



Concussions and Other Mixed Martial Arts Injuries

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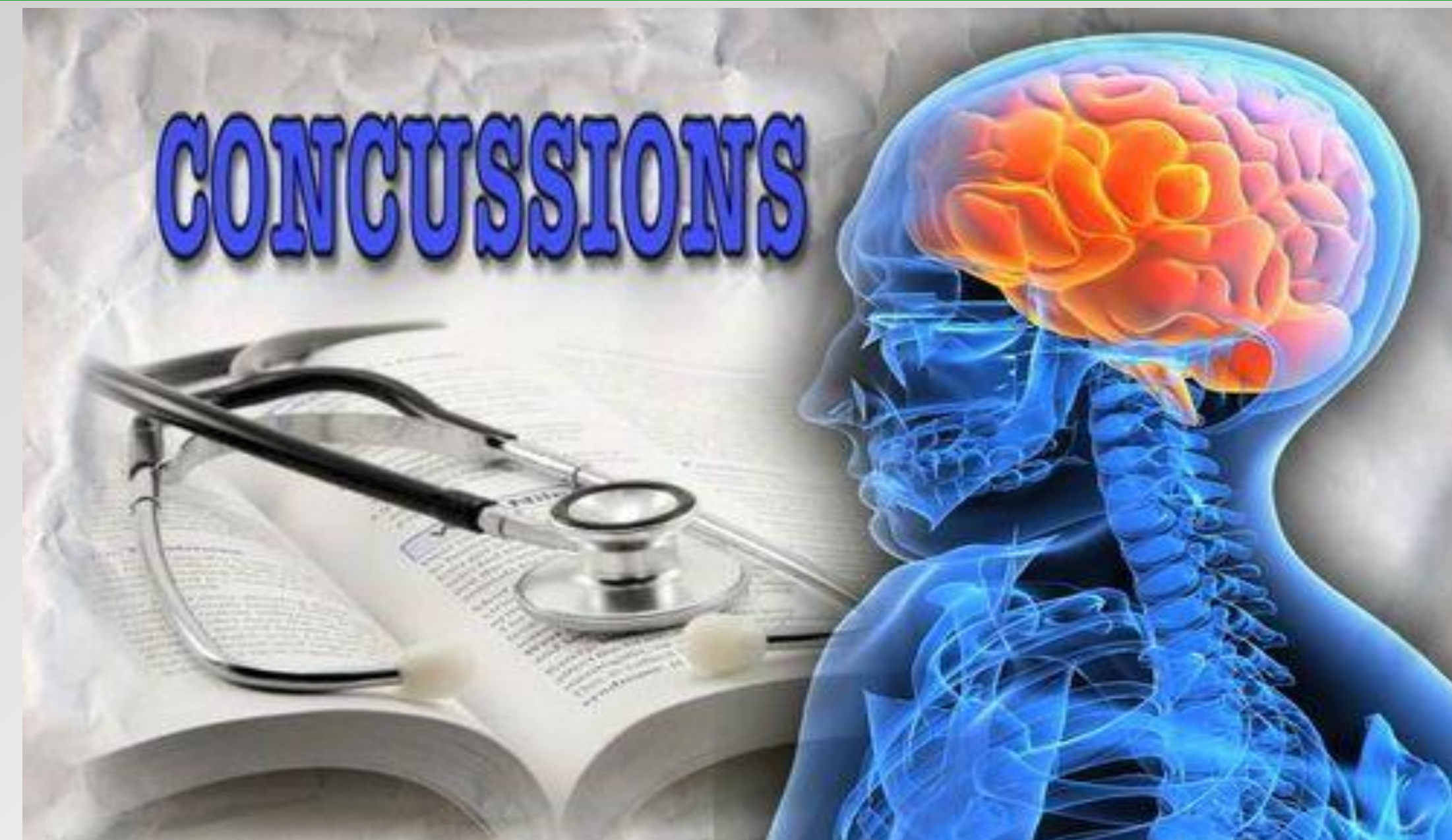


ABSTRACT

Mixed Martial Arts is in its relative infancy as an official sport, however, the various components of the MMA athletic competition have been in use throughout human history. Mixed Martial Arts is a blend of virtually every form of unarmed combat sport utilizing: punches, kicks, elbows throws, takedowns, spinning, jumping and other movements. The competitors will utilize a combination of strength, power, speed, and endurance throughout their matches. The early results of recorded injuries during these sporting events indicate that any physical therapist interested in working with mixed martial arts athletes or clients who prefer to exercise in a similar fashion will need to be well versed in evidence-based “best practices” of several different areas such as; concussions, neck and back injuries as well as upper and lower extremity problems.

