Comparison of active cervical range of motion for elite male players within two helmeted sports utilising differing helmet systems
(American Football and Ice Hockey)

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Introduction
A reduction in cervical range of motion may have serious implications on activities of daily living, from impacting the way we move, to generating symptoms that can range from local and referred pain from facet irritation or muscle spasm to dizziness, nausea and vomiting [1]. Therefore maintaining a healthy functioning cervical spine should be an imperative.

Playing any level of sport places a person in a vulnerable position in terms of injury risk, with the likelihood increasing in proportion to the amount of high impact contact between participants. With the advent of safety equipment it would be thought that injuries would be reduced, however, anecdotal evidence suggests the contrary as athletes perceive themselves to be more protected and are thus more likely to put themselves in situations where head, face, and neck injuries can occur [2].

It has been shown that participating in Rugby Union, which does not have safety equipment, can significantly affect a player’s active cervical range of motion (ACROM) [3] even over a single game. However, whether a similar effect can be seen in high impact sports where protection is worn has yet to be determined. It was decided to compare data from Rugby Union players with that from American football and ice hockey players who wear helmets and also participate in high impact sports; albeit using different styles of helmet and degrees of neck supports.

Methods
Twelve elite professional ice hockey players (age 25.8±4.5 years; time playing at elite level 17.7±6.9 years: data presented as mean±1 standard deviation) and fifteen elite American football players (age 22±1.9 years; years playing at elite level 5 ±2.8 yrs) were selected for testing. Anthropometric data was recorded prior to subjects performing a series of warm up exercises for the cervical spine consisting of three repetitions of cervical spine movements through all ranges of ACROM. The ACROM was measured with a cervical range of motion device (CROM) using the methodology described previously [3].

Exclusion criteria included: inflammatory arthropathies, previous surgery, recent head, neck or shoulder trauma inclusive of RTA’s, WAD and recent concussion.

Group means were compared for flexion/extension. All measurements taken were compared against data for age-matched controls [4] and a sample of Rugby Union forwards [3]. Data analysis was performed using SPSS: ANOVA with post hoc tukey and student t-test analysis.
Results

<table>
<thead>
<tr>
<th></th>
<th>Flex</th>
<th>Ext</th>
<th>Tot</th>
<th>Flex:ext</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>54 ± 9</td>
<td>77 ± 3</td>
<td>131 ± 21</td>
<td>0.7 ± 0.1</td>
</tr>
<tr>
<td>American Football</td>
<td>55 ± 8</td>
<td>66 ± 7</td>
<td>121 ± 15</td>
<td>0.8 ± 0.2</td>
</tr>
<tr>
<td>Ice Hockey</td>
<td>52 ±13</td>
<td>68 ±15</td>
<td>119±21</td>
<td>0.8 ± 0.3</td>
</tr>
<tr>
<td>Rugby Forwards</td>
<td>46 ± 3</td>
<td>43 ± 9</td>
<td>89 ±12</td>
<td>1.1 ± 0.1</td>
</tr>
</tbody>
</table>

Table 1. This table details the ACROM results gathered from the two sports shown against control data and data from a previously published study of un-helmeted rugby union forwards [3]. All measurements reported as degrees and displayed as mean ± 1 Standard deviation.

There were significant differences (p<0.01) between flexion and extension in all groups except the Rugby forwards. Although there was a significant difference in flexion between Rugby forwards and American footballers (p<0.01), there was no such difference between the Rugby forwards and ice hockey players.

Conclusions
Participation in contact sports can have a somewhat deleterious effect upon ACROM. This study suggests that the wearing of protective equipment mitigates the reduction in ACROM in extension and flexion seen in Rugby union players. Whether this finding is due to the presence of protective equipment or other factors such as the unique types of play, contact or training is yet to be determined. Recognition of the mechanisms which can lead to a reduction in a players’ ACROM may help guide healthcare professionals to address the changes with appropriate rule adaptations, treatment and rehabilitation protocols.

References:

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