

The sports concussion picture: fewer ‘pixels’, more HD

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“The only ones who see the whole picture, are the ones who step out of the frame” Salman Rushdie, *The Ground Beneath Her Feet*

CURRENT CONCUSSION SCRUTINY

In contrast to the ‘whole picture’ described by Salman Rushdie, the media attention that concussion is currently receiving resembles a series of ‘pixels’. Not only journalists but coaches, athletes, parents and even medical colleagues often appear to focus on only one facet of the intricate picture that makes up the composite concussion portrait. Examples of ‘pixels’ include computerised cognitive tests, Rugby’s pitch side suspected concussion assessment (PSCA) and chronic traumatic encephalopathy (CTE). Each of these topics is often scrutinised outside of the context of many other significant aspects of the concussion picture.

CTE is one of the SEM’s ‘hot topics’ and the concussion strategies incorporated in collision sport are under increased scrutiny; in this edition of BJSM we provide updates on both.

THE CONCUSSION STATUS QUO

Few other areas of clinical sports medicine have received as much systematic attention as concussion has in the last 12 years. Independent experts have summarised the published evidence following a review of the literature and critical discussion held in Zurich in November 2012. The medical community has embraced concussion understanding and the protocols defined by the 2013 Concussion in Sport Consensus Statement.¹

The Concussion in Sport Consensus Statement is a document of significant gravitas because it captures the systematic NIH consensus format, which is inclusive of scientists and clinicians constituting more than just expert opinion. The proto-col consists of

- ▶ Predefining a group of key questions; ▶ Identifying a body of relevant literature; ▶ Two days of presentations by experts; ▶ A third day of discussion and debate in closed session by an expert panel;
- ▶ The drafting of a document circulated among the panel;

- ▶ A strategy to translate this knowledge.

This logical developmental progression means that the 2013 Concussion in Sport Consensus Document¹ should be our current reference point.

RECURRING ZURICH THEMES

Certain tenets have remained consistent and indeed strengthened through all four concussion consensus documents.¹⁻⁴

- ▶ The clinical presentation and assessment of concussions are multifaceted;
- ▶ Symptoms and signs evolve and resolve over an undetermined period of time requiring serial and repeated assessments;
- ▶ Certain cohorts, most notably children⁵ and athletes with 'modifying' characteristics,⁶ require a more conservative approach;
- ▶ No player suspected of suffering a concussion should return to play that day;
- ▶ The return-to-play decision is a clinical one best made by medical doctors familiar with consensus protocol.

These are key themes and indispensable clinical features that frame every concussion 'picture'. The consensus statements and other pragmatic guidelines,^{7,8} familiar to an expanding cohort of concussion experts, map out a structured approach based on the evidence at hand. A less comprehensive view based on only one aspect of the process may be distorting.

CHRONIC TRAUMATIC ENCEPHALOPATHY

The histological evidence for a degenerative neurological condition in certain athletes who have participated in collision sports appears convincing. The astrocytic, neuro-fibrillary and neuritic changes are defined, as well as the pattern of τ protein deposition have been described as a neuropathologically distinct tauopathy.⁹ The existence of CTE in historical and modern 'gladiators' has been well elucidated and indeed classified by Gardner et al¹⁰ in their article in this edition of BJSM.

What is tempting is to assume a reductionist approach that directly links all collisions in all contact sports with the development of long-term degenerative brain disease. While CTE may be well defined pathologically and some association with sport has been identified—it still needs a significant amount of work to understand who is at risk and why.

Moreover, and Tator expands on this well, too many questions remain before we can fill the aetiological chasm that exists between contact sports participation and CTE. These include the clarity regarding the number of blows, the effects of subclinical impact, the influence of other noxious influences on the brain, potential under-lying genetic susceptibility and specificity of such histological changes to sport.

In literally focusing the histopathologist's microscope on the CTE slide, what is magnified is only one pixel which should not distort the entire concussion picture.

What is clear is that, while more scientific and clinical facts emerge, a conservative approach to cases of concussion remains prudent.

RUGBY—LEADING ... AND LEARNING FROM OTHER CODES

Rugby Union's PSCA referred to in two of this issue's papers—is currently a 'pixel' under scrutiny. PSCA is a screening tool allowing a team and the sideline doctors 5 min to take a player off the field and make a call as to whether he/she has suffered a suspected concussion and should be removed from the game permanently. The key concepts to understanding PSCA are that it:

- ▶ Is only a triage support 'tool' and part of an expanded concussion management strategy;
- ▶ Is a multimodal support mechanism developed for doctors at the elite level of Rugby to assist with the assessment of a player who has a head injury where the diagnosis is not immediately apparent;
- ▶ Has been developed for a 'replacement' sport recognising that its introduction should not undermine the fabric of the game and it should not be open to tactical manipulation.
- ▶ Recognised that PSCA is not perfect but currently there is no perfect tool available.

Raftery¹¹ clearly explains that PSCA evolves from Zurich's guidelines and is only one aspect of Rugby's concussion 'picture' which includes a prevention strategy (law changes and enforcement, conditioning, etc), education and aware-ness campaigns for medics and laymen, an expanded concussion management proto-col and research support.

It refers directly to Zurich 2012 in being multimodal (memory recall, symptom analysis, clinical and balance evaluation) and is incomplete without the serial follow-ups (based on the SCAT3) which are specifically prescribed in every case of suspected Rugby concussion. There has been a tendency to judge Rugby's concussion stance on PSCA (and its implementation) alone. While Rugby may be leading the concept of additional sideline assessment time, it too can learn from other codes that incorporate, for instance, video surveillance.

As with other sports, it is perhaps not the protocols that are at fault, but their implementation, a theme that has previously been highlighted in concussion literature.^{12 13}

SOCIAL MEDIA MAY IMPROVE IMPLEMENTATION AND CREATE CLARITY

What is needed in all sports is to pull the pixels together into a flowing, plasma-quality picture that encapsulates the context of every concussion injury. The challenge in effective implementation is to have law makers, administrators, coaches, referees and players as well as medical staff all understanding that it is NOT acceptable to play while any of the clinic-ally determined parameters have yet to be fulfilled. How can we constructively harness the heightened mindfulness of concussion albeit as a result of sometimes pixelated and distorted media sources?

Intensified public awareness channelled appropriately especially when combined with formal injury intervention programmes such as BokSmart¹⁴ and Rugby Smart may convey the reality that the

benefits and risks of contact and collision sports are acknowledged and being constructively addressed with resultant reduced injury rates. To this end, social media may be an important ally. In their various guises, social media have been shown to be immensely powerful tools in sports and exercise medicine.^{15 16} A constructive and deliberate strategy using many social media tools at our disposal may be a poignant strategy for sporting bodies and the Concussion in Sport Group to adopt in a systematic and rewarding manner.

CONCLUSION: IMPLEMENTING EFFECTIVELY

Medical doctors with an understanding of the evolution of concussion knowledge as well as the research horizon remain in the best position not only to assess and manage the concussed athletes but also to disseminate the information required to facilitate a global implementation of consensus protocols.

Using only a single tool or drawing conclusions from seeing only one perceptible aspect of concussion management creates a distorted, 'pixelated' image. Similarly neither the clinicians nor the media should react to only one aspect of a player's presentation.

Following Zurich's guidelines, better implementation and greater, consistent dissemination should be the areas of emphasis. This will allow the concussion 'picture' to look more like that on an HD 'plasma' rather than the isolated 'pixels' that have been the focus of so much attention. As doctors, we need to lead in management and broader implementation of the best guidelines we have— Zurich 2012. Social media may be an essential ally in conveying the 'whole picture'.

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