Informal Search of MMA Injuries

Category	Number of Injuries	Percent of Injuries Reported
Head/Face (lacerations, fx. bones, etc.)	5	14%
Concussions	1	3%
Neck and Back	4	11%
Shoulder (GH)	3	9%
Upper Extremity Broken Bones	3	9%
Upper Extremity Musculotendinous	1	3%
Lower Extremity Broken Bones	2	6%
Lower Extremity Musculotendinous	3	9%
Knee: (Tendons, Meniscus, ligaments)	7	20%
Other: Includes; infections, heart, and other dysfunctions	6	17%



CONCUSSIONS

Etiology:

- With impact, sheering forces to the blood vessels within the brain can cause damage (initiating the inflammation process)
- Cerebrospinal fluid (CSF) volumes increase which and interfere with reabsorption.
- Pressure builds and within the first few hours of injury, a decreased level of cerebral blood flow can cause ischemia.
- There is an initial increase in glucose metabolism and then a period of decreased abilities of the cells to “uptake” glucose for use as energy. This can last from one to nine months. - almost like an acute, localized diabetic incident
- There is a “storm” of brain activity which when coupled with the lack of blood flow and inability of the cells to utilize glucose will equal an energy imbalance in the brain.

Concussions have **functional** symptoms not **structural**:

- Somatic
- Neurobehavioral
- Cognitive

1. Somatic (pertaining to the body):
 - Headache
 - Nausea/vomiting
 - Balance Problems
 - Sensitivity to light and/or loud noises
 - Numbness/tingling
2. Neurobehavioral:
 - Fatigue/drowsiness/sleeping more
 - Sadness/depression
 - Nervousness
 - Trouble sleeping
3. Cognitive (thinking/reasoning):
 - Feeling “slowed down or in a fog”
 - Difficulty concentrating
 - Lapses in memory or difficulty recalling things

BALANCE AND COGNITION

- Balance testing adds 37% more sensitivity to detect problems even when athletes are symptom free.
- Up to 40% of asymptomatic patients show cognitive deficits, suggesting that the assessment of cognitive function should also be a component in the baseline assessment of concussion
- **Dual Task Activities = good evidence-based results in recovery of balance, dizziness, visual disturbances and cognition**
- Dual-task activities require the athletes to perform multiple activities across varying categories at the same time **Ex: patient may be asked to perform balance and cognitive activities simultaneously such as standing on a wobble board while counting to 100 by 3’s.**
- The hypothesis is that deficiencies are a result of the inability of the executive functions of the brain to share attention between the demands of the two tasks



CASE REPORT and PATIENT OUTCOMES

- 27 year old male, blow to the left side of temporo-parietal cranium during mixed martial arts fight
- Headache at right forehead, vertigo at night when turning onto right side, subside in 1-2 minutes
- Pain; in right temporal area, right cervical, and right trapezius Occasionally pain will be located on left side also
- He describes his discomfort as a pressure and heaviness at those points.
- Cervical extension and forward bending initiate the vertigo which is associated with nausea.
- He reports fatigue that comes on rapidly and exacerbates the symptoms, and is having difficulties remembering “normal things”.
- Sensitivities to sound and light , provokes headache symptoms
- Barriers to ADL’s; inability to drive, not able to read due to headache and neck pain, intolerance for activities with movement.
- He also described feeling “not so steady” on his feet and claims he has been very irritable and emotional since the incident.

Outcomes

- The patient’s coordination improved = better quality, smooth movements
 - Susceptibility to fatigue decreased
 - Improved tolerance to activity
 - Patient self-reported not feeling as “foggy”
 - Increased cervical range of motion
 - Cervical headaches pain 0/10
 - NDI score improved to 32%
 - Berg Balance score increased
- **No longer fall risk

PLAN OF CARE

After rest period, therapy should target:

- motor
- Vestibular
- Cognitive
- psychological therapies
- according to patient tolerance a graded exercise program
- cervical spine
- **postural stability**
- sensory integration exercises
- balance training
- oculomotor training
- eye-head coordination training
- visual motion sensitivity training
- neuromuscular control
- patient education on proper body mechanics



The Plan of Care:

Physical therapy sessions 3x’s per week for 4 weeks

Treatment included:

- Additional canolith repositioning maneuver
- AROM, PROM, and soft tissue manual therapy to the subcranial, upper and lower cervical regions
- Vestibular habituation exercises
- Postural education and strengthening
- Strength/conditioning exercises per protocol (as tolerated)
- Begin Return-to-Play protocol

*Incorporate dual-task activities that include cognitive interventions in conjunction with balance, coordination, or motor control activities, and cardiovascular endurance activities.