Discussion on the use of Headgear in Amateur Boxing

Background:
In 2013, the Amateur International Boxing Association (AIBA) introduced a rule that required male-senior boxers to remove headgear during fights. This rule change has been controversial due to the potential dangers this may incur. AIBA has claimed this will improve safety for the boxers, and in 2018 plans to enforce this rule for all boxers in all amateur bouts.

To address the counterintuitive nature of this assumption, Dr Charles Butler, the Honorary Chairman of the AIBA Medical Committee provided a rationale for the rule change, which is listed below. In addition, each of the points is examined with reference to the literature, as appropriate.

The purpose of this document is to permit those involved in amateur boxing to effectively assess this issue. To do so, it is important understand the rationale AIBA incorporated to justify the rule changes, and be cognizant of the current research in this regard. When those involved have all the information, it is possible for each individual to determine if in fact there is sufficient evidence to warrant the rule change to no headgear, with a view on athlete safety.

Rationale to remove headgear during amateur boxing competition (AIBA).
(Summary, according to Dr Charles Butler, Honorary Chairman of the AIBA Medical Commission)

The subject is complex but in summary form:

Neurologic injury is commonly taken as the most important measure of safety of any sport

- See the most recent "Zurich Consensus" the gold standard on concussion published in BJSM 2013--- comments on Headgear and Concussion
- The American Academy of Neurology March 18, 2013 makes mirroring published statements
- As you know, the head guards worn by Pros in practice are meant to prevent cuts, not concussion
- See the peer reviewed article by Bianco in BJSM 2013 showing a 3x increase in RSCH when head guards became mandatory in 1984
- Our own study is in process of peer review
- Unfortunately changes in rules lead to changes in styles.
  - The addition of head guards lead to weaponization of the head where boxers developed a style of competing with head more forward and more head to head contact
    - As you are aware, head to head contact is bad. It is being more strictly regulated in football and other sports to decrease long term brain damage
    - Head to Head contact with headgear leads to the "slosh" effect on the brain
    - Head to head contact without Head guards leads to the "slosh" effect plus cuts.
    - Currently 80% of our cuts come not from legal blows but from head to head contact. We see the cuts, we do not see the "slosh" effect on the brain???
- We need coaching and R/J changes such as being implemented in football to decrease head to head contact.
- Before the implementation of head guards, this cut problem did not exist in nearly the proportions we see today and the RSCH rate was 1/3 before mandatory use of head guards compared to afterwards (cf. Bianco BJSM).
Point-by-point Analysis

(1) Neurologic injury is commonly taken as the most important measure of safety of any sport
The measure of safety in sport may be defined by the incidence of severe injury, and neurologic insults can have a profound impact; hence the necessity to be prioritized.

2. See the most recent "Zurich Consensus" the gold standard on concussion published in BJSM 2013-- comments on Headgear and Concussion. The American Academy of Neurology March 18, 2013 makes mirroring published statements

The “Consensus statement on concussion in sport” [1] is the model that AIBA and all sports should refer to when establishing guidelines, protocols and rules to deal with concussion and to establish the safest possible competitive environment.

In the article referred to, however, the discussion on the use of headgear explicitly refers to studies that involve rugby and their recommendations do not suggest the removal of headgear. Rather the authors propose that sport-specific studies should be performed to develop protective gear that is well designed in response to the particularities of the sport.

To emphasize this interpretation, note that both the first author and senior author of the Zurich Consensus (P. McCrory, M. Turner) published a peer-reviewed editorial in the British Journal of Sports Medicine in which they are highly critical of AIBA’s current stance on headgear [2]. To quote directly from their article:

“Amateur boxers in these new competitions will fight without headgear ... This in turn will mean more injuries to participants that seem to go against the Olympic ideal of amateurs striving for athletic greatness rather than the rewards of the prize ring.”

“...what little published evidence exists actually supports helmets as a means of reducing impact to the brain and presumably brain injury resulting from boxing. Rather than fundamentally changing the amateur rules and possibly increasing injury risk by discarding helmets, it would seem more appropriate to encourage and publish independent research into the protective effects of helmets, gloves, mouth guards and rule changes in line with the developments in other sports before a change is made. ...”

“...why AIBA sanctioned boxing would want to move towards a professional model of boxing with the likely higher acute injury rates (eg, concussion) seems intuitively counterproductive. At the very time that increased media and medical scrutiny of high-risk sports (with the potential for brain injury) exists and the increasing litigation and regulation for injured athletes, this move makes little sense.”

