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

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

Concussions

**Etiology:**
- With impact, shearing 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

**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 habitation 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.*