

The effect of intended primary contact location on tackler head impact risk

Gregory J. Tierney, Ciaran K. Simms

I. INTRODUCTION

Tackling is a dynamic and integral part of rugby union. Unfortunately, it is also the main cause of head impacts and concussion [1-2]. One study [1] categorised legal tackles as either upper body or lower body tackles. An upper body tackle was defined by the tackler's intended primary contact location being above the ball carrier's hip and below the neck [1]. A lower body tackle was defined as the tackler's intended primary contact location being at or below the ball carrier's hip. The study also found that tacklers were at most risk of receiving a direct head impact, and that upper body tackles were the main cause of this. These upper and lower body tackle definitions are broad and cover a wide range of body regions (see Fig. 1 and Fig. 2). The aim of this study, therefore, is to identify more specific intended primary contact locations on the ball carrier for a number of upper and lower body tackles that led to a tackler receiving a direct head impact.

II. METHODS

A head impact was defined for this study as one for which the player received an impact to the head and then received on-field medical treatment to the head and/or was required to undergo a Head Injury Assessment (HIA) during the game. All Pro 12 and ERC Champions Cup games from the 2014/15 and 2015/16 season of a professional rugby club team were reviewed for head impacts. In addition, video data were collected by retrospectively reviewing international test rugby union matches from the RBS 6 Nations 2014–2016, Guinness Autumn Test Series 2013–2015, Rugby World Cup warm-up games 2015 (Home nation games only) and the Rugby World Cup 2015 (all games). Based on these two approaches, a total of 54 head impact cases were identified: 15 upper body and 13 lower body front-on tackles; and 17 upper body and 11 lower body side-on tackles. The video data were obtained from freely available online resources. Although a HIA can occur from an impact to the body [3], a direct head impact was identified in every video. Each tackle was then categorised based on the tackler's intended primary contact location on the ball carrier (see Fig. 1 and Fig. 2).

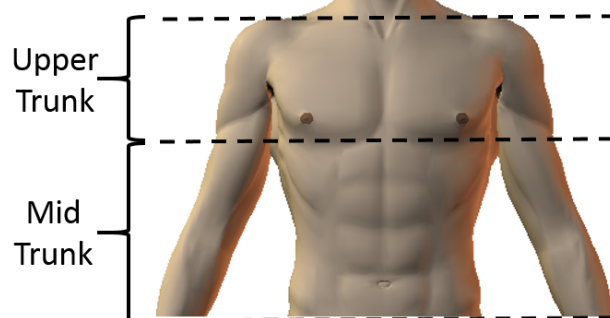


Fig. 1. The ball carrier's upper body, split into the upper trunk and mid-trunk regions.

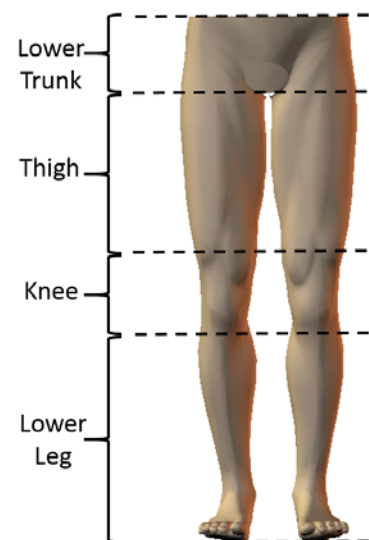


Fig. 2. The ball carrier's lower body, split into the lower trunk, thigh, knee and lower leg regions.

III. INITIAL FINDINGS

It can be seen in Fig. 3, below, that the upper trunk was the tackler's main intended primary contact location on the ball carrier for all tackles that resulted in a head impact, as well as both front-on and side-on upper body tackles (Fig. 4). The same trend can be seen, though less so, for the thigh during lower body tackles (Fig. 4).

