Workplace Concussions

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Outline

- Statistics
- Description of concussion
- Classification
- Symptoms
- Referrals
- CTE and sports concussions
- Red flags
- Questions

Workplace Concussions

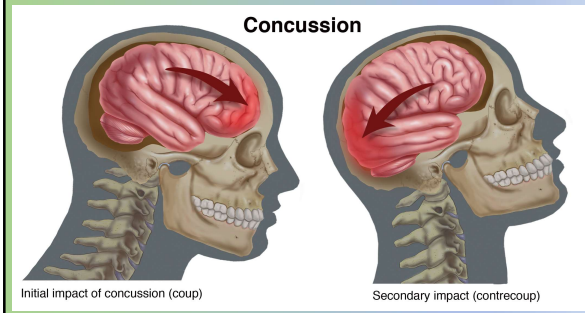



Traumatic Brain Injury (TBI) Statistics in the US

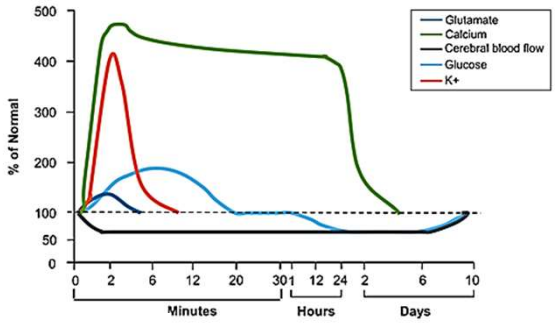
- 2.8 million new TBI each year:
  - 50,000 die
  - 282,000 hospitalized
  - 2.5 million treated & released in ER
- 3.2 million permanently disabled
- The number of people with a TBI not seen in an ER is not well known.

Concussion Statistics

- # People seen in a clinic/ER: 600/100,000 pop./year
- Portland metro area pop.– 2.4 million people
- *Approx. 14,400 concussions per year in Portland metro area*



Neurometabolic Cascade Following Cerebral Concussion/mTBI



From Giza CC, et al.[10]

Classification of Traumatic Brain Injury:

Mild	LOC (loss of consciousness)	< 30 minutes
	GCS (Glasgow Coma Scale)	13-15
	PTA (post traumatic amnesia)	<24 hours
	Neuroimaging (scan)	normal
Moderate	LOC	<24 hrs
	GCS	9-12
	PTA	>24 hours
	Neuroimaging	abnormal
Severe	LOC	>24 hrs
	GCS	3-8
	PTA	>7 days
	Neuroimaging	abnormal

Mild TBI (Concussion)

Loss of consciousness	LOC <30 mins
Glasgow Coma Scale	GCS 13-15
Post Traumatic Amnesia	PTA <24 hrs
Neuroimaging	Normal

What is a concussion?

- Is a concussion a brain injury?
- My employee didn't lose consciousness, can they still have a concussion?
- My worker didn't hit their head, can they still have a concussion?
- They told me the CT scan was normal, so how can they have a concussion?
- What types of workplace injuries cause concussions?

Workplace Concussions

1. What symptoms is my employee likely to have?
2. Who should my employee be seeing?
3. My employee has had 5 concussions, do they have CTE?
4. My employee's complaining of headaches from the computer and bright lights. What can I do?
5. Really? Red flags to pay attention to.

Concussion Symptoms

Fatigue

Double vision

Impaired balance

Reduced memory

Headache

Concussion Symptoms

Physical - Headaches, dizziness or impaired balance, visual, nausea, tinnitus, sensitivity to light

Cognitive- decreased short term memory, decreased speed of info processing, difficulty concentrating, increased distractibility

Affective (behavioral/emotional)- depression, fatigue, increased anxiety, sleep disturbance, irritability, decreased frustration tolerance, emotional lability

Headaches

- Chronic tension type headache – 40%
- Analgesic overuse headache – 42%
- Migraine and probable migraine – 49%
- Prevalence of headache throughout first year – >54%
- Cumulative incidence – 91%
- Headache severity is negatively correlated with RTW
- Risk factors:
  - Prior history of headache
  - Age <60
  - Gender is not a risk factor

