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Short Communication

Spectrum of cases of head injuries in amateur boxers during practice session

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ABSTRACT

Safety precaution in amateur boxing in practice sessions is less than optimal. Safety measures such as wearing of head gear, restriction of practice sessions and medical supervision & examination are strictly adhered to during practice session. The varying patterns of Sub Dural Hematomas encountered by the authors in a span of 2 years in young amateur boxers during practice sessions are hereby reported.

1. Introduction

Sub Dural Hematomas account for the majority of lethal brain injuries seen in both organized and recreational athletic activities. It is important to understand that Sub Dural Hematomas in athletes are dissimilar to those commonly seen in the elderly and in many non athletes who are trauma victims. The athlete usually does not have the large potential subdural space that an elderly patient possesses, and therefore a "mass effect" and increase in intracranial pressure can occur with greater rapidity. In addition to injury from the mass effect of blood beneath the dura mater, there is often significant associated damage (contusion or edema) to the underlying brain due to multiple of blows. Acute Sub Dural Hematomas and associated cerebral edema are the leading cause of boxing-related death.

The aim of presentation of this study is to highlight the wide spectrum of presentation of head injuries during practice sessions encountered by the authors .As aptly demonstrated by our cases, boxers who sustain Sub Dural Hematomas may immediately become unconscious and/or suffer focal neurological deficits, or the symptomatology may develop insidiously over days or even weeks. The sequelae range from acute neurological complications to the chronic process of chronic Sub Dural Hematomas.

2. Case report – 1

Eighteen years old recruit was practicing for the regimental boxing competition. After one of the practice sessions he developed complaints of giddiness, ignored by both – him & the authorities. He had another practice session, the very next

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day after which he had increased giddiness. After a few hours he was found unconscious in the barracks. He was immediately evacuated to the nearest medical setup where he was suspected to have sustained head injury and was further evacuated to the tertiary care hospital. At admission he was unconscious with G C S score of E1 V1 M4. On examination his right pupil was not reactive to light and he had hemiplegia on the left side. On investigation he was found to have a large Sub Dural Hematoma in the right fronto-temporal region with associated brain swelling producing significant midline shift to the left. He was taken up for emergency craniotomy. The Sub Dural Hematoma was evacuated and the procedure was completed with duraplasty and removal of the bone flap in view of the severe brain swelling. Postoperatively the patient continued to be in a vegetative state for a long time and further developed hydrocephalus necessitating a shunt. Even after two years of operation the patient is not self dependent, and he is unlikely to make it as a fit soldier in future.

3. Case report – 2

Nineteen years old son of a retired soldier, an amateur boxer in the college boxing team, presented to our Neurosurgical OPD with history of mild but continuous dull headache & occasional giddiness & nausea of 10 days duration. He also gave history of having been through 15 days of practice sessions for inter batch boxing championship, however denied any history of knock out. The patient was examined & no clinical abnormality was detected. He was managed symptomatically on OPD basis but came back after two days with persisting symptoms. NCCT head was done which showed a thin Left Fronto-Temporal Acute Sub Dural Hematoma. The patient was managed conservatively and he recovered fully with no residual deficits.

4. Case report – 3

A 14-year-old child presented to our setup with history of knock out in school boxing practice session, followed by one episode of vomiting around 40 days back. The child had remained asymptomatic more or less after that except for frequent episodes of mild to moderate headache without any diurnal pattern or any neurological deficit for which he was being treated symptomatically at a local practitioner. However he continued to be symptomatic with moderate increase in intensity of headache & after around 40 days of injury he presented with complaints of diplopia on Left lateral gaze and was referred to the neurosurgical center.

On examination the patient had no positive findings except for a pulse of fifty-two & subtle Left VI nerve paresis. Urgent NCCT Head showed a large Left Fronto-Temporo-Parietal chronic Sub Dural Hematoma with midline shift.

