

Is the new Quick Release Attachment System more efficient at removing face masks than the Combined Tool Approach?

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Abstract

This is a systematic review to determine which method, combined tool approach or quick release attachment system, removes a football helmet facemask quicker. Evidence indicates both methods for facemask removal can be quick and efficient. However, the quick release attachment system was quicker and produced less movement of the head compared to the combined tool approach during the facemask removal process. In emergent football cervical spine injuries, the quick release attachment system is better to use in removing the helmet facemask than the combined tool approach.

Introduction

Cervical spine injuries are very common in high collision equipment laden sports such as football, resulting in numerous sequelae ranging from neurological deficits to cessation of breathing due to phrenic nerve compromise. In cases of phrenic nerve compromise causing cessation of breathing the airway needs to be accessed as quickly as possible by removing any barriers obstructing it such as a facemask. The National Athletic Trainers Association (NATA) position statement on acute management of cervical spine-injured athletes recommends the facemask be removed when a patient is being immobilized and transported to a hospital (Swartz, Boden, Courson, Decoster, Horodyski, Norkus et al. 2009). The position statement also states, “Rescuers should be aware of, and well trained in, established face-mask removal techniques. The facemask should be removed with the tool and technique that performs the task quickly and with minimal movement and difficulty. A powered (cordless) screwdriver is generally faster, produces less head movement, and is easier to use than cutting tools; it should be the first tool used in attempting to remove a facemask attached with loop straps that are secured with screws. Because it may be impossible to remove the screws, a backup cutting tool, specifically matched to the sport equipment use, should be available” (Swartz, Boden et al. 2009, p. 309). In 2007, the helmet company Riddell created a quick release attachment system for facemasks that greatly reduced the time of facemask removal. This systematic review examined multiple studies to determine if the new quick release system is quicker than the combined tool approach mentioned in the NATA position statement.

Methodology

Keywords searched in PubMed

Protective equipment, football injuries, cervical spine, airway management, emergency management, quick release attachment system, equipment removal, spine injuries, airway access, football equipment, loop straps, facemask removal tools.

Inclusion/Exclusion Criteria

English written articles, studies regarding football helmets, the helmets and facemasks being tested had to be used by high school or college aged athletes, had to be researching the quick release attachment system or some kind of combined tool approach. Any article found researching any other kind of helmet or sport other than football were excluded, studies only researching a cutting tool or a cordless screwdriver, but not both, were eliminate. No articles were excluded based on any rating scale.

Conclusion

Studies (see Table 1 for an overview of individual studies) examined for this systematic review demonstrated both methods of facemask removal are clinical acceptable for use. Both the combined tool approach and the quick release attachment system were able to quickly remove the facemask. However, studies examining the quick release attachment system found this method was quicker and produced less movement of the head and cervical spine compared to the combined tool approach. Being able to minimize head and cervical spine movement while quickly accessing the airway is a key in the proper treatment of cervical spine injured football players. This allows the prevention of secondary injuries and potentially the reduction of morbidity associated with this type of injury. Based upon this systematic review, when deemed necessary, the quick release attachment system is more efficient at removing the facemask from a football helmet than the combined tool approach. However, not every football player helmet will be equipped with a quick release attachment system. The combined tool approach is the best method of facemask removal for this situation.

Table 1: Overview of studies included in systematic review

Researchers	Techniques being researched	Number of helmets tested	Participants	Outcome
Swartz, Belmore, Decoster, and Armstrong (2010)	Schutt and Riddell Quick Release (QR) and combined tool (CT) approach	8 Revolution IQ (QR), 6 ION 4D (QR), and 8 VSR-4 (CT)	24 certified athletic trainers	<u>Success Criteria:</u> N/A <u>Results:</u> This study compared two different QR to the CT and concluded both styles of the QR produced less movement of the cervical spine, was a quicker method, and rated easier to use by the participants
Gruppen, Smith, and Ganss (2010)	Riddell QR	69 Revolution IQ	2 senior level athletic training students	<u>Success Criteria:</u> All clips removed in under two minutes <u>Results:</u> Overall success rate was 94.8%
Scibek, Gatti, and McKenzie (2012)	Riddell QR	63	3 certified athletic trainers	<u>Success Criteria:</u> Removal of one QR clip in under 30 seconds <u>Results:</u> Overall success rate was 96.3%
Toler et al. (2010)	Riddell QR, Cordless screwdriver, Pocket mask insertion	N/A	18 certified athletic trainers and 18 athletic training students	<u>Success Criteria:</u> Trial was deemed failure if time exceeded 3 minutes, or the helmet equipment or tool failed. <u>Results:</u> The pocket facemask allowed for the quickest access to the airway. This should only be used during respiratory arrest, otherwise use the QR to remove the facemask.
Jenkins, Valovich, Arnold, and Gansneder (2002)	Trainer’s angel, Facemask extractor, Power screwdriver, and QR system	N/A	18 certified athletic trainers	<u>Success Criteria:</u> N/A <u>Results:</u> The screwdriver and the quick release system removed the facemask the quickest and produced less movement of the cervical spine. The study concluded the power screwdriver and the quick release system were more effective to remove the facemask.
Gale, Decoster, and Swartz (2008)	CT approach	76	N/A	<u>Success Criteria:</u> Removal of the facemask in under 3 minutes. <u>Results:</u> Overall success rate of 98.6%
Copeland, Decoster, Swartz, Gattie, and Gale (2007)	CT approach, cutting tool	600 total (300 for each technique)	3 certified athletic trainers	<u>Success Criteria:</u> Removal of the facemask in under 3 minutes. <u>Results:</u> The CT approach was 100% successful and the cutting tool was 99.4% successful.
Swartz, Norkus, Cappaert, and Decoster (2005)	CT approach, Trainer’s Angel and cordless screwdriver	N/A	19	<u>Success Criteria:</u> Removal of the facemask in under 4 minutes. <u>Results:</u> Overall success rate of 89.6% between the two different groups, but no individual success rate of the groups was given. Tables in the study show when the cordless screwdriver was used there was less movement of the head than when the different cutting tools were used.