

**Concussion:
Assessment, Treatment, and
Risk Factors for PCS**

Dr. Arlin Pachet
Clinical Neuropsychologist

Presentation Overview

- Acquired Brain Injuries
 - Epidemiology
 - Case study introduced
 - Classification of brain injury severity
 - Common Issues
- Clinical Neuropsychologist defined

Presentation Overview

- Neuropsychological evaluation
 - The testing process
- Post-Concussional Syndrome
- Common referral questions
 - Severity, impact, and quantum of damages
 - Prognostic issues (i.e., return to work)

Traumatic Brain injury - Epidemiology

- Incidence varies - 200/100000 typical
- In Alberta 1997 - 2001 inpatient admissions for TBI (66.7/100000)
- Alberta - falls (38.7%), MVA (31.8%), assault (9.8%). In US GSW has overtaken MVA as greatest cause of TBI deaths
- Alberta - trimodal age distribution - <1yr, 15-24, >75yr
- Mean age 33 yrs, 68% male

200/100,000 = 5,000/year seeking medical attention in AB

80% hospitalized

20% die pre-hospital

80% mild TBI

10% moderate TBI

10% severe TBI

(3200) GCS >12

(400) GCS 9-12

(400) GCS <3-8

320-640 need services (10-20%)

7% die (200)

50% die (200)

93% (372)

33% No Disability (127)

66% Disability (245)

200 (100% disability)

Estimates of Injury severity frequency and need for services (Krause, 1987 and Willer, 1994)

**PARS
N ψ**

Case Study

- AJ, a 27 y.o. male was involved in a MVA while traveling at highway speeds
- AJ struck his head on the driver's side window, shattering the window
- The other driver was charged with reckless endangerment

Case Study

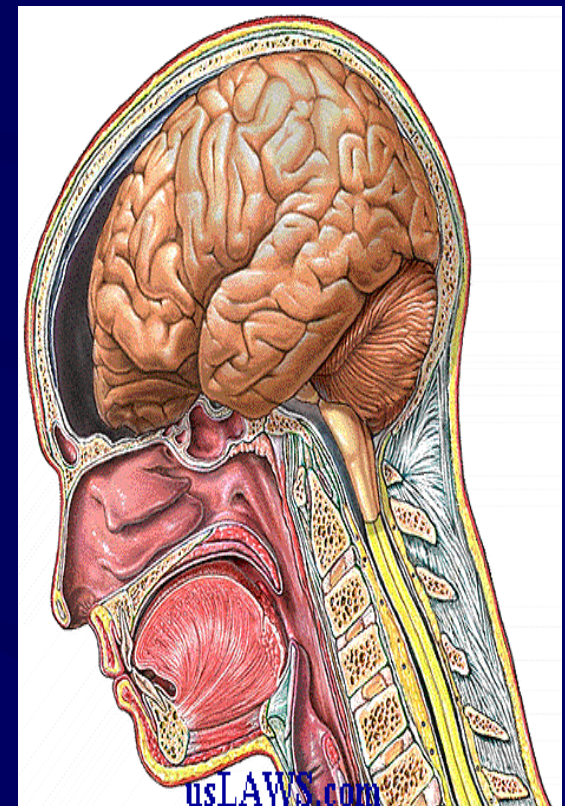
- Initial GCS= 13, which rose to 15 approximately 25 minutes post-accident
- PTA= 30 minutes
- RA= 10 min.
- Emergency 6 hours and discharged home
- Head CT was unremarkable
- One prior sport-related concussion

Case Study

- Client is married with two young children (1 y.o. and 3 y.o.)
- Worked as a mechanic for Nissan
- Evaluated 7 months post-accident
- Has not returned to work because of numerous somatic and cognitive complaints

Brain Injury Classification

- Common Injury Indicators
 - Glasgow Coma Scale Score
 - Post-traumatic Amnesia
 - Retrograde Amnesia
 - Loss of Consciousness



Brain Injury Classification

SEVERITY INDICATOR	MILD	MODERATE	SEVERE
Lowest GCS in first 24 hours	13-15	9-12	3-8
PTA Duration (numerous definitions)	< 24 hrs 5 min to 1 hr < 30 min	30 min to 24 hrs 1 hr - 24 hrs	1 to 7 days
Coma Duration	No coma or 30 min	30 min to 24 hrs	> 24 hrs

Very Severe = PTA longer than 7 days

Brain Injury Classification

CONCUSSION GRADING SYSTEM

Grade 1:	No LOC, transient confusion, concussion symptoms or mental status abnormality resolve in <15 min.
Grade 2:	No LOC, transient confusion, concussion symptoms or mental status abnormality last >15 min.
Grade 3:	Any LOC, either brief or prolonged.

