

Paralysis due to the high tackle — a black spot in South African rugby

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Summary

The high tackle around the neck is illegal but still commonplace in South African rugby. An analysis of 40 rugby players who sustained spinal cord injury during the period 1985 - 1989 revealed that 8 were injured by a high tackle. The case histories and radiographs of these 8 players were analysed. The majority sustained flexion-rotation injuries after being tackled from the side. Another mechanism of injury was hyper-extension during a tackle from the rear. Disturbingly, 4 of the 8 players sustained complete permanent paralysis. This was consequent upon the orthopaedic injuries sustained — specifically facet dislocations or 'tear-drop' fractures, both injuries carrying with them a high risk of serious spinal cord injury. It is concluded that foul play in the form of the high tackle is still a major cause of serious spinal cord injury in South African rugby.

S Afr Med J 1991; 79: 614-615.

Law 26 of the game of rugby football, as framed by the International Rugby Board,¹ states under the heading 'Misconduct, dangerous play' that it is illegal for any player to tackle early or late or dangerously, including the action known as a 'stiff-arm tackle'. Contraventions of this law are taken very seriously by referees and this has contributed towards a decrease in the incidence of serious cervical spinal cord injuries over the last few years. Silver and Gill² reporting on rugby spinal cord injuries sustained during the 5-year period 1982 - 1987 in the UK, record only 1 instance of a high tackle in 19 players. In contrast, a 5-year analysis of rugby spinal cord injuries in the Cape Province of South Africa during the period 1985 - 1989,³ has shown that 8 of the 40 players injured (20%) were hurt by a high tackle.

The only previous detailed analysis of injuries caused by a high tackle was made in 1978⁴ and a repeat analysis of the 8 players in this series has been made in order to re-evaluate the circumstances and mechanisms of these serious injuries.

Patients and methods

The case histories and radiographs of 8 rugby players admitted to Conradie Hospital's Spinal Cord Injury Centre during the period 1985 - 1989 were analysed. (Since this is the only spinal cord injury centre in the Cape Province, any patient sustaining spinal cord injury anywhere in the province is referred to this unit.) Specific attention was paid to the circumstances of injury, orthopaedic injuries as reflected on radiography and neurological deficit present on clinical examination.

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Accepted 22 Aug 1990.

Results

As shown in Table I, only the lower cervical spine was involved, with levels of injury varying from C4 to C6/C7. The majority of injuries were facet dislocations, either unilateral or bilateral. Two flexion 'tear-drop' compression fractures of the vertebral body were also present. One player showed no radiological evidence of any injury.

Discussion

The mechanisms of injury in a high tackle have previously been described.⁴ The rugby player making a high tackle usually wraps one arm around his opponent's neck from the side, applying a rotational and flexion force to the cervical spine (Fig. 1). This was the mechanism of injury in 7 of the 8 players in this series. Rotation of the flexed spine causes tearing of the ligamentous structures rendering the cervical spine unstable and dislocation then occurs. Should an axial force be applied in combination with flexion, this may result in a flexion 'tear-drop' fracture of the vertebral body, as occurred in 2 players in this series. If the tackle is made from behind, the neck is forced into a rotated and hyper-extended position. This was the mechanism of injury in 1 player in this series. Both the head and neck are hyper-extended, the articular masses and spinous processes posteriorly are forced together and, acting as a fulcrum, cause rupture of the anterior longitudinal ligament and intervertebral disc or discs. The cervical spine above the ruptured disc continues to move posteriorly carrying the spinal cord with it. The cord is then pinched between the postero-inferior edge of the superiorly located vertebral body and the intact lamina of the vertebra below. Owing to the inherent elasticity of the soft tissues of the neck, spontaneous reduction of the dislocation takes place.⁵

Four of the players in this series (50%) sustained complete permanent paralysis after a high tackle. Analysis of the type of orthopaedic injury sustained in a high tackle explains this high incidence of complete paralysis.

The most common injuries sustained were facet dislocations (Table I), either bilateral or unilateral. The forward displacement of the superior vertebral body at the level of injury causes severe spinal cord compression and injury. The second commonest orthopaedic injury noted was the flexion 'tear-drop' fracture. This fracture derives its name from the characteristic triangle-shaped fragment that fractures from the antero-inferior corner of the vertebral body, said to resemble a drop of water dripping from the vertebral body. The posterior fragment of the divided body is displaced backwards into the spinal canal. These fractures, resulting from a combination of forceful flexion and axial compression of the cervical spine, are usually associated with very serious neurological damage.

The cervical muscles are of considerable importance in protecting the cervical spine against injury. Voluntary tensing of these muscles at the moment of impact would significantly decrease the trauma sustained. Unfortunately, it is rare for the tackled rugby player, who is usually unaware of the approach of his opponent, to have sufficient time to take preventive action. His vulnerability is further increased as he is caught off

TABLE I. CLINICAL FINDINGS

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
Age (yrs)	34	21	39	24	15	26	26	31
Level Injury	C6/C7 UFD	C5/C6 UFD	C5/C6 UFD	C6 TDF	C5 TDF	C5/C6 UFD	C4/C5 BFD	No orthopaedic injury on radiograph
Neurological deficit	C6(C)	C5(I)	C5(I)	C6(I)	C5(I)	C6(C)	C4(C)	C6(C)

UFD = unilateral facet dislocation, TDF = 'tear-drop' fracture; BFD = bilateral facet dislocation; (C) = complete paralysis; (I) incomplete paralysis.



Fig. 1. Typical high tackle around the neck made from the side.

vised matches with minimal adherence to the laws of the game.

Conclusion

That 8 players sustained spinal cord injury from high tackles over a 5-year period is unacceptable. This incidence of injury is far in excess of that recorded in other rugby-playing countries. The seriousness of the situation is compounded by the high number of injured players who have sustained permanent complete paralysis after a high tackle.

Tackling is an integral part of rugby, and drastic changes in the rules in an endeavour to remove all physical danger are impractical, but certain points obviously need to be emphasised. The technique of safe tackling must be stressed, particularly at junior level.

A high tackle is still common practice and, although this is sometimes accidental because of a miscalculation during a fast movement, it is often deliberate.

Rigorous enforcement of the appropriate rules are necessary in order to decrease the number of these tragic and avoidable injuries.

balance with one or both feet off the ground while attempting a kick or running at speed.

Kew *et al.*,⁶ in an analysis of 76 rugby players with cervical spinal cord injury, identified the centre and fly-half positions as carrying the second and third highest risk of injury, respectively. This is because players playing in these positions are frequently exposed to tackles.

Another point of note is that 6 of the 8 players were injured in games played in remote towns where it appeared that players are largely ignorant of the laws of rugby and suitably qualified referees are not available, resulting in poorly super-

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