CONCLUSION

ACL injuries are very common in the family practice setting. As the population becomes more active, these injuries will continue to be encountered by primary care physicians. A thorough understanding of the anatomy, presentation, evaluation, and management of these injuries will ensure a functional and healthy quality of life. Further research is needed to address the most effective methods in preventing and managing these injuries.

REFERENCES


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22. Jaros A. The Association Between Measures of Core Stability and Biomechanics of the Thunk and During a Single Leg Squat. Chippendale, 2010


The goal of this study is to identify the injury patterns and frequency incurred during MMA fights at the professional level. This data was focused to highlight the medical professional in ringside management of the fighters and the events. Imaging including x-rays and Computed Tomography (CT Scans) were also analyzed to give further insight and reflection of the injuries. This data is aimed to help the ring side medical professional prepare for emergency situations and medical care for event coverage.

METHODS
Data was obtained directly from the Nevada Athletic Commission (NAC). All data was obtained solely from UFC events that took place in Las Vegas Nevada during a two-year period from January 01, 2007 through December 31, 2009.

Each fighter was examined immediately after the fight by a physician directly affiliated with the NAC. This occurred in the ring and/or the locker rooms. The physician then employed medical decision-making choices as to the care of the fighter. If the physician felt the fighter warranted further care not able to be given in the facilities the fighter was sent to the emergency department either via private transportation or ambulance.

A NAC physician recorded documentation of the medical diagnosis and decisions made in the facility. Emergency department documentation reviewed included chart notes, discharge documentation and radiology reports/images and were independent of the NAC. Mandatory suspension periods are given by the NAC after the exams, in which time the fighter cannot compete. These time frames range from 30, 45 and 60-day suspension depending upon the severity of the injury, injury location, fight result and possibly further consultation input. Individual fighters often fought in more than one bout during the two-year period studied. Thus, each time the fighter fought in a bout, his results were tabulated as an independent variable. No fighters’ complaints or injuries were calculated as a cumulative variable. According to NAC documents, all UFC “events” had an average of 10 (min 9, max 18) fights per event. Although the UFC now has female competitors, all the data was obtained exclusively from male participants. Descriptive data points collected from the NAC included:

1. Fight outcome: win, loss, early stoppage, decision
2. If fighter lost, mechanism of loss: Knock Out (KO), Technical Knock Out (TKO), Tap outs (TO) specified in Arm/Ankle lock maneuver or a Choke-out technique
3. Anatomical location of the fighters’ complaints
4. Ring-side physicians diagnosis

5. X-ray and CT Scan results from the Emergency Department
6. Follow up results from outside physicians.

Fighters occasionally had multiple injuries and complaints up to 4 separate injuries were allowed. This number was arbitrarily chosen due to one specific fighter whom reported 4 separate injury locations.

Subjects were then grouped by outcome of the fight including win, loss or decision. Following this, the total complaints, types of complaints and injuries were examined using Pearson’s Chi-square tests where appropriate (expected frequency >5), otherwise Fisher’s exact tests were used. Subjects were then divided by those with KO/TKO vs. all other decisions for the complaint and injury variables as previously stated for the Tap outs. All analyses used SAS for Windows 9.2, Cary, NC.

RESULTS
A total of 304 fighters (n = 304) fought in 152 fights over the two-year study period. There were 15 events total that occurred in the two-year period. Of the 304 fighters, regardless of the outcome of the fight, 182 (60.3%) report no injury complaints in their bout, whereas 182 (60.3%) reported complaints of injury to the physician. Two fighters’ lacked follow up and were excluded.

Fighters’ complaints of anatomical locations described to the physician were as follows: 85 Face/Head (28.0%), 33 Leg/Ankle (11%), 15 Hand/Wrist (5%), 10 Knee (3.3%), 7 Arm/Elbow (2.3%) 7 Shoulder (2.3%), 4 Foot (1.3%), Chest/Rib 3 (1%), 4 Neck/C-Spine (1.3%), 2 Eye (0.6%).

Physicians diagnosed the following identifiable injuries: 58 Facial Laceration/Soft tissue (19.2%), total facial fractures of 14 (4.6%) of which 9 were nasal bone fractures (2.9%), 4 were orbital fractures (1.3%) and 1 was a mandible fracture (0.33%), 6 Eye (2%), 3 Knee (1%) including 1 of both an ACL tear and a Meniscus tear, 6 Leg (2%), 4 shoulder (1.3%), 3 hand (1%), 2 Neuropraxia (0.7%), 1 Rib Fracture (0.3%).

