A comparative study of cervical spine function in elite male athletes

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Aim

Performance of sport at elite level creates enormous demands on the physiology of the participant. Unless damage obviously impacts on performance it tends to be ignored in preference to the resolution of other more obvious problems. Previously, we have shown the impact of chronically ignoring minor trauma in relation to the significant changes in the functional capacity of the cervical spine in rugby union (Lark and McCarthy; 2007, 2010). Here we extend the previous work into other elite sports in a study that initially arose from observations made when attempting to source appropriate control groups.

Methodology

•Elite male sports participants (elite being defined as fully professional highest league players currently in the first team or reserve; alternatively individual sports men who were selected to participate at international level) were measured between Spring 2012 – Autumn 2014. Sports included those involving contact and non-contact (see Table 1 for details).

•The protocol used in this study is the same as that described in Lark & McCarthy 20077 (see Figures 1 & 2).

•Exclusion criteria included current neck pain or trauma, previous surgery or serious pathology.

•A cervical range of motion device1,4,5 was used to measure ACROM. (see Figure 2).

•Ethical approval was granted by The Faculty of Health Science and Sport’s Ethics Committee, University of Glamorgan, written informed consent was obtained from all volunteers.

Figure 1 – Setup
A cervical range of motion device, with magnets placed onto a bandana. Biofeedback pressure cuff not visualised.

Figure 2 – Measurement Procedure
Following a warm up procedure, the player went from their neutral point (A) into full extension (B), neutral (C) and full flexion (D), this was measured in no set order, (to reduce potential order effects).

Figure 3 – This chart shows the average total movement in Flexion and Extension (degrees, actual value shown in each bar) with +1 standard deviation (error bars) for each of the elite sports squads (n= number measured in each squad). All other squads had significantly higher (p<0.01) total range of motion, when compared with the Rugby Union squad data. Asterisks indicate significantly lower total ROM (*=p<0.05; **=p<0.01) when compared with the swimmers.

Results

The data was analysed using SPSS (v19) and was found to be normally distributed (Shapiro-Wilkes), therefore ANOVA with post-hoc Tukey analysis were used to compare groups. Table 1

Table 1 – Anthropometric and sagittal motion data
This table shows the anthropometric measurements of all male groups. Data is presented as mean +1 SD. * indicates p<0.05 and ** p<0.01 compared to rugby union

Conclusions

These findings (Table 1 AND Figure 3) confirm that playing elite contact sports such as rugby, both union and league and ice hockey can be associated with a decrease in ACROM. Swimmers appear to generally have the greater ACROM. In the case of helmet wearing sports such as American Football and Ice Hockey, these players appear to have an altered head neutral position (Table 1, flexion:extension ratio).

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References