Burr hole evacuation of chronic Sub Dural Hematoma was done. The child made an uneventful recovery with post op NCCT head showing minimal residual Sub Dural Hematoma & pneumocephalus. He was discharged with advice to avoid Boxing as a sports activity.

5. Discussion

Boxing has been a human sport activity since antiquity. It was introduced to the Olympics in 688 BC. Ancient boxing had fewer rules. Boxers fought without rounds, until one of them was knocked out or admitted defeat by raising one or two fingers. The introduction of “caestus” in 150 BC by Romans wherein the gloves were reinforced with lead or iron, transformed the Greek art of boxing into an inhuman and deadly contest.[1]

The purpose of boxing is to render the opponent unconscious & producing temporary (occasionally permanent) brain damage. Mawdsley and Ferguson have described the mechanism of acute injury (temporary damage) following the impact. As a result of impact there is a transient acceleration of head. The skull moves faster than brain because of the inertia of the later and it comes to rest earlier then the brain. With the result the brain impacts on the bony ridges of the skull surface or on the sharp edges of the dural attachment. The impact force is responsible for concussion. Stretching forces on the veins that cross the subdural space (bridging veins) result in the development of Sub Dural Hematoma. The shearing movement of the skull and the brain against dural attachment and bony ridges produce contusions and intra parenchymal hemorrhages.[2]

Chronic traumatic brain injury which is also known as chronic traumatic encephalopathy(C T E), punch drunk syndrome or dementia pugilistica.[3] Loss of pigmented neurons especially in the lateral part of the substantia nigra has been observed in many postmortem studies of professional boxers with traumatic parkinsonism.[4]

Lijuan et al concluded that diffusion tensor imaging can show early pathological changes in the cellular and microvascular structure in the brain of the boxer population and it can be useful index for monitoring the neurological health of boxers.[5]

Although CT and MR imaging studies are extremely useful tools for the evaluation of boxers for intracranial injury, imaging studies also may be used as evidence barring these athletes from future participation in the sport. Thus, at times there may be an incentive for them to refuse or avoid such tests. Although no evidence has been published supporting the suggestion that a boxer who has suffered an intracranial hemorrhage is at any increased risk of such events in the future, governing bodies in the sport may consider this finding to be sufficient evidence to bar the fighter from future participation. Whereas athletic commissions want to be cautious, athletes on the other hand aspire to win championships and million-dollar paychecks. They may not be easily dissuaded by imaging findings, especially when symptoms do not exist or have resolved. Athletes who perceive that they will be banned from the sport will be less likely to seek diagnosis and treatment.

Realizing fatalities and morbidity inflicted by boxing to the boxer, various safety measures have been introduced over a period of time. Biting, grouching, kicking and other brutal techniques were outlawed as early as 1897. Marquis of Queensbury introduced boxing gloves, 3 min round, 10 s knock out and safety helmets. Further boxing got classi-

fied as professional and amateur. Amateur boxers have been made to observe all the above safety measures and bout is fought on the point basis unlike the knocking down system which is still prevalent in professional boxers.[6]

Though many boxers feel that they receive many punches on their head, in their career it is one such blow which is fatal. They also feel that adopting the safety measures and posting a doctor near the ring can prevent most of the boxing injuries. Despite these safety measures and the presence of doctor in the ring side it is impossible to predict the fatal blow or prevent the cumulative effects. All the organizations which lobby for boxing as a safe game, only compares the acute injuries and do not address the chronic injuries, as well as practice sessions & the morbidity & mortality associated with them.