3. As you know, the head guards worn by Pros in practice are meant to prevent cuts, not concussion
There is a limitation with anecdotal evidence. Whether or not the statement has veracity; intent does not define the result. A pro boxer may utilize headgear with the sole purpose of preventing cuts, however, the boxer may then also benefit from reduced risk of brain injury even without intent or realization. The extent that this may protect against concussion is difficult to assess without any real data that involves systematically tracking injuries incurred during training. However, as identified by the authors above, any evidence that exists supports the use of headgear to reduce impact to the brain, and thereby potential injury.
4. See the peer reviewed article by Bianco in BJSM 2013 showing a 3x increase in RSCH when head guards became mandatory in 1984

The article from Bianco [3] is an interesting analysis of boxing with and without headgear. In it the authors try to identify how rule changes (including the use, or not, of headgear) over the last 60 years have impacted decisions in competition. In some instances rule changes have resulted in increases and/or decreases in different types of decisions independent of headgear usage. The challenge for the authors was to differentiate between the various changes to the rules, changes to a focus on safety for referees, or how other changes may have influenced the results. The authors attempt to identify some of these factors in their analysis and discussion.

Decisions relevant to this discussion are: RSC – referee stops contest – when a boxer is not defending sufficiently, or at the referee’s discretion may get injured; RSCH – when the referee stops the contest as with RSC, but specifically due to a blow to the head; KO – the bout is stopped when a boxer is knocked out and cannot continue within 10 seconds [3].

As stated, the authors observe a notable increase in RSCH decisions in the years following the introduction of headgear, compared to the preceding years. They also recognize, however, that the implementation of the RSCH rule has varied over the years and previously was never incorporated. As a result, the authors have tried to remove this bias by combining the KO, RSCH and RSC decisions, and when doing so, there is no statistical difference observed in the 20 years preceding the introduction of headgear and the 13 years following headgear usage.

It is important to note, however, that there was a significant reduction in the number of KOs following the introduction of headgear. Since a KO is the only ruling that is not open to interpretation, unlike for RSCH and RSC that varies with the subjective degree of vigilance the referee places on safety, the KO is the most objective measure of safety in the sport of boxing. Of particular note, it is the only outcome that definitively results in neurologic injury, since the most severe form of concussion (Grade 3), according to the American Academy of Neurology [4], is defined by unconsciousness that arises due to a blow to the head. This prioritization is in agreement with the first point, “neurologic injury is the most important measure of safety of any sport”.

Thus, the evolution in the rate of KOs in amateur boxing requires the greatest attention when evaluating safety standards. In fact, the introduction of headgear and the switch to computer scoring were the two leading changes that have significantly reduced the number of KOs in a 3 round 3-minute format. As of 2011, the KO rate had dropped to less than 1/10th the KO rate without headgear [3]. Inexplicably, these two fundamental rules that have markedly enhanced athlete safety have been abolished in the current system, since 2013.

5. Our own study is in process of peer review

(Note: This unpublished study, internal to AIBA, has been referred to in numerous newspaper articles to support the claim that boxing without headgear is safer)

The only public information regarding Dr Butler’s research comes from data that was attributed to him in a Wall Street Journal article [5]. In it he was quoted as stating that after 7352 rounds of boxing under AIBA rules (with headgear) 0.38% resulted in concussion, whereas following 7545 rounds of boxing under WSB rules (without headgear) only 0.17% resulted in concussion.

If this information is correct, of concern is the methodology. Aside from possible confounds comparing two different types of competitions (different rules, refereeing, etc), the main issue is that it appears the comparison is made based on the number of rounds and not the number of fights. Since WSB boxers
fight up to 5 rounds, and AIBA fights are up to 3 rounds, there is an inherent bias when only rounds are scored. Further, since there can only be one KO per fight, and not one KO per round, the fundamental measure is the number of fights. Otherwise, when the incidence is extremely low (as it is in both cases at <0.5%), the results will be pointedly biased for WSB fighters and statistically questionable.

In fact, when calculating statistics on the number of fights rather than rounds, no significant difference is found. The Z-Test tests whether the difference between two proportions (here: the proportion of concussions for WSB fights versus AIBA fights) are meaningful; the resulting z-score is 0.85 yielding a p-value of 0.39 in a two-tailed test. This means that in the data listed, when estimating for fights, there is no statistical difference (p>0.1) between KOs in WSB and AIBA; hence there is no justification to believe that boxing without headgear (in WSB fights) is somehow safer than wearing headgear (AIBA fights).

