Opinion

Use of a mobile CT scanner at professional boxing and MMA events: making combat sports safer

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Background

Professional boxing and mixed martial arts (MMA) are popular contact sports with high risk for both acute and chronic traumatic brain injury (TBI). Although rare, combatants have died in the ring/cage or soon after the completion of the bout. The cause of death in these cases is usually acute subdural hematoma, acute epidural hematoma, subarachnoid haemorrhage, intracranial haemorrhage, or second-impact syndrome (SIS). Neuroimaging or brain imaging (either CT scan or MRI brain) is currently included in the process of registering for a license to fight in a combat sport in most commissions in the United States and around the world. Neuroimaging in the immediate aftermath of a bout primarily serves to rule out acute traumatic brain injury. At present if concern for acute TBI in a combatant is raised either during or after the conclusion of a bout, based on the neurological evaluation by the ringside physician, the fighter is immediately transported via on-site ambulance to the nearest Level I trauma center for urgent CT scan head and neurosurgical intervention if deemed necessary. Some TBIs may not manifest immediately or manifest in a subtle fashion so as to escape detection by the ringside physicians in the immediate aftermath of a bout. In this commentary the use of a mobile CT scanner at professional boxing and MMA events is proposed with the intention of making these sports safer.

Discussion

Professional boxing and Mixed Martial Arts (MMA) are popular contact sports worldwide. Both sports though carry a high risk of acute and chronic TBI. Acute TBI is the most common cause of death and disability in these sports. Novel solutions are needed to address this problem and make the sports safer. Since some TBIs do not manifest immediately or manifest in a subtle fashion they escape detection by the ringside physicians in the immediate aftermath of the bout leading to catastrophic outcomes. The use of a mobile CT scanner has the potential of improving MMA and boxing combatant safety, reducing medico legal liability for the state athletic commission and reducing insurance premiums of the promoters.

Mobile CT scan unit: The mobile CT scan unit is housed in the back of an ambulance and shall be stationed at an appropriate and easily accessible location in the venue (Figure 1).

Figure 1 Mobile CT scan unit (Source: *https://www.nyp.org/neuro/services/stroke/mobile-stroke-treatment-unit*).

It will be staffed by a highly specialized team of two paramedics, a computed tomography (CT) technologist. Once the CT scan is completed, it is wirelessly transmitted to a Level I trauma center hospital, where a neuroradiologist evaluates it in real-time to make an accurate diagnosis of TBI. Use of the mobile CT scanner would be under the direction of the ringside physicians for any participant with any reported neurological symptoms or any abnormalities found on physical examination which the ringside physician determines needs immediate CT scan evaluation. It is hoped that it will greatly reduce the time from the onset of symptoms of TBI to the delivery of care — a crucial factor in improving TBI outcomes. Some combatants with an epidural hematoma manifest with a lucid interval (a temporal improvement or stabilization in a patient's condition after a TBI followed by rapid deterioration) and it is hoped that the utilization of the mobile CT scanner at the venue would help in timely identification of such boxers and rapid transportation to the hospital. While the injured combatant is enroute to the hospital, the CT scan images can be reviewed by the neurosurgeon on call and the operating room staff can be summoned. This shall maximize the efficiency of the operating room utilization, staff and materials and improve patient outcome. The operating cost of the unit shall vary according to local health care economy. Cost estimate for an event in the New York metropolitan area has been estimated to be in the range of $1,200 flat fee for each event plus $800/hr. The total would be $6,000 per 6 hour event.

Recommended good practice guidelines regarding neuroimaging requirements after a bout include:

1. Based on the assessment by the ringside physician(s) after the post-fight physical examination, a combatant who is suspected of having sustained a traumatic brain injury (TBI). Concern for TBI is raised if the combatant manifests or reports symptoms of headache, blurred vision, double vision, nausea, vomiting, balance or gait issues after a bout.
2. A combatant who has a focal neurological examination after a bout should have neuroimaging.

3. Any combatant with a Glasgow Coma Scale/Score (GCS) of less than 13 on initial assessment, suspected open or depressed skull fracture, suspected basal skull fracture, post-traumatic seizure, focal neurological deficit and/or greater than one episode of vomiting since the suspected head injury should undergo an urgent CT scan of the head (as per National Institutes of Health and Care Excellence (NICE) guidelines for determining the need for an acute CT scan of the head in adults following a traumatic head injury).[1,2,3]

Conclusion

Recognizing and mitigating the ever present concern for acute TBI in combat sports by novel ideas (protocols) and technology is urgently needed. A mobile CT scanner has the potential of improving MMA and boxing combatant safety. The above suggestions are proposed with the recommendation that the proposed suggestions be debated vigorously by the scientific community with regards to clinical outcomes, feasibility and cost. Evidence based guidelines can then be developed to incorporate this technology into the combat sports arena by the medical community in conjunction with professional MMA and boxing governing bodies.

Author contributions

NKS conceived, drafted and revised the manuscript.

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NKS serves as Associate Editor, The Eastern Journal of Medicine and Chief Medical Officer of the New York State Athletic Commission (NYSAC). The views expressed are his and do not necessarily represent the views of the NYSAC.

Data sharing statement

The author has no additional data to share.

References

1. National Clinical Guideline Centre (UK). Head Injury: Triage, Assessment, Investigation and Early Management of Head Injury in Children, Young People and Adults. London: National Institute for Health and Care Excellence (UK); 2014.
2. Davis T, Ings A. National Institute of Health and Care Excellence. Head injury: triage, assessment, investigation and early management of head injury in children, young people and adults (NICE guideline CG 176). *Arch Dis Child Educ Pract Ed.* 2015;100(2):97–100.
3. Hodgkinson S, Pollit V, Sharpin C, et al. Early management of head injury: summary of updated NICE guidance. BMJ. 2014; 348:g104.