When comparing fight outcomes with injury rate, three fight outcomes had a substantial increase in injury incidence; Tap out via an Arm bar 58.3% (7/12), TKO 52.9% (27/51), decisions 46.8% (37/79), other rates were: Tap out via choke maneuver 29.4% (10/34), KO 20% (1/5), Tap out otherwise not specified 20% (1/5), Tap out via Ankle Lock 0% (0/3). Winning competitors were not spared injury; winning by Tap out retained an injury rate of 16.5% (18/109). (See Figure 2, Figure 4)

Table: Percent Frequency of CT Scans by Fight Result

<table>
<thead>
<tr>
<th>CT Scan Results</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>168</td>
<td>55.2%</td>
</tr>
<tr>
<td>Negative</td>
<td>136</td>
<td>44.8%</td>
</tr>
</tbody>
</table>

Correspondingly, a higher incidence of CT scans was obtained for those losing by TKO/KO. CT Scans were obtained in the following frequency: CT Scans 12/56 (21.4%) and all other results (win or loss) CT Scan 12/247 (4.9%) (p<0.0001) with a RR=12.7 95% CI= (5.75, 27.9).

Statistically significant increases in injury rates were observed when analyzing the various outcomes of the fight. If a fighter lost by TKO or KO, his injury rate (any location, any injury) was highest when compared to losing by any other method. Loss by TKO/KO when compared to all other outcomes resulted in 1/3 of the total injuries occurred (9.27% of 33% total injury rate, p= 0.004), 78% of total facial bone fractures (p=0.001) & 83% of the total eye injuries (p<0.001).

Because of this glaring correlation between facial fractures with TKO and KO’s a more detailed analysis was required. The relative risk of a fighter losing by TKO/KO and acquiring a facial bone fracture was nearly 20 fold when compared to all other outcomes regardless of win or lose. Specifically, all other fighters’ (win or lose) incidence of facial bone fractures was 3/246 (1.2%), whereas, a loss by TKO/KO had an incidence of injury rate 11/361 (9.26%) (p<0.001) with a RR=19.8 (95% CI=5.3, 73.8).

Correspondingly, a higher incidence of CT scans was obtained for those losing by TKO/KO. CT Scans were obtained in the following frequency: CT Scans 12/56 (21.4%) and all other results (win or loss) CT Scan 12/247 (4.9%) (p<0.0001) with a RR=12.7 95% CI= (5.75, 27.9).

Figure 4 Injury Percentage Rates by Fight Result

Figure 3 Percent Frequency of CT Scans by Fight Result
DISCUSSION

After the institution of stricter regulations by the Nevada Athletic Commission (NAC) in 2001, the popularity of MMA soared. These stricter guidelines include limiting the glove weight and outlawing the use of head locks. Furthermore, the commissions have mandated that fighters receive a total of 10-12 oz. gloves. These restrictions were made to prevent fighters from delivering a higher velocity and acceleration of strikes, the large difference in delivered strikes in combat sports and the fact that MMA fighters deliver and receive far less strikes to the head than boxers may affect long term outcomes. Both Acute and Chronic brain injury is an area of importance that needs to be addressed and studied further.

The above table compares all KO or TKO to all other fight results. The complaints and injuries are not mutually exclusive and each fighter could have more than one complaint and/or injury. When looking at complaints and/or injuries, an adjustment must be made for the multiple comparisons. A p-value of <0.006 would then be required for statistical significance for each of the separate complaints and injuries. The KO/TKO group had more CT scans, more complaints and statistically significant more face complaints, more injuries and more facial bone fractures and injuries compared to all other fight results.

Table 2 compares all Tapouts to all other fight results. The complaints and injuries are not mutually exclusive and each fighter could have more than one complaint and/or injury. When looking at complaints and/or injuries, an adjustment must be made for the multiple comparisons. A p-value of <0.006 would then be required for statistical significance for each of the separate complaints and injuries. Therefore, nothing can be considered statistically significantly different between Not Tapouts and all Tapouts.

