Clinical Topics

Serious head injury in sport

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Summary and conclusions

Of 1900 head injuries serious enough to be admitted to the neurosurgical unit in Glasgow over a five year period, 52 (2·7%) were due to "sport." Golf, horse-riding, and Association football were the sports most commonly linked with serious head injury. Golfing injuries were all compound depressed fractures, and all these patients made a good recovery; horse-riding produced more severe injuries, three of the eight patients being left with residual disability. Much attention has been directed to preventing repeated minor head injury in boxing, but this study emphasises the need for preventing both the primary head injury and secondary complications associated with other sports.

Introduction

Most sport injuries are musculoskeletal and closely related to the particular sporting activity. By contrast, head injury occurs in many sports, but in most instances it is accidental and unrelated to specific activities. It is also different in that it may be life-threatening, usually owing to secondary complications rather than the severity of the initial impact. Much of the associated mortality and morbidity due to these complications is preventable, provided appropriate action is taken promptly. To learn more about primary prevention (of the head injury), and about minimising the effects of injuries once they have occurred, we have reviewed sporting injuries serious enough to have reached a regional neurosurgical unit.

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Methods

The Institute of Neurological Sciences in Glasgow is responsible for the neurosurgical care of 2·7 million people. Patients with head injuries are secondarily referred from other hospitals irrespective of distance if there is suspicion of an intracranial haematoma or compound depressed fracture. We have reviewed retrospectively patients with "sports" head injuries admitted to this institute over five years (January 1974 to December 1978). Sports injuries were defined as those sustained during athletic or competitive recreational activities or both; children injured at play were not included. Patients' levels of responsiveness were assessed using the Glasgow coma scale.[1] Coma was defined as the inability to obey commands, utter recognisable words, or open the eyes. Outcome was assessed at six months according to a five-point scale previously described.[2] Patients who had fully recovered by the time of hospital discharge were not followed up further. We also had access to figures from the Scottish Head Injury Management Study (SHIMS), which gave details of head injury admissions to accident and emergency departments, primary surgical wards, and neurosurgical units throughout the country.[3 4]

Results

In Scotland in 1974 of 84 000 patients with a head injury attending accident and emergency departments 9240 injuries (11%) were due to "sports," according to the Scottish Head Injury Management study.[4] Of these sports head injuries, which included all leisure activities, only one-quarter were admitted to hospital, to a primary surgical ward. Of 424 patients with head injuries admitted to the neurosurgical unit in the same year, 7% were due to sport by this wider definition (only 0·3% of patients who had attended accident and emergency departments with head injuries).

Of head injury admissions to the institute between 1974 and 1978 only 52 (2·7%) were due to sport by the narrower definition of sports injuries used in this paper.

The sports most frequently causing injury were golf, horse-riding, and football (table I); there were only two boxing injuries. Three-quarters (39) of all the patients were male, although seven of the eight horse-riding victims were female. The mean age of those injured in each sport represented the average age of the participants, except for

TABLE I—*Details of head injuries sustained in individual sports. (Percentages of type of injury for each sport in parentheses)*

Sport	No of cases	% of series	Linear fracture	Depressed fracture	Intracranial haematoma	Intracranial contusion*	Diffuse injury
Golf	14	27	0	13 (93)	1 (7)	2 (14)	0
Horse-riding	8	15	2 (25)	2 (25)	3 (38)	1 (12·5)	4 (50)
Football	7	13	0	4 (57)	1 (14)	0	2 (29)
Shooting	5	10	4 (80)	0	1 (20)	1 (20)	0
Climbing	4	8	2 (50)	1 (25)	1 (25)	0	2 (50)
Rugby	3	6	0	0	0	0	3 (100)
Boxing	2	4	0	0	0	0	2 (100)
Skating	2	4	1 (50)	0	0	0	1 (50)
Others	7	13	3 (43)	1 (14)	2 (29)	0	3 (43)
Total	52	100	12 (23%)	21 (40%)	9 (17%)	4 (8%)	17 (33%)

*Computed tomography.
Others = One each in swimming, karate, hang-gliding, squash, hockey, cricket, and athletics.

golf. All golf injuries were under 16 years (mean 10 years), 13 of the 14 injuries being caused by a club, the other by a ball.

