Combined Tool Approach is 100% Successful for Emergency Football Face Mask Removal

Objective: To compare effectiveness of two techniques for removing face masks from used football helmets (cutting tool (FMX) – FMXtractor® or combined tool (CT) – cordless screwdriver plus FMXtractor® as needed). Null hypotheses: no differences in face mask removal success, removal time or difficulty between techniques or helmet characteristics.

Design: Retrospective, cross-sectional.

Setting: NOCSAE-certified helmet reconditioning plants.

Participants: 600 used high school helmets.

Interventions: Face mask removal attempted with two techniques.

Main Outcome Measurements: Trial success, removal time, rating of perceived exertion (RPE).

Results: The CT approach was 100% (300/300) successful; 81% of trials required use of the backup FMXtractor®. There was significantly ($P<0.001$) less call for the backup tool in helmets with all silver screws than in helmets with other screw colors (Silver=6% failure; Other=31% failure). The FMX approach was 99.04% successful. Mean removal time was 44.51±18.79s (CT: 37.84±15.37s, FMX: 51.21±19.54s; $P<0.001$). RPE was significantly different between techniques (CT: 1.83±1.20, FMX: 3.11±1.27; $P<0.001$). Removal from helmets with silver screws was faster (Silver=33.38±11.03, Other=42.18±17.64; $P<0.001$) and easier (Silver=1.42±0.89, Other=2.23±1.33; $P<0.001$).

Conclusions: The CT technique was faster and easier than the FMX technique. Most CT trials were completed with the screwdriver alone; helmets with silver screws had 94% screwdriver success. Clinically, these findings are important because this and other research has shown that compared to removal with cutting tools, screwdriver removal decreases time, difficulty and helmet movement (reducing potential for iatrogenic injury). The combined-tool approach captures benefits of the screwdriver while offering a contingency for screw removal failure. Teams should use degradation-resistant screws.

Key Words: cervical spine injury, football helmet, emergency management

Clinical Relevance: Sports medicine professionals must be prepared with appropriate tools and techniques to efficiently remove the face mask from an injured football player’s helmet.