6. Unfortunately changes in rules lead to changes in styles
   a) The addition of head guards lead to weaponization of the head where boxers developed a style of competing with head more forward and more head to head contact
   The assertion that the use of the head as a weapon is due to the wearing of headgear is very speculative. Is there data to support this? Further, in the event a boxer does come forward with their head, there are currently rules in place to penalize and disqualify the boxer. This appears to be more a question of the quality of refereeing, than the use of headgear.

   b) As you are aware, head to head contact is bad. It is being more strictly regulated in football and other sports to decrease long term brain damage
   The attention to brain injury in all sports has increased greatly in recent years. Of note, a good deal of this awareness has resulted from class-action lawsuits stemming from professional sports, such as the National Football League and the National Hockey League, and more recently from amateur sports with class-action lawsuits being launched in soccer against FIFA [6], a massive class-action lawsuit for head injuries suffered by student athletes against the National Collegiate Athletic Association (during which a judge rejected a $75 million settlement as insufficient) [7], and just in the last month a class-action lawsuit was filed against a state high-school organization by a former football player [8]. The underlying message in these lawsuits is characterized by this quote in a recent CNN article, attributed to the attorney leading the lawsuit against FIFA, Steve Berman [6]:

   "Despite simple, best-practice guidelines, which have been updated three times since the initial international conference on concussions, FIFA has failed to enact the policies and rules needed to protect soccer players ... We believe it is imperative we force these organizations to put a stop to hazardous practices that put players at unnecessary risk." 

Of concern, this quote parallels commentary from the authors of the Zurich Consensus on Concussion group with regards to AIBA’s decision to remove headgear [2]:

   “ ... it is a great pity that AIBA has not demonstrated ongoing engagement with the mainstream international sports concussion groups (eg, the CISG group) developing guidelines and recommendations for sport to protect athletes.”

   c) Head to Head contact with headgear leads to the "slosh" effect on the brain
   There is a so-called brain slosh with any impact to the head. This is of particular concern in contact sports. The use of headgear does not completely eliminate brain slosh, but it reduces the intensity of impact thereby reducing the severity of the brain slosh. In a 2012 study from Bartsch et al., they
systematically examined the effect of headgear on the impact from punches [9]. According to their results, linear impact was reduced in the headgear versus non-headgear conditions, and provided the most “meaningful reductions” in the majority of the parameters measured. Since, the majority of head-to-head contact is linear in nature, not wearing headgear will lead to a greater force of impact, hence greater brain slosh.

d) Head to Head contact without Head guards leads to the "slosh" effect plus cuts.
When boxers do not wear headgear, not only will they suffer from a greater impact during head-to-head contact, but they will also suffer a much greater risk of cuts. This observation, however, seems to support the use of headgear.

e) Currently 80% of our cuts come not from legal blows but from head to head contact. We see the cuts, we do not see the "slosh" effect on the brain???
It is not clear the inference of this statement, however it appears to suggest that a justification for the removal of headgear is to allow for cuts that may then act as a marker or signal for potential brain injury (ie: brain slosh)? If this were the case, would not some boxers being more susceptible to cuts, already controvert the viability of such a marker? But, more importantly, does this not simply suggest stricter rules for head contact are required? For example, disqualification of a boxer that initiates a head clash, or likewise stopping a bout and going to the scorecards following any head-to-head contact?

7. We need coaching and R/J changes such as being implemented in football to decrease head to head contact.
Rules that allow better protection by limiting damage caused by dangerous actions are always requisite and in need of assessment. As described in the previous point the use of headgear does not preclude stopping fights simply because there is no appearance of blood. Extra precautions should be afforded to bouts that involve a clash of heads, and pre-emptively stopping a bout with a head clash may be in the best interest to the health of the boxers, and the sport.

Of equal importance, there were rule changes that already resulted in a significant reduction in concussions. These comprised the introduction of headgears and computer scoring, described by Bianco et al [3], and discussed above in point #4. The introduction of computer scoring followed the introduction of headgear, and the rate of KO once again was reduced by a significant margin. Yet not only have recent rule changes resulted in the abolition of headgear, in spite of evidence to the contrary, computer scoring has also been replaced by pro-scoring, which promotes a more aggressive style [2].

8. Before the implementation of head guards, this cut problem did not exist in nearly the proportions we see today and the RSCH rate was 1/3 before mandatory use of head guards compared to afterwards (cf. Bianco BJSM).
In actual fact cuts were reduced by up to 90% after the introduction of headgear, according to the reference listed by Dr Butler [3]. This does not support Dr Butler’s perception of the “weaponization” of the head through the use of headgear, nor has it resulted in increased cuts during or since its removal as compared to the number of cuts before the implementation of headgear.

In point #4 above, the discrepancy between the RSCH rate before and after the introduction of headgear has been discussed. Although there was an initial upswing in RSCH rulings – perhaps due to greater vigilance in refereeing – by 2011 RSCH rulings had been reduced to half of what they were when no headgear was used [3].

* * *
It is important to recognize that in addition to the evidence that does exist, the potential damage from blows to the head extends much further than to when an athlete is knocked out. Since a concussion does not require a knockout to occur [10] there may be a vast subset of brain injury, including undocumented concussion, traumatic brain injury [11] and chronic traumatic encephalopathy [12], for which little data specific to amateur boxing exists. To identify the severity of some of these issues a systematic assessment of concussion symptomology after all bouts would be required. Without such information, headgear continues to offer the best alternative [9] to buffer against these aftereffects.
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REFERENCES:


