

Making boxing safer: the case for establishing NO-GO criteria in boxing

Abstract

Background: Professional boxing is a popular contact sport with a high risk for both acute and chronic traumatic brain injury (TBI). Although rare, many boxers have died in the ring or soon after the completion of a bout. The most common causes of death in these cases are usually acute subdural hematomas, acute epidural hematomas, a subarachnoid haemorrhage, an intracranial haemorrhage or Second Impact Syndrome (SIS).

Discussion: After the recent tragic death of fighters in the ring, renewed calls have been made to make boxing safer and even to ban the sport altogether. While boxing could be banned in some countries, a total ban on boxing cannot be logically implemented. A far more practical discussion involves on how to make the sport more safer. In this commentary NO-GO criteria in boxing are defined based on personal and collective evidence of experienced ringside physicians and clinical acumen.

Conclusion: Standardising medical stoppage decisions in boxing with the help of clearly defined NO-GO criteria will help to protect a boxer's health and safety in the ring. Good practice guidelines for screening and management of high-risk fighters are also suggested. It is recommended that the medical community debate the proposed guidelines and NO-GO criteria vigorously, in order that evidence-based guidelines can be developed in conjunction with professional boxing governing bodies.

Keywords: boxing, safety, concussion, knockout, medical stoppage, traumatic brain injury, contact sports, ringside physician

Volume 4 Issue 3 - 2020

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Received: August 14, 2020 | **Published:** September 14, 2020

Abbreviations: TBI, traumatic brain injury; GMI, gross motor instability; MRI, magnetic resonance imaging; MRA, magnetic resonance angiogram

Recently the boxing world was heart broken by the untimely demise of boxer Patrick Day. By the accounts of all who knew him, Patrick was an intelligent well-spoken young man who was loved by all. He died at the tender age of 27 after suffering devastating traumatic brain injury (TBI) during the course of a professional boxing bout. Patrick was no rookie stepping into the ring for the first time. He was an accomplished boxer with a record of 17 wins and 4 losses in professional boxing. His amateur record was 75-5.

Following Patrick's death, the boxing community has been looking inwards and searching for answers on what went wrong that eventful night and what can be done to prevent such tragedies in the future.¹⁻³ Unfortunately, there are no easy answers. In a sport where every punch thrown at the head is thrown with the intention of winning by causing a knock-out (KO) (aka a concussion); the risk of TBI lurks all the time. Many still do not understand that deaths when they do occur in the ring are not the result of a single blow (punch) to the head; rather it is the culmination of multiple head shots which the fighter sustains during the course of the bout. Importantly the initial signs of a concussion/TBI are subtle and wholly subjective.⁴ The fighter may experience a headache, subjective feeling of dizziness or imbalance, vision problems and difficulty in focusing. There are no objective signs which can help the ringside physician, the referee, the inspectors and the corner men identify the concussion/TBI with confidence. By the time objective signs such as gross motor instability (GMI) (obvious balance problems, lack of coordination or inequality in pupil size) appear, the TBI is usually well evolved and precious little can be

done ringside to save the boxer's life except to transport him to the hospital in an emergent fashion for life saving brain surgery. Usually a decompressive hemicraniectomy is carried out for evacuation of the blood clot and to reduce the intracranial pressure. Even though surgery in some of these cases may save the boxer's life, he is usually left behind with significant and permanent neurological deficits such as motor weakness, speech and cognitive deficits and problems with coordination and gait. Hence the goal should remain to stop a fight early rather than late. A good stoppage done by the referee or the ringside physician on medical grounds is one which is done for the right indication such as concern for TBI and at the right time (neither too early, certainly never too late!).

Standardizing medical stoppages in the ring is no easy task but certainly something which we all should be paying closer attention to. One approach which can be adopted is to establish NO-GO criteria in boxing. If any of the NO-GO criteria are encountered during the course of the bout, the bout should be stopped on medical grounds to protect the health and safety of the boxer. Ringside physicians, referee, the Commission officials, the corner men and most importantly the two boxers should be aware of these NO-GO criteria.

In order to identify and prevent acute TBI in boxing, the following good practice guidelines and NO-GO criteria are proposed based on personal and collective evidence of experienced ringside physicians and clinical acumen:

The fight should be stopped if the boxer voices any of these complaints or displays any of these signs at any time during the course of the fight

1. If the boxer voices complaint of headache.

2. If the boxer is displaying overt signs of a concussion and gross motor instability (GMI). These signs include but are not limited to confusion and disorientation, impaired balance and coordination.
3. If the boxer suffers any duration of loss of consciousness after a KO. This boxer should not be allowed to continue even if he gets up at the count of 8. It is good practice for the referee to waive off the count in these instances, signaling an end to the contest so that the fighter can immediately be attended to by the ringside physician medical team.
4. If the boxer suffers an impact seizure or displays fencing responses at the time of a KO. This boxer should not be allowed to continue even if he gets up at the count of 8. It is good practice for the referee to waive off the count in these instances, signaling an end to the contest so that the fighter can immediately be attended to by the ringside physician medical team.
5. The boxer suffers loss of visual acuity during the course of a fight. This is usually on account of trauma to the eye. Loss of visual acuity results in an impaired fighter who cannot defend himself/herself effectively. Allowing the fight to continue risks the health and safety of the boxer.
6. The boxer suffers loss or restriction of visual field during the course of a fight. This may be on account of trauma to the eye, neural mechanisms which control eye-movements or due to swelling around the eye (peri-orbital swelling). Restriction of visual fields results in an impaired fighter who cannot defend himself/herself effectively. Allowing the fight to continue risks the health and safety of the boxer.
7. If the boxer becomes a physically compromised fighter during the course of a fight. This usually occurs on account of injury to the hands/shoulders or the lower extremity (knee or ankle injury) leading to inability to defend oneself from the opponent.
8. If the boxer starts to vomit during the course of the bout, the fight should be stopped (caveat is that boxers will sometime vomit after a hard body or liver shot).

As good practice guidelines it is further suggested:

1. The referee or the ringside physician should stop the bout if in doubt about the health of the fighter. "When in doubt, stop the bout."
2. High risk combatants merit a greater degree of medical supervision. A High Risk Combatant is a combatant who falls into any one, or more, of the following categories:
 - 40+ years old;
 - 6 consecutive losses in any manner in any professional combat sport;
 - 3 consecutive losses by TKO/KO;
 - 1+ year(s) of inactivity after start of professional career;
 - 10 losses or more as a professional combatant;

For any combatant who falls into one, or more, of these categories, additional testing to assess cardiovascular and neurological fitness prior to fight is suggested. This may include:

- A. Magnetic Resonance Imaging (MRI) of the brain with susceptibility weighted imaging (SWI) or gradient echo imaging (GRE).

- B. Magnetic Resonance Angiogram (MRA) of the Brain.
- C. Neurological evaluation performed by a neurologist to determine brain fitness to fight.
- D. Formal neurocognitive testing either via a neuropsychologist (pen and paper testing) or computerized testing such as ImPACT with a notation if any deterioration from the baseline (first) assessment (if available). For non-English speaking combatants, interpreter mediated testing or testing in native language is acceptable.
- E. Cardiac evaluation performed by a primary care physician/internist with referral to cardiologist if needed.
- F. Additional blood work including a complete blood count (CBC) with platelet count and complete metabolic panel (SMA20) which includes hepatic tests, blood urea nitrogen, creatinine and glucose, lipid profile, thyroid profile.

For combatants above the age of 40, restricting the number of rounds in both non-championship and championship bouts may be considered. Referee and ringside physicians should have a low threshold for stopping a bout involving high risk combatants. High risk combatants should undergo a detailed post-fight medical evaluation. If concern for concussion or TBI is raised, they should be immediately transferred via onsite ambulance to the nearest Level I Trauma Center for neuroimaging and further medical evaluation.

3. Acute subdural hematoma is the most common acute brain injury in boxing, accounts for 75% of all acute brain injuries and is the leading cause of boxing fatalities. Boxers may exhibit a lucid interval following a traumatic brain injury. A lucid interval is a temporary improvement in a boxer's condition after a traumatic brain injury, after which he again deteriorates. The lucid interval may vary from ten minutes to an hour after knockout. Hence it is important that following a "tough" fight, the boxer be observed for a length of time and not be immediately discharged from the venue. If there is any change in the neurological status of the boxer while under observation, he/she should be immediately transported via on-site ambulance to the nearest Level I trauma center for neuroimaging (CT scan head or MRI brain) and further medical evaluation.

Conclusion

It is recommended that the above proposed NO-GO criteria and best practice guidelines be debated vigorously by ringside physicians and the wider scientific community and that evidence-based guidelines on medical stoppages be developed by the medical community in conjunction with the professional boxing governing bodies. There is an urgent need to make boxing more safe and it is far better to stop a fight early rather than too late

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