structural injury.
  - SRC may include a range of short-term and long-term symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive features typically follows a sequential course. However, in some cases, symptoms may persist.

The clinical signs and symptoms cannot be explained by drug, alcohol, or medication use, other injuries (such as cervical injuries, peripheral vestibular dysfunction, etc.), or other comorbidities (e.g., psychological factors or coexisting medical conditions).

Consensus statement on concussion in sport — the 5th international conference on concussion in sport held in Berlin, October 2016

SYMPTOMOLOGY

<table>
<thead>
<tr>
<th>Physical</th>
<th>Physical</th>
<th>Emotional/Mood</th>
<th>Sleep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>Fuzzy or blurry vision</td>
<td>Irritability</td>
<td>Sleeping more than usual</td>
</tr>
<tr>
<td>Faint or blurry vision</td>
<td>Headache</td>
<td>Sadness</td>
<td>Sleeping less than usual</td>
</tr>
<tr>
<td>Tinnitus or ringing in ears (early on)</td>
<td>Distress</td>
<td>More emotional</td>
<td>Trouble falling asleep</td>
</tr>
<tr>
<td>Sensitivity to noise or light</td>
<td>Balance problems</td>
<td>More emotional</td>
<td>Trouble falling asleep</td>
</tr>
<tr>
<td>Difficulty concentrating</td>
<td>Feeling tired, having no energy</td>
<td>Sensitivity to noise or light</td>
<td>Non-accidents or anxiety</td>
</tr>
<tr>
<td>Difficulty remembering new information</td>
<td>Feeling tired, having no energy</td>
<td>Sensitivity to noise or light</td>
<td>Non-accidents or anxiety</td>
</tr>
</tbody>
</table>

PRIMARY CARE ROLE

Mild Traumatic Brain Injuries/Concussions

History
  - How injury occurred
  - Type of force
  - Location on the head or body
  - Amnesia — antegrade versus retrograde
  - LOC — how long?

PHYSICAL
  - Observe closely for the 24-48 hours
  - Headache or vomiting
  - Decreased cognition
**DO'S AND DON'TS**

**Do**
- Promote sleep
- Promote healthy eating and adequate hydration
- Avoid external stimuli
- Avoid exertional activity
- If not seeing progression within 5-7 days refer to specialist
- Limit cellphones and earbuds
- Screen for Mental Health

**Dont's**
- Use zolpidem, antihistamines, or alcohol
- Use narcotics for headache
- “Lock Them Down”

**PRIMARY CARE PHYSICIAN SCREENERS**

**ACE** – (good for ER visit & Urgent Care screening)

**SCAT5** – good for first 48+ hours – 5 days

**Children's SCAT5** - good for first 48+ hours - 5 days

**CONCUSSION MANAGEMENT**

* Recovery of concussion
  - In patients who do not have complex or persistent issues to 7-10 days
  - May be longer in children and adolescents 2-3 weeks (new research)
  - Cornerstones = Physical and Cognitive rest until acute symptoms have resolved
  - REST period:
    - Rest in acute phase 24-48hrs
    - Further research needed to determine optimal rest
    - Low-level exercise may be beneficial for prolonged recovery, but timing unknown
CONCUSSION RECOVERY TIME IN ADOLESCENTS
(COLLINS 2016, NEUROSURGERY)

Recovery is more likely 21-28 days

• Symptoms improved in ~2 weeks
• Neurocognitive impairment ~ 4 weeks
• Vestibular-oculomotor ~ 1-3 weeks

Gender differences

• Symptoms seem to be more prominent and last longer in female athletes
• Males less dizziness and less VOMS impairment at 1-2 weeks
• No sex difference in neurocognitive domains

TREATMENT PROTOCOL

Primary Care

• Immediate Diagnosis
• Concussion Protocol
• Neuroimaging?
• Return to play
• Refer to Specialist

Specialist

• Continued Medical
• Neuroimaging
• Labs
• Specialist referrals
• Neuropsychological Testing
• Treatment
• Mental Health Therapy
• Cognitive Rehab

EARLY NEUROIMAGING

• Standard Neuroimaging (CT, MRI)
• **Contribute little to concussion evaluation**
• Use only when suspicion of structural injury
• Focal neuro deficit
• Suspicion of skull fx
• Prolonged LOC (>1 min)
• Worsening symptoms
SPECIALIST SCREENERS

• ImpAct ~ Controversy on Baselines
• King-Devick ~ MAYO Clinic (Higher specificity and sensitivity than common routine screening: pap smear, mammograms)
• SWAY ~ FDA Approved
• Headrest ~ (research starting)
• CTIP ~ (malingering)

BRAIN INJURY SPECIALIST

• Diagnosis
  • Cognitive evaluation
  • VOMS, tandem gait, BESS
  • Laboratory work-up
  • Neuroimaging
  • Neuropsychological evaluation
  • Computerized cognitive assessment
• Laboratory Work-up
  • T4 and TSH
  • Estrogen and testosterone
  • DHEA
  • GH
  • GH 1
  • ACTH
  • Vitamin D
  • Vitamin B-12
  • CBC

BRAIN INJURY SPECIALIST (CONTINUED)

• Neuroimaging
  • T1
  • T2-weighted with FLAIR (white matter changes)
  • SWI (susceptibility weighted imaging)—susceptible opening, disruptions of white matter, injured neurons and glia
  • SWI (susceptibility weighted imaging)—susceptible opening, disruptions of white matter, injured neurons and glia
  • DTI (diffusion tensor imaging)—traumatic axonal injury
• Management
  • Sleep, headache management, mood regulation
  • Subconcussion treatment
  • Vestibular
  • Oculomotor
  • Cervical spine
  • Cognitive rehab
  • Mental Health Counseling
ROLE OF NEUROPSYCHOLOGY

Neuropsychological assessment (NP) has been previously described by the CISQ as a ‘cornerstone’ of SRC management. Neuropsychologists are uniquely qualified to interpret NP tests and can play an important role within the context of a multidisciplinary approach to managing SRC. SRC management programs that use NP assessment to assist in clinical decision-making have been instituted in professional sports, colleges and high schools.

Post-injury NP testing may be used to assist return-to-play decisions and is typically performed when an athlete is clinically asymptomatic. However, NP assessment may add important information in the early stages after injury. There may be particular situations where testing is performed early to assist in determining aspects of management—for example, return to school in a pediatric athlete. This will normally be best determined in consultation with a trained neuropsychologist.

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“RETURN TO LIFE”

"RETURN TO LEARN"

• Testing Accommodations
• Note Taking
• Workload Reduction
• Breaks
• Extra Time
• Attendance
• Follow-ups
MYTHS

Sleep – Can they sleep?

• Koll Oil

• Imaging can diagnose a TBI/concussion

• Children bounce back faster than children

• Play through the pain

• The effects of a TBI or Concussion are usually seen immediately

• A mTBI is neither disabling or permanent

• A LOC is required to have a mTBI

• "Lock Them Down"

• Helmets have lowered the chance of a concussion.

QUESTIONS?

Contact Information

Brain Injury Clinic at Tanner

Dr. Mac Thurston, MD — Medical

Dr. Ben Christiansen, PsyD, LP — Neuropsychology & Cognitive Rehab

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Appointments: (801) 773-4865