Medical, Cognitive, & Psychosocial Issues

- **AJ's complaints included:**
 - **MEDICAL:** cervical and low back pain, headaches
 - **COGNITIVE:** distractibility, decreased memory, and decreased speed
 - **PSYCHOSOCIAL:** stress, anger dyscontrol, and depression

Common Medical & Psychosocial Issues

- Medical: visual dysfunction, hyperacusis, vestibular (balance, dizziness), medication dependence
- Psychosocial: Insight, PTSD, impulsivity, change in personality, downward spiral

Cognitive Issues Post-MTBI

- Chronic cognitive impairment is infrequent after an uncomplicated MTBI
- Subjective reports of cognitive dysfunction often non-neurologic in nature (i.e., psychologically based)
- Possible subtle deficits in new learning, memory, and speed of processing

Clinical Neuropsychologist Defined

- **Defined as a psychologist with:** specialized training in cognitive bases of behavior, behavioural neurology, CNS anatomy and physiology, human learning and psychometrics
- Applies this knowledge to assess human behavior as it relates to normal and abnormal functioning of the central nervous system

Neuropsychological Evaluation

- A comprehensive analysis of brain functioning and the extent of cognitive impairment resulting from the brain injury



Neuropsychological Evaluation

- A clinical interview and review of medical records
- Administration of a battery of valid and reliable neuropsychological tests
- A neuropsychological evaluation may take over 8 hours of face to face contact to complete

Secondary Gain & Motivation

- Numerous techniques are available to identify clients who may not be giving their optimal effort or are feigning the severity of their injury
- Administer symptom validity tests, pattern analysis, random responding, etc.....

AJ's Assessment Results:

- Excellent effort and motivation throughout the evaluation
- Mild difficulties with speed of processing and rate of new learning
 - Increased reliance upon his wife,
- Symptoms consistent with major depression

AJ's Assessment Results:

- Pain complaints (neck, low back, headaches)
- Hyperacusis, photosensitivity, poor sleep
- Non-drinker, no prescription medication
- **** Development of PCS

Post-Concussional Syndrome (PCS)

- PCS refers to the emergence and variable persistence of a cluster of symptoms following a concussion or MTBI
- Subjective complaints are usually persistent and viewed as troublesome

Post-Concussional Syndrome (PCS)

- Early symptoms: headache, drowsiness, dizziness, nausea
- Middle phase: headaches, dizziness, irritability, fatigue, cognitive complaints, depression, anxiety
- Late phase: intensification of symptoms, entrenchment

Risk Factors For PCS

- ***Injury variables:*** may predispose a MTBI client to more prolonged recovery and / or to persistent problems on a neurologic basis.
- ***Subject variables:*** may predispose a MTBI client to more prolonged symptomology on a psychological basis.
- 20-25% of individuals who sustain a MTBI will have residual symptoms or disability.
Note: Estimates vary widely (20% to 60%) depending on which research is cited.

Risk Factors For PCS

- Persistent symptoms have been reported to increase with the presence of intracranial lesion.
- Degree of deficits identified during a neuropsychological evaluation is associated with the presence of MRI or CT abnormalities, despite radiologic resolution of the lesion with repeat studies.

Risk Factors For PCS

- Extent of PTA
- Prior brain injury: factors of cumulative effect and “brain reserve capacity”
- Premorbid learning disability
- Pre-injury emotional problems or psychosocial dysfunction
- Development of psychological difficulties post-injury

Risk Factors For PCS

- Premorbid occupational and educational status
- Pre-injury social stress or chronic social difficulties
- Elevated blood alcohol levels at time of injury
- Pre-injury substance dependence
- Financial incentive
- Older age

**Could AJ
have
been
assessed
earlier?**



Benefits of Early Assessment in MTBI Clients

- Reduced likelihood of individual developing post-concussion syndrome, which prolongs recovery
- Symptoms resolve quicker
- Education to rid client and family of misinformation
- Faster return to work compared to individuals with no treatment

Common Referral Questions

- Did the client sustain a brain injury, and if so, what was the severity of his brain injury?
- What is the severity of the client's current symptom complaint?
- Does the client's current functioning reflect the effects of pre-injury, injury, or post-injury factors? Exacerbation of pre-injury limitations?

Common Referral Questions

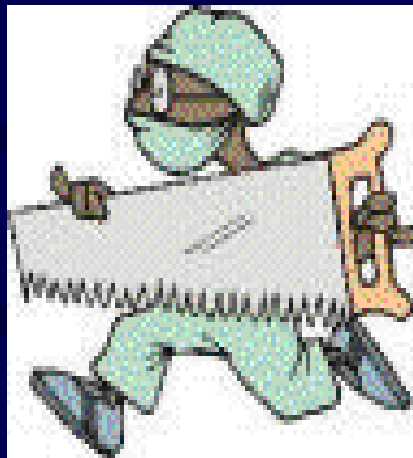
- Is the pattern of findings consistent with what you would expect given the injury? Consistent with the clients complaints?
- Does the client have any employment restrictions?

Common Referral Questions

- What other factors may be contributing to the client's perceived disability?
- Treatment needs? Follow-up needed?
- Prognosis for further recovery?
- Specific recommendations may also be requested regarding cognitive rehab.

Treatment of MTBI

- Pain Management Education
- Sleep Hygiene Education
- Psychological Intervention
- Cognitive retraining



- Nutrition
- Fitness
- Stress & Anger Management
- Brain Injury Education

**Thank you very much for
your attention and
participation!**