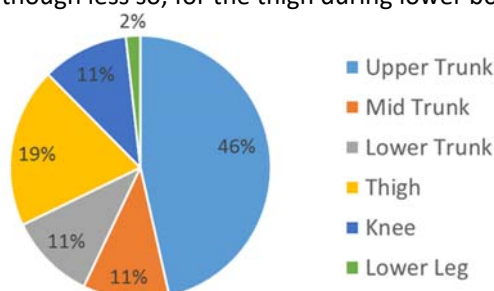


Fig. 3. Intended primary contact location on the ball carrier for all head impact tackles.

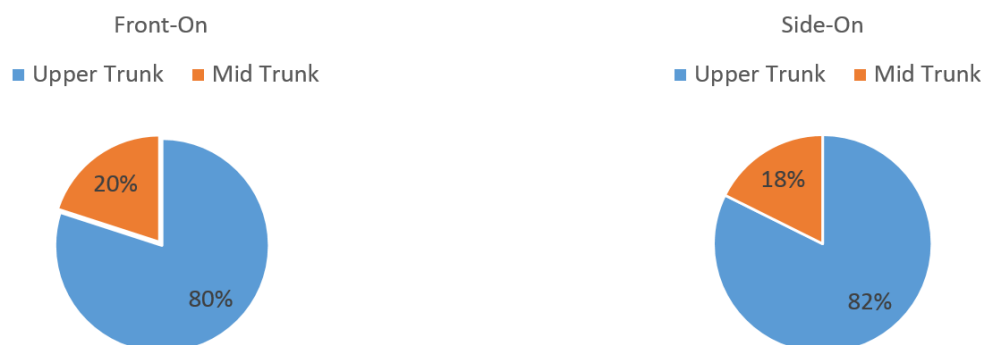


Fig. 4. Intended primary contact location on the ball carrier for upper body front-on and side-on head impact tackles.

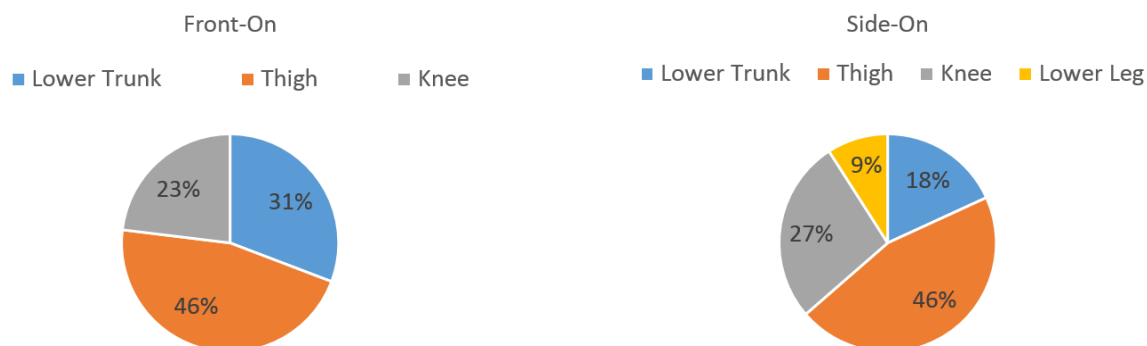


Fig. 5. Intended primary contact location on the ball carrier for lower body front-on and side-on head impact tackles.

IV. DISCUSSION

The tackle height law in rugby union has been an area of controversy for many years [4], and the results of this study show that tackling the upper trunk of the ball carrier is the main cause of direct head impacts for the tackler. These findings suggest that lowering the tackle height law from the line of the shoulder to below the upper trunk/pectoralis (Fig. 1) could reduce the incidence of head impacts in the game. For lower body tackles, the results have a greater spread amongst intended primary contact locations. Further work should gather exposure data to allow the relative risk to be assessed for intended primary contact location. A reliability study of the analysis would also be of benefit.

References

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- [2] Fuller, C. W., et al., *Br J Sports Med*, 2015.
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- [4] Scher, A., *Drug Res*, 1978.