Balance

30-65% of patients report problems with balance

Causes:

- Medications
- Vision impairments
- Vestibular impairments
  - Benign paroxysmal positional vertigo
  - Labyrinthine concussion
  - Traumatic endolymphatic hydrops
- Perilymph fistula
- Vestibular migraine
- Sensory impairments
- Mental health issues

Visual complaints after Concussion

Vision

- What we see (acuity)
- 80% of our perception, learning, cognition and activities are mediated through vision
- >50% of the circuits in our brain are involved in vision
- Role in balance
- Role in cognition

Vision changes after Concussion

- Photophobia
- Impaired depth perception
- Reduced visual field
- Problems with focusing (accommodation)
- Impaired scanning or tracking (ocular motor function)
- Delayed visual memory/processing
- Convergence/divergence - how the eyes move, together, towards or away from the nose
- Visual spatial distortions (visual-vestibular)
- Neuro-motor (visual-motor output) deficits

Visual Treatments

- Prism lenses or other lenses
- Tinted lenses
- Eye patching
- Magnification
- Vision therapy
- Glare reduction techniques
- Compensatory strategies

Cognitive Inefficiency

- Neuropsychological testing is essentially normal at 3 months post injury
- There maybe subtle differences that the patient is acutely aware of, and these are typically worse with cognitive fatigue of stress
- Neuropsych testing is done in a quiet room; its' the best we have but it does not mimic real life (auditory, visual and internal distractions; fatigue, etc.)

Fatigue in Concussion

- Most frequently reported persistent symptom
- Patients with persistent fatigue, use different brain networks compared to healthy controls during a vigilance task
- It's difficult to quantify and study, but evidence supports two models:
  - Cognitive fatigue results from the increased work/effort required for the brain to process information after trauma-induced damage
  - Cognitive fatigue results from sleep disturbances
- Slower RTW in one study was predicted by age, multiple bodily injuries, intracranial abnormality and fatigue.

Fatigue

- Can result from impaired attention and speed of information processing, requiring greater cognitive effort to perform tasks
- Pain, medications, anxiety, and depression can increase fatigue
- One study found:
  - Concussion fatigue is significantly correlated with abnormal brain functional connectivity in the thalamus and medial frontal gyri;
  - A 20 min psychomotor vigilance task is enough to invoke statistically significant differences in mental fatigue and specific functional connectivity changes in concussion patients;
  - Resting-state fMRI combined with quantitative data-driven analysis can detect abnormalities in brain functional connectivity of concussion patients.

Timing and types of referrals

- Occupational therapy, OT
- Physical therapy, PT
- Speech Language Pathology, SLP
- Psychological counseling
- Neuropsychological testing
- Vestibular testing, therapy, ENT
- Vision: ophthalmology; neuro-ophthalmology; neuro-optometry
- Osteopathy
- Acupuncture
- Driving evaluation

Chronic Traumatic Encephalopathy CTE

- Clumps of abnormal tau protein seen in brain tissue on autopsy
- Appears years after repeated head trauma
- CTE is not equal to a small number of concussions over many years

Sports Concussions

- Prospective study
- Defined period of exposure (sports season)
- Ability to get pre-injury testing
- Witnessed account of the injury and instant replay if needed
- Ability to do standardized testing within minutes of injury
- Systematic follow-up to track recovery and outcome
- Continuity of care
- Ready access to non-injured matched controls
- Longitudinal studies, easy to follow the patients over time, even years and even, in some, including multiple injuries
- Clean sample

Red flags and Pearls:

- All brain injuries improve. If not, explore meds, other medical conditions, hydrocephalus, seizures, or psychological factors including secondary gain.
- Symptoms should be present from the beginning but may not be recognized.
- Loss of consciousness and/or head strike not required.
- There is a cumulative effect of multiple brain injuries, essentially there is reduced resiliency to other cognitive challenges.
- Concussion does not cause directed violence, planned crimes, repressed memory syndromes, chronic fatigue syndrome, loss of long-term memories etc.
- Get multiple sources of information: medical records, school records, family report, legal report, work history, etc.

Thank You