

The Problems of Protecting the Neck from Combat Wounds

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Introduction

Combat neck injury continues to cause significant morbidity and mortality in the current operational environment due to its inherent anatomical vulnerability. The severity of these injuries have been reflected in changes made to the recently introduced military version of the Abbreviated Injury Score system (AIS 2005-Military) [1]. Of all of the areas of the body, neck wounds were ascribed the second highest increase in severity when compared to their civilian equivalent. However with little written in the literature about either the morbidity or mortality associated with combat neck injury it is unclear as to how these increases in severity were determined.

Incidence of combat neck injury

There has been a well-publicised increase in the incidence of battlefield head, face and neck injuries in relation to total battle injuries [2- 5]. However these figures generally reflect an increase in the numbers of facial wounds and the incidence of neck injuries in relation to total battle injuries appears to have remained relatively static. Separate incidences for combat neck injury alone have only ever been described in seven papers in the last 100 years [2, 4, 5- 9]. American forces sustained neck wounds in 3% of battle injuries in Korea [6] in comparison to an average of 5.2% of battle injuries between 2003-2008 in Iraq and Afghanistan [2, 4, 7- 9]. Data on neck injuries for UK forces in the 20th century is not known, but the incidence of neck injuries in relation to total battle injuries for UK forces between 2006- 2008 was 11% [5].

Mortality from combat neck injury

Mortality from combat neck injury has traditionally been described as being high [2, 3, 5] but finding figures in the literature to corroborate this is difficult. Ramasamy et al [10] demonstrated that neck wounds were associated with a mortality of 46% but were unable to state whether the neck wound itself was the cause of death. This concept is a limitation of all trauma registry based studies of neck injury to date [2, 4, 5, 10]. Ascertaining the mortality from a combat neck wound itself should be seen as an urgent research goal and will provide vital evidence towards proving or disproving the necessity of protecting the neck.

Approaches to protecting the neck

Neck injuries in both US and UK forces [3, 6, 10,11] are predominantly fragmentation injuries and are therefore potentially preventable. Generally, neck protection is achieved by flexible collars attached to the body armour vest (Figure 1), but the size, design and detachability of the collar varies greatly between nations (Figures 2&3).

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Figure 1: Close up of neck protectors used in UK Mark III Osprey body armour- a similar design is apparently available for Osprey Assault.

The US also use nape protectors attached to the rear of the combat helmet but their effectiveness and acceptance has never been reported. Most designs of neck collar cover Zone 1 of the neck (Figure 4) leaving the upper two zones vulnerable [11- 13]. Fox et al [11] speculated that the lower incidence of Zone I neck injuries seen in their small cohort of US servicemen with cervical vascular injury was due to the neck protection afforded by US Interceptor body armour but this has not been corroborated in any other study.



Figure 2: A UK serviceman wearing Osprey Assault body armour without the detachable neck protector demonstrating the large surface area of unprotected neck.

The situation is further compounded by the acceptance of wearing neck protection by different nations. The Dutch and Norwegian systems use smaller non- detachable neck collars than the US and UK systems which are larger and detachable. It is generally accepted that issued neck protectors are rarely worn by UK servicemen. Reasons cited for not wearing neck protectors included a dislike of the design as well as a belief that survival on the modern battlefield is enhanced by increased manoeuvrability and heat dissipation and not just increased anatomical coverage. US

servicemen on the other hand almost ubiquitously wear their neck collars and this difference, in combination with the greater neck coverage seen in all three of the types of US body armour in current service (Figure 3), is likely to account for the lower incidence of neck wounds seen in US compared to UK servicemen.



Figure 3: The US Modified Tactical Vest (MTV) with integral neck protection—the neck protector is almost identical to that used in Interceptor body armour and the Improved Outer Tactical Vest (MTV)

Surface Wound Mapping of penetrating neck injury

Surface Wound Mapping (SWM) of penetrating wounds has been attempted intermittently in the past [12, 13] but is currently seeing a resurgence in the US military where mapping is becoming linked to injury description in their Joint Theatre Trauma Registry (JTTR) [1]. A pilot SWM study concentrating on the face and neck (Figure 5) has just been authorised for use in the UK JTTR and this may in turn lead to whole body mapping for UK forces too. This pilot face and neck SWM study will hopefully demonstrate the incidence of penetrating injuries to different areas of the neck thereby allowing tailoring of future neck protector design. This research needs to be linked with work to determine the mortality from a neck wound itself as well as comparing how the varying neck protector designs adopted by different nations translate into changes in incidence and mortality. Only then will we have evidence to support whether fundamental design changes are required in the way that current UK body armour systems protect the neck. It may also allow comparisons of neck injury patterns and survivability between body armour systems of different nations, as suggested by the differences between US and UK data.

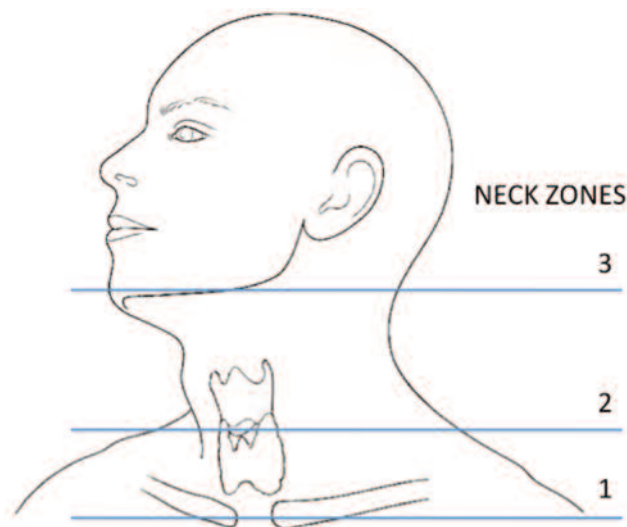


Figure 4: Zones of neck injury

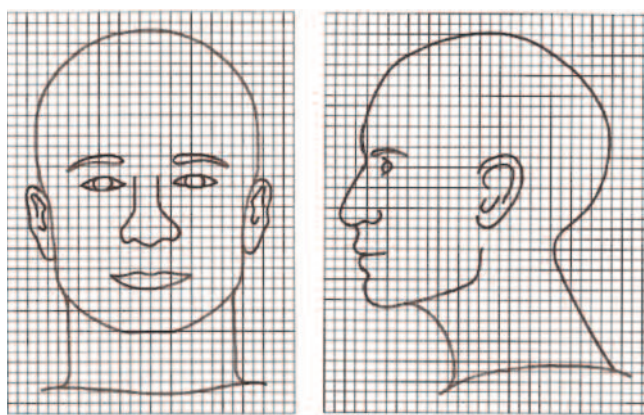


Figure 5: Surface Wound Mapping (SWM) of face and neck injury

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