Mixed Martial Arts has become internationally popular. The UFC is widely considered to be the highest level of competition in MMA in the United States, and internationally. To the average spectator this sport would appear to have an extremely high injury rate. The gloves in MMA competition are far smaller than those worn in boxing, the fighters strike with fists and elbows, kicks are employed to the head, body and legs and choke maneuvers are all used to win a match. However, when observing two years of fights that took place in Las Vegas from 2006-2008 an injury rate comparable to boxing was observed. Of the observed injuries the vast majority were facial soft tissue injuries. The serious injury rate observed was surprisingly low. Noteworthy was the fact that no deaths, intracranial hemorrhages, spinal cord or spinal injuries were observed during this time frame.

Although this is the first study to include data exclusively from the UFC, this two-year retrospective epidemiological study appears to be reflective of the acute injuries that occur in other combat sports. Acute and Chronic Brain Injuries were not able to be properly studied due to lack of data. Available data and management of neurological injuries in MMA will undoubtedly need more attention and research in the years to come as this sport continues to grow.
This study sheds light on injury trends, locations and incidences of injuries at the highest level of MMA competition. This information should give ringside physicians or medical personal information when managing the competitors acutely.

REFERENCES

INTRODUCTION
Headaches are the most frequent neurological disorder seen by family physicians. Approximately 90% of individuals will experience headaches in their lifetime, with the most common type being tension headaches. Migraines are the second most common type of headache, specifically migraine without aura, and tend to be more chronic and debilitating than tension headaches1. Migraines are caused by irritation of the trigeminal nucleus (see Figure 1). Irritation of the trigeminal nerve and its associated ganglion affects the release of vasoactive substances which in turn cause vasodilation of the large vessels underneath the dura mater causing pain2. The International Headache Society reports the average lifetime prevalence of migraines is 18%, with 1 in 5 women, and only 1 in 13 men, experiencing them in their reproductive years3. Prior literature on migraines has linked the high prevalence of migraines in females of childbearing age to hormonal influences4-6. Many females report their first migraine to coincide with the same year of menarche. Additionally, migraines are commonly triggered by transitions in hormone balance of the menstrual cycle7,8,9,10. One theory is that migraines may be precipitated secondary to a rapid drop in estrogen levels. This idea is further supported by the lower prevalence of migraines in pre-pubescent or post-menopausal females as well as those females whose migraines improve during pregnancy and rebound in the post-partum period11,12,13.

Headaches are a common ailment seen in pregnancy, with migraines without aura responsible for 64% of headaches in pregnancy, and migraine with aura for another 10%14,15. Studies indicate that women who suffer from pre-conception migraines tend to show improvement in migraine frequency and intensity over the course of their pregnancy16,17. However, many women continue to experience migraines in the early months of their pregnancy, and some do not obtain adequate pain relief during the second and third trimesters. There are a few reports of women even having worsening of migraines18. Also, de novo migraines can develop during pregnancy, often presenting as migraines with aura19. The incidence of gestational migraines is notable for correlations with hypertensive disease, pre-eclampsia, vascular complications and low birth weight infants20,21,22,23. One could theorize that by treating gestational migraines, these other potential high-risk associations may be modulated.

Osteopathic Considerations in the Management of Migraine in Pregnancy
Sara Soshnick, DO, Christina Mezzone, DO, Sheldon Yao, DO, Reem Abu-Sbaih, DO
New York Institute of Technology - College of Osteopathic Medicine, Osteopathic Manipulative Medicine.

Many women frequently suffer from migraines and require pharmacotherapy to alleviate and control their symptoms. Unfortunately, many of these therapies are contraindicated when a woman becomes pregnant leaving her to find alternative treatments. Osteopathic medicine provides a unique perspective for treating migraines without the use of medication. Osteopathic manipulative treatment (OMT) can provide hands-on treatment to help alleviate migraine symptoms and improve the quality of life as a woman’s body changes throughout her pregnancy.

KEYWORDS:
Osteopathic Manipulative Medicine
OMM
Migraine
Headache
Pregnancy

Address correspondence to: Sheldon C. Yao, D.O. Acting Chair, Assistant Professor, Department of Osteopathic Manipulative Medicine, New York Institute of Technology College of Osteopathic Medicine. Phone: 516-686-3754 Email: syao@nyit.edu

Figure 1 – Migraine pathway
Source: “Site of Migraine Generation: The Trigeminovascular System” Photo: The Role of CGRP and its Antagonists in Migraine. 10/2/2013 <http://flipper.diff.org/app../items/5242>