Commentary

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Making boxing safer- revisiting the red flag policy

Abstract

Due to the striking nature of combat sports like boxing, it is associated with a high risk for acute traumatic brain injuries (TBIs) as well as chronic neurological sequelae of multiple head impact exposures such as chronic traumatic encephalopathy (CTE). Polices such as the Ref Flag Policy were formulated to protect the health and ensure safety of combatants.

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Introduction

Professional boxing is a popular combat sport. Due to the striking nature of the sport, it carries a high incidence of acute traumatic brain injuries such as concussion, subdural hematoma (SDH), intraparenchymal hemorrhage (IPH), cerebral contusions and subarachnoid hemorrhage (SAH). Traumatic SDH remains the most common cause of boxing related mortality. Enhanced medical protocols designed to timely identify concussions and acute TBIs in the ring can help reduce boxing related mortality and morbidity. One such protocol is the "Red Flag Policy" which was first designed and implemented by the New York State Athletic Commission (NYSAC). Over the years this policy has been accepted and implemented by other Commissions in the United States and abroad. This commentary explains the policy's purpose, provides analysis and opinions on the policy's strengths and potential weaknesses.

Commentary

The red flag policy was formulated with the intention of identifying high risk fighters. These are fighters who harbor an increased risk of clinical deterioration in the aftermath of a fight. The policy has the following two main recommendations.

Hematuria: as per the policy, any fighter who has blood either in the pre-bout or post bout sample urine is red flagged. This combatant is then brought to the attention of the ringside physician who attempts to determine the cause and significance of the hematuria.

Concern for traumatic brain injury (TBI: as per the policy, any fighter for whom concern for possible mild TBI (concussion) is raised after the fight is over is red flagged. The combatant is then brought to the attention of the ringside physician. The ringside physician after determining that the combatant is stable and neurologically intact (GCS 13 and above) observes the combatant in the Commission room. This period of observation may vary from 15 to 30 minutes. During this time, serial neurological evaluations are carried out. A combatant who remains stable with no neurological signs or symptoms such as gross motor instability (ataxia), headache, dizziness, vomiting is discharged from the venue with advise to go to the nearest emergency department if any of the above signs were to manifest later. A combatant who is symptomatic with concussion symptoms or becomes symptomatic over the course of the observation period is sent via an ALS ambulance to the nearest designated Level I trauma center for neuroimaging (CT scan head), evaluation and management.

Rationale behind the red flag policy

Red flag for hematuria detected in prefight urine sample: it is highly unusual for the prefight urine sample to manifest hematuria. If the prefight urine sample is red in color, it may signify that the combatant is coming into the fight in a dehydrated state. Just a combatant may be at high risk for an adverse outcome in the ring. Hence this fighter is red flagged and warrants a detailed prefight medical evaluation to determine cause of hematuria and medical fitness to fight.

Red flag for hematuria detected in post-fight urine sample: there can be a number of causes for hematuria post fight.[1,2] The clinical significance varies based on cause. In boxing "kidney shots" (blow to the back near the renal fossa) are deemed illegal. The referee is instructed to not allow kidney punches but these do occur accidentally and blunt force trauma to the genitourinary system can be cause of hematuria. Due to the deep seated location of the kidneys in the renal fossa, kidney laceration is a rarely encountered injury in boxing. While medical data is lacking theoretically a boxer is more likely to suffer a laceration to the liver and spleen as compared to the kidney. The second cause of hematuria after a fight is dehydration and mild degree of breakdown of muscle protein (rhabdomyolysis). Again medical data is lacking as to the frequency of this condition in boxing and other combat sports like mixed martial arts (MMA). Management of hematuria in the post-fight setting involves clinical assessment of the boxer's health status. If the boxer is hemodynamically stable with a soft abdomen and the hematuria is not gross, he/she is instructed to aggressively hydrate orally. Usually in such cases, a repeat urine sample is requested and if clearer as compared to prior sample, the boxer is discharged from the venue with instructions to hydrate and go the emergency room if he develops flank pain or gross hematuria. If there is gross hematuria and/or the boxer is clinically symptomatic (flank pain, abdominal tenderness, hemodynamic instability), he is transferred via ambulance to the ED of the nearest level I trauma center for imaging (ultrasound abdomen) and definitive treatment.

Red flag for concern for TBI/concussion: combat sport like boxing is associated with a high risk of acute TBIs such as concussions, subdural hematoma, subarachnoid hemorrhage, cerebral contusions and intracranial hemorrhage.[3,4] Traumatic SDH remains the most common cause of boxing related mortality.[5,6,7] Boxers become symptomatic either during the bout itself or in the immediate aftermath of a fight. Some fighters though may exhibit a lucid interval varying in duration from a few minutes to half an hour. Sometimes referred to as "walking, talking and dying", these boxers may appear

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asymptomatic and neurologically intact at the end of the fight, clear their post fight physicals only to collapse later in their locker room or outside the arena. The red flag policy helps in preventing these boxers from falling between the cracks. The goal is to observe for a period of time the fighter who has had a tough fight with multiple head impact exposures for signs of neurological deterioration rather than just discharging them from the venue after the post fight exam. The red flagged boxer is usually observed in the commission room. Serial neurological assessments including standardized assessment for concussion (SAC) are carried out by the ringside physician. If the boxer remains asymptomatic and neurologically intact over the period of testing, he is discharged from the venue with advice to go to the nearest ED if he starts to exhibit signs and symptoms of concussion. If during the period of serial assessment the boxer becomes symptomatic, he is transferred via onsite ambulance to the ED of the nearest level I trauma center for CT scan head and definitive management based on results.

It is important to note here that a neurologically unstable fighter demonstrating a GCS of less than 13, gross motor instability, voicing headache or having nausea and vomiting is not to be red flagged. Such a fighter should be immediately transported to the hospital for neuroimaging study (CT head). There is no "weakness" in the Red Flag policy but it should not be used in isolated. Rather it should be implemented in conjunction with other protocols that enhance fighter safety in the ring.

Conclusion

Commissions like NYSAC have prioritized health and safety of combatants who fight under its jurisdiction. The red flag policy was first devised and implemented by the NYSAC. It is a sound and practical policy which is grounded in science and helps to make the sport of boxing safer. It should be universally adopted by boxing commissions in the United States and abroad.

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NKS drafted the manuscript

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