Effects Of 3D Multiple Object Tracking On Head Impacts During A Collegiate Ice Hockey Season

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(No relationships reported)

Player-to-player contact is the most frequent head impact mechanism in collegiate ice hockey. Training with three-dimensional multiple object tracking (3D-MOT) could potentially reduce the quantity and severity of head impacts by enhancing player anticipation of these impacts. Purpose: The purpose of this study was to utilize 3D-MOT training as a tool to reduce the quantity and severity of head impacts in NCAA Division III men’s and women’s ice hockey players.

Methods: Collegiate men’s and women’s ice hockey players (N = 33; men = 17, women = 16) were randomly assigned to a 3D-MOT group (3D-MOT = 17) or control group (C = 16). 3D-MOT training occurred twice per week for 12 weeks throughout one regular season. Quantity, location, linear acceleration, and rotational velocity of head impacts were measured in practices and games. Independent samples t-tests compared peak linear acceleration and peak rotational velocity between groups. Pearson chi square analysis compared the quantity of impacts between groups. Independent groups ANOVAs compared peak linear acceleration and peak rotational velocity of impacts between player positions and peak linear acceleration and peak rotational velocity at five different helmet locations between groups.

Results: 3D-MOT forwards sustained head impacts with greater mean peak linear acceleration (3D-MOT = 41.33 + 28.54g; C = 38.03 + 24.30g) and mean peak rotational velocity (3D-MOT = 13.99 + 8.18 rad.sec-1; C = 12.47 + 7.69 rad.sec-1) in games, and greater mean peak rotational velocity in practices versus control forwards (3D-MOT = 11.96 + 6.77 rad.sec-1; C = 10.22 + 6.95 rad.sec-1). Conversely, 3D-MOT defensemen sustained fewer in-game head impacts (3D-MOT = 181 head impacts; C = 282 head impacts) and head impacts with a mean peak rotational velocity less than control defensemen (3D-MOT = 11.54 + 6.76 rad.sec-1; C = 13.65 + 8.43 rad.sec-1). There was no significant difference for all other parameters analyzed between 3D-MOT and control groups.

Conclusion: 3D-MOT training reduced the quantity and severity of head impacts for defensemen in games, but not for forwards. Player position may play an important role in future interventions to reduce quantity and severity of head impacts in collegiate ice hockey.

Concurrent Validity and Reliability of the XLNTbrain Balance Test with the Balance Error Scoring System

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Background: The Balance Error Scoring System (BESS) is commonly used for balance assessment, but it is not considered to be cost-effective and requires minimal equipment. The XLNTbrain Balance Test, was recently developed and uses smartphone accelerometer technology to provide clinicians with a more objective measure. The objective of this study is to describe changes in cognition and balance scores during recovery from concussion injury. The primary hypothesis is to describe changes in cognition, balance, and symptom severity over a one month timeframe following concussion injury. A secondary hypothesis is that symptom severity at time of injury will be associated with objective measures during the recovery period.

Methods: Fifty-one physically active participants (15 males, 22 females, 20.73 ± 5.96 years old) who recently sustained a concussion completed a battery of four cognitive tests, eight balance tests, and two balance tests. No significant differences between test 1 and 2. The high symptom group had large effects and subjective measures during recovery from concussion injury. The primary hypothesis is to describe changes in cognition, balance, and symptom severity over a one month timeframe following concussion injury. A secondary hypothesis is that symptom severity at time of injury will be associated with objective measures during the recovery period.

Results: A significant moderate relationship was found between the total scores of the BESS and XLNTbrain Balance Test (r=0.43, p=0.008), and between the firm tandem stance condition of the BESS and the eyes closed tandem stance condition of the XLNTbrain Balance Test (r=0.41, p=0.013). There were no statistically significant differences in scores between testing sessions for the BESS and XLNTbrain Balance Test. Reliability was established using paired-samples t-tests and Intraclass Correlation Coefficients (ICC1,1) computed for the BESS and XLNTbrain Balance Test.

Conclusions: Although the XLNTbrain Balance Test appears to demonstrate moderate concurrent validity against the BESS, it did not demonstrate improved reliability. Future research should determine if the XLNTbrain Balance Test demonstrates validity against force plates. Additionally, the sensitivity of the BESS and XLNTbrain Balance Test to the effects of concussion should be explored.