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# Ocular sports injuries: the current picture

A Barr, P S Baines, P Desai, C J MacEwen

## Abstract

**Objectives**—To determine the recent incidence of eye injury due to sport in Scotland, identify any trend, and establish which sports are responsible for most injury? The type of injury and final visual outcome is also evaluated.

**Methods**—A prospective observational study of ocular injuries sustained during sport was performed over a one year period. Only patients requiring hospital admission were included. Data were collected on a standardised proforma and entered into a central database. Patients were followed up for at least three months.

**Results**—Of 416 patients admitted because of ocular injury, 52 (12.5%) resulted from playing a sport. Although all racquet sports together accounted for 47.5% of these injuries, football was the single most common sport associated with ocular trauma, being responsible for 32.5% of cases. The most common clinical finding was macroscopic hyphaema occurring in 87.5% of patients. Overall the final visual acuity was 6/6 in 92.5% of patients.

**Conclusions**—The incidence of eye injury due to sport at 12.5% is lower than previously reported, suggesting a change in the pattern of ocular trauma. Football is the single most common cause of ocular injury from sport in Scotland, but the wearing of protective headgear would be difficult to instigate. The incidence of hyphaema in sport related ocular trauma (87.5%) is almost double that of all ocular injury (47.8%), so the potential for serious visual loss as the result of a sports injury should not be underrated. Ophthalmologists have a role in protecting this young population at risk by actively encouraging the design and use of protective eyewear.

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Keywords: eye injury; ocular trauma; hyphaema; protective eyewear

The incidence of eye injuries due to sporting activities has shown a steady increase in recent times. In 1923 Garrow found that sport accounted for only 0.7% of eye injuries admitted to Glasgow Royal Infirmary.<sup>1</sup> By the 1970s a figure of 4.1% was reported from Belfast.<sup>2</sup> In 1988 a study from Manchester Royal Eye Hospital reported sports injuries to account for 25.1% of all admissions due to trauma.<sup>3</sup> A study from Glasgow in 1989 reported 42.2% of ocular injuries requiring admission to hospital to be sports related.<sup>4</sup> This paper examines the latest incidence of sports injuries in Scotland.

## Methods

This study formed part of a larger prospective observational study of all patients admitted to hospital with ocular trauma in Scotland over a one year period, the full methods and results of which have been published elsewhere.<sup>5,6</sup> The entire population of Scotland constituted the study population, and for the purposes of this study all injuries that occurred during a sporting activity were included in the analysis. All data were collected on standardised proforma by the admitting consultant and entered into a dedicated database in the audit unit at the Royal College of Ophthalmologists. The completeness of reporting and validity of the data were assessed by comparison with routinely collected Standard Morbidity Record 1 (SMR1) data from the Department of Health in Scotland and discussed in detail in previously published work.<sup>5,6</sup> Patient characteristics and the cause, type, and place of injury were recorded. Duration of hospital stay was recorded, and the final visual acuity in the injured eye was documented. All patients were followed up until discharged or for a minimum of three months.

## Results

During the one year study period, 52 patients were admitted to hospital with ocular trauma secondary to sport. This represented 12.5% of all cases of ocular trauma requiring inpatient care. Twelve patients were excluded from the study because of lack of data, leaving 40 cases for further analysis.

Analysis by sport showed football injuries to be the most common, sustained by 32.5% of patients requiring admission, closely followed by squash (30%). Racquet sports combined (squash, tennis, and badminton) accounted for 19 injuries (47.5%) (table 1). All injuries sustained involved only one eye. There were 31 males (77.5%) and nine females (22.5%). The mean age of the patients was 24 years (range 10-45). Sport was the most common cause of eye injury in the 5-14 year age group.<sup>6</sup>

Within the racquet sports, contact with the racquet was the most common cause of injury affecting 17 patients (42.5%). Injuries inflicted by the projectile of the sport (ball or shuttlecock) made up a further seven cases (17.5%),

Table 1 Numbers injured in various sports

Sport	No of patients	%
Football	13	32.5
Squash	12	30
Hockey	4	10
Tennis	4	10
Badminton	3	7.5
Fishing	3	7.5
Shinty	1	2.5
Total	40	100

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Table 2 Types of injury sustained

Injury	No	%
Hyphaema	35	87.5
Comotio retinae	2	5
Corneal penetration	1	2.5
Retinal detachment	1	2.5
Corneal penetration with intraocular foreign body	1	2.5

Table 3 Final visual acuities (VA) at follow up

Final VA	No of patients	%
6/6	37	92.5
6/9	2	5
6/12	1	2.5

and blows from the opponent's body caused five (12.5%). In the remaining 11 (27.5%), the cause was not known.

Macroscopic hyphaema was the most common reason for admission and was present in 35 patients (87.5%) (table 2). Of these patients with hyphaema, six had additional posterior segment damage, three developed secondary glaucoma, and one had a brow laceration.

There were two penetrating injuries: one caused by a fishhook, which had also resulted in an intraocular foreign body, and the other caused by a hockey stick. The detached retina was a football injury.

All but one patient achieved a final visual acuity of 6/9 or better. Overall the visual acuity in 37 patients (92.5%) was 6/6 (table 3). The 6/12 outcome was a football injury resulting in retinal detachment. The 6/9 results were after a penetrating injury from a fishhook and a hockey injury resulting in hyphaema with secondary glaucoma.

### Discussion

This study has provided data on the pattern of ocular injuries due to sport and suggests that this has changed. Eye injuries from sport are less common than other types of ocular trauma. Sports accounted for 12.5% of eye injuries admitted to hospital in this study, and this is lower than reported in recent previous studies.<sup>3,4</sup> In recent years there appears to have been a significant shift away from sport and road traffic accidents as causes of ocular injuries, in favour of home and the workplace.<sup>5,6</sup> This change may not, however, reflect a true reduction in incidence but rather changes in medical practice, with a trend in favour of outpatient management and higher thresholds for admission to hospital. It may be expected that this change would be evident in poorer outcomes of those admitted, although this does not appear to be the case. The cases included in this study were those deemed by a consultant ophthalmologist to require admission to hospital. The use of hospital admission as an indicator of severity of injury was appropriate at the time the study was performed in 1991, as it reflected ophthalmological practice at that time. However, criteria for admission have changed with major changes in the management of ocular trauma over the past decade.

A declining incidence of ocular sports injuries may be explained by the changing age structure of Scotland's population, with declining numbers in the young adult age group most at risk. Census data from the General Register Office for Scotland shows a 13% decline in the 15–29 year age group in the past decade. Changes in the number of people participating in sporting activities would also be important to consider, although much of this activity takes place outwith the auspices of sports facilities or organisations and is therefore difficult to quantify. There has been no evidence in the United Kingdom to suggest that increased use of protective eyewear for sport has been responsible for this reduction in ocular injuries. A study from Canada has shown a significant reduction in reported eye injuries after the mandatory introduction of protective face-masks for school and college hockey players.<sup>7</sup> Face and eye protection has been shown to be of value in hockey and squash.<sup>8</sup>

Football was the most common cause of eye injuries in this study, and, although attention has previously tended to focus on racquet sports injuries, several studies have recognised the importance of football related ocular trauma.<sup>9,10</sup> In Scotland this is probably related to the considerable popularity of the sport, with large numbers participating.

Football was found to be responsible for 50% of patients with sports injuries attending a Glasgow accident and emergency department<sup>11</sup> and 44.7% of eye injuries seen at a Glasgow eye casualty unit.<sup>10</sup> Football related eye injuries have been reported to be increasing in the United States since the 1970s, and this can be attributed to the rising popularity of the sport (soccer).<sup>9</sup> Protection against football related eye injuries is especially difficult because the head is intentionally used to strike the ball and protective head gear would be cumbersome; furthermore its use is against the current rules of the game as it may lead to injury to opponents.

The outcomes from sports related ocular injuries in this study were reassuringly good and to some extent this explains the 23% loss of patients to long term follow up. It is recognised, however, that late complications secondary to ocular trauma can occur (traumatic cataract, secondary glaucoma, and retinal detachment) and possibly outwith the follow up period. This study emphasises that most ocular sports injuries are contusional in nature rather than perforating. Although the visual outcomes of injuries reported in this study are good, traumatic hyphaema, with its associated complications, is well recognised to be a serious and often vision threatening sequelae of blunt trauma. Blunt impact on the eye distorts the globe, causing a rapid rise