Over 90% of golfing injuries were depressed fractures, all but one in the frontal region. Intracranial haematoma occurred in nine patients. This complication may threaten life and may also lead to permanent disability in patients whose initial injury was not severe.

There was only one death, in a climber who fell. Over 80% of patients made a good recovery, but 12% were disabled (table II); three of the six disabled patients had been injured while horse-riding. The severity of injury from this cause was evident soon after injury, 75% being in coma on admission, compared with only 7% of the other injuries.

Post-traumatic epilepsy developed in 12 (23%) patients, 10 within seven days of injury. This complication was not related to any particular sport.

Discussion

The number of patients sustaining head injuries from different sports will vary with the locality, depending on the risk factor of that particular sport and on the number of participants. The popularity of golf in Scotland is reflected in the number of golf injuries, which may well be less frequent elsewhere. Figures for climbing are falsely low, since death often occurs before transfer is possible. In 1979 there were 11 deaths due to climbing accidents in the west of Scotland; at least six of these were due to head injury,[5] making climbing by far the commonest sport causing fatal head injury in this region. There is no motor racing circuit in this area, precluding this as a cause.

The frequency of horse-riding as a cause of head injury has been noted in other regions. In an unpublished series from Cambridge, Gleave noted that 32% of 600 sports injuries admitted to the neurosurgical unit were due to horse-riding, while in Oxford horse-riding accounted for 154 admissions to a general hospital over a two-year period. Two-thirds of these sustained head injuries, of which 18% had post-traumatic amnesia of more than one hour and 14% had a skull fracture.[6]

TABLE II—*Outcome after injury. (Percentages for each sport in parentheses)*

Sport	No of cases	Good	Moderately disabled	Severely disabled	Dead
Golf	14	14 (100)	—	—	—
Horse-riding	8	5 (63)	2 (25)	1 (13)	—
Football	7	6 (86)	1 (14)	—	—
Shooting	5	5 (100)	—	—	—
Climbing	4	3 (75)	—	—	1 (25)
Rugby	3	2 (67)	1 (32)	—	—
Boxing	2	2 (100)	—	—	—
Skating	2	2 (100)	—	—	—
Others	7	6 (86)	—	1 (14)	—
Total	52	45 (86)	4 (8%)	2 (4%)	1 (2%)

PREVENTION OF HEAD INJURY

In non-combative sports most head injuries are accidental. In some sports, such as horse-riding and climbing, head injury must be anticipated and protective head gear should be worn. The age range of golf-club injuries suggests that youngsters should be forewarned of the need to stand well clear when others are wielding golf clubs.

In boxing the introduction of sprung flooring reduced the severity of head injuries.[7] Similarly, padded flooring minimises serious head injury in karate,[8] but as this sport is not under statutory control many fights still take place on concrete floors.

PREVENTION OF SECONDARY BRAIN DAMAGE

Secondary brain damage may arise from intracranial haematoma or infection, even after injuries that initially appear to have been only mild. In most serious injuries associated with coma there are risks from airway obstruction, especially during ambulance journeys. Prevention of secondary brain damage depends on recognising the risks after certain types of injury and ensuring that medical aid is sought. Few sporting events will be covered by a doctor, and the trainer must know what to do.

Post-traumatic amnesia and depression of conscious level indicate brain injury. Careful questioning may be required to detect the presence of amnesia or slight degrees of disorientation. Players who have been unconscious, or who have more than a few minutes' post-traumatic amnesia, should have a skull radiograph. Although few will be found to have a skull fracture, this finding indicates a greatly increased risk that a haematoma will develop—albeit a rare complication. For this reason anyone with a fracture, no matter how well they seem to be, should be admitted to hospital for at least 24 hours' observation; even if there is no fracture, the presence of severe headache, confusion, or a focal neurological sign, in particular pupillary abnormality, indicates the need for admission. A postal inquiry in the north of England showed that only a small percentage of rugby players with post-traumatic amnesia are admitted to hospital; of 303 players with head injuries, 58 had post-traumatic amnesia for more than one hour and 232 for more than five minutes. Only 38 of these had been admitted.[9]

The possibility of a depressed fracture underlying scalp lacerations must also be considered; if treated as a simple cut there is a risk of meningitis or intracranial abscess, as reported previously from the west of Scotland[10]; in that study sports injuries accounted for 9% of 400 depressed fractures admitted over a 10-year period.

PREVENTION OF CUMULATIVE DAMAGE

Injuries producing even a few minutes' post-traumatic amnesia may cause some microscopic structural brain damage[11] and impaired psychological function for two to three weeks.[12] The effects of repeated minor injury are cumulative[13]; the occurrence of permanent damage (traumatic encephalopathy) in boxing[14] and in jockeys[15] has led to the introduction of statutory medical cover in these sports.

More recently, it has been suggested that a similar encephalopathy may occur in other sports, including Association football, rugby football, and wrestling.[16] Boxers must wait four weeks after loss of consciousness before fighting again to allow recovery from the injury. Similar rules should probably be applied to all sports, although a short period of post-traumatic amnesia (as distinct from loss of consciousness) should not necessarily prevent a player from returning to a non-combative sport. If the postconcussional syndrome is present—namely persistent headaches, postural dizziness, irritability, and a failure of concentration—the player should not return to the sport until all symptoms have resolved. It is understandable that both trainers and players may be reluctant to follow such policies, but if further damage should occur before recovery is complete then cumulative effects may be more serious. Thorndike[17] suggested that any player who has sustained three or more injuries with loss of consciousness or post-traumatic amnesia

should be banned from further contact sports. Murphey and Simmons[18] advised that if head injury was severe enough to produce coma, or if a player has had a craniotomy, then further contact sports should be discouraged.

Inevitably, boxing causes repeated minor head injury, and in this sport much attention has been directed towards minimising the effects. Availability of computed tomography may indicate the extent of damage produced by such injuries.[19] Statutory medical cover and stringent rules regarding further fights after injury have done much to reduce the number of serious head injuries,[7] but the number of participants has also declined. The present study has shown that other sports, in particular horse-riding, are now a more frequent cause of severe head injury. More emphasis should be placed on prevention in these sports. The governing bodies of the individual sports should draw up rules to ensure that sports trainers and supervisors are aware of the correct management of head injuries.

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USSR Letter

Questions of sickness certification

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By virtue of its impact on the workforce, a health service with universal coverage of the population can be viewed as one means of enhancing economic development. For any type of government it may offer the attractive prospect of helping to reduce the number of working days lost owing to accidents and illness among the labour force. In practice, however, democratic governments and totalitarian regimes differ substantially in the extent to which they can oblige health care personnel to put the behests of the state above the health of their patients.

In most pluralist democracies the doctors who practise under a national health service will be required to issue certificates which validate absence from work and enable insured persons to draw sickness benefit, but, generally speaking, their "policing" function is at a minimal level thanks to their retention of an independent power-base. In the USSR, since doctors cannot exercise influence as a pressure group, they have no choice but to accept the role assigned to them in the enforcement of labour discipline. In what follows I draw on a recent article to describe the Soviet regulations governing sickness certification and certain changes that are considered necessary in them.[1]

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Short-term sickness

The front-line doctors in a policlinic or similar unit are limited to issuing initial "certificates of lack of fitness for work" for up to only three days or for five in cases of influenza during an epidemic. They are permitted to extend the duration of sick leave on their own initiative by up to a further three days, or one for influenza. Any absence from work for longer than six days must be validated by superiors in the medical hierarchy. This is done either by a departmental head or by a small committee of the policlinic's staff convened as necessary by the deputy chief doctor, a specialist in what the Russians revealingly term "expertise in fitness for work."

Although the official reasoning behind the adoption of three- and six-day limits is not clearly stated in the article, two considerations appear to have been especially influential. The first is the desirability of a second consultation to confirm or correct the initial diagnosis and the treatment based on it. In this context the authors of the article report a most striking result from their