5.1. *Pre-boxing checkup recommended*

- Pulse. An anxious boxer may have sinus tachycardia, while an aerobically fit boxer may have sinus bradycardia. A boxer with more than 5 irregular beats per minute should be declared unfit for a session unless there has been a proper cardiology consult.
- Blood pressure. A boxer with a diastolic over 90 should be declared unfit to box. A high level of fitness can produce a low blood pressure reading, and such an athlete should not be excluded.
- Pupils, extra-ocular movements, and accommodation. Two flashes in each eye, one to see the direct response, one to see the consensual response. Eyes to their maximum distances in each of the six directions, and convergence to the nasal root. Documentation whether there is convergence all the way in. This is essential since some people have anomalies and if these are noted after a fight without being previously documented, they could generate much confusion.
- Heart sounds. The great concern is hypertrophic cardiomyopathy, with its distinctive murmur.
- Lungs. A mild chest infection could trigger asthma in the ring.
- Spleen and liver. A blow to the spleen in the presence of chronic malaria, infectious mononucleosis could be catastrophic. And it would be regrettable for the doctor to miss impending hepatitis, or a hot gall-bladder.
- Neck veins. Boxers may become dehydrated while trying to make weight. If the neck veins are flat, instruct the boxer to drink a few glasses of water (or better, an electrolyte beverage).
- Gait. Include tiptoe, heels, and tightrope.
- Romberg test. Eyes closed, feet together, arms extended toward the examiner. Includes a gentle push to test the righting reflexes.
- General. A boxer should be asked not to participate if he/she has an upper respiratory infection.

5.2. *Post-boxing checkup recommended*

There also seems to be a need for neurological assessment of players after every bout of practice session. The feasibility of radiological assessment in the form of MRI scan after each knock out needs to be assessed in all seriousness. The authors also recommend three monthly periodical compulsory medical checkup of boxers irrespective of the fact whether he has had "knock out" or not.

- Pupils, extra-ocular muscles, and accommodation. This is time-honored.
- Press the infraorbital ridges to be sure there is no point-tenderness to suggest a fracture.
- Romberg test as above.

Questions are asked about the fight to be sure there is no post-traumatic amnesia.

Today's amateur boxers are very much aware of second-impact syndrome, and after even the slightest suspicion of a first concussion, there should be a mandated month out of the ring. Should it happen again, the intervals should be successively prolonged.

6. Conclusion

The American Academy of Pediatrics, through its Committee on Sports Medicine and Fitness (Pediatrics 99: 314–5, 1997) acknowledges that the rate of obvious head injury is actually lower in amateur boxing than in football, rugby, or ice hockey. However, the academy singles the sport out for condemnation because "intentional head injury" is the "primary objective". The essence of a sport is to develop the fighting spirit, enhance physical capabilities and provide entertainment to the public. Sports are a matter of national pride and injuries are definitely the offshoot of the sporting carrier. But no other sport aims at debilitating the participant either temporarily or permanently. Despite all the safety measures and presence of a doctor near the ring, the boxing injuries continue to occur. Although the safety of boxers is a long debated issue & much has been done to take care of the same in professional & Amateur boxing, like limiting the number of rounds, elaborating a point system to assess scores & presence of doctors the same may not be true for the practice sessions, where in absence of any monitoring authority there are more likelihood of the players sustaining injuries.

The authors feel the need for compulsory medical supervision during practice sessions. Each boxer should have had a complete physical exam within the last six months, and also gets examined by a physician as per recommended schedule.

Conflicts of interest

All authors have none to declare.

REFERENCES

1. Miller S. *Ancient Writers, Papyri and Inscription of the History, Ideals of Greek Athletics and Games*. Chicago: Ares Publishers Inc; 1976.

2. Mawdsley C, Ferguson FR. Neurological disease in boxers. *Lancet*. 1963;19:799–801.
3. McCrory P. Boxing and the brain. *Br J Sports Med*. 2002;36.
4. Unterharnscheidt F. A neurologist's reflection on boxing V concluding remarks. *Rev Neurol*. 1995 Sep–Oct;23(123):1027–1032.
5. Zang Lijuan, Ravdin Lisa D, Relkin Norman, et al. Increased diffusion in the brain of professional boxers: a preclinical sign of traumatic brain injury. *Am J Neuroradiol*. Jan 2003;24:52–57, 395.
6. Jako P. Safety measures in amateur boxing. *Br J Sports Med*. 2002;36:394–396.

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