Comparison of Time and Difficulty during Football Helmet and Facemask Removal
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Context: Sports medicine professionals presented with a potentially spine-injured athlete must effectively manage the situation to avoid iatrogenic sequelae. This is complicated in football where protective equipment inhibits airway access. Current guidelines for managing such injuries recommend removing the facemask rather than the helmet. However, previously published studies have not directly compared helmet and facemask removal. Objective: To compare time, split time and difficulty of facemask (FMR) and helmet removal (HR) in two different helmet styles. A secondary objective was to compare these variables during HR with air bladders either inflated or deflated. Design: Repeated measures. Setting: Controlled laboratory. Participants: 22 certified athletic trainers (15 males, 7 females 33.9±10.5 yrs, 11.4±10.0 yrs certified, 172±9.4 cm, 76.7±14.9 kg). All participants were free from upper extremity or CNS pathology for 6 months and signed an IRB-approved consent. Interventions: Independent variables consisted of removal technique, helmet type, and bladder deflation status. After familiarization, participants conducted 2 successful trials of 6 conditions in random order. Conditions consisted of FMR and HR on two helmets: Riddell Revolution™ and Riddell VSR4™. Trials involving HR were completed with participants either deflating (D) accessible air bladders or leaving bladders inflated (I). Helmets and facemasks were removed from a live model who wore properly fitted helmets and shoulder pads. The model’s head was stabilized by the participant and an investigator. RPE (modified Borg CR-10 scale) was reported by the participant after each trial. Repeated-Measures ANOVAs with Bonferroni correction were conducted to compare time, split time and RPE for FMR and HR. Paired t-tests were used to compare collapsed FMR and HR data for each dependent variable. Alpha=P< 0.05. Main Outcome Measures: Total time and split time required for FMR and HR, and the level of difficulty. Because HR involves more steps than FMR, split times reflect time required for chinstrap and cheek-pad removal before actual HR. Results: Regardless of helmet, FMR (37.97±5.24s) was faster (p=0.001) and easier (1.93±0.85) (p<0.001) than HR (96.13±23.15s, RPE 3.71±1.18). FMR in the Revolution (33.64±7.46s) was faster (p=0.008) than VSR4 (42.3±6.96s). HR-I in the Revolution (51.98±20.43s) was faster (p<0.001) than HR-D (67.40±16.63s). Review of split times collected revealed 65.5% and 87.1% of HR time for Revolution and VSR4, respectively, was spent performing tasks required before actually removing the helmet. Inflation status did not affect time or difficulty during VSR4 HR. Conclusions: Removing a facemask provides for faster and easier airway access than removing a helmet in the Revolution® and VSR4helmets, validating current recommendations. Overall, removal was easier and faster in the Revolution® than in the VSR4, indicating that recent helmet designs improves time to airway access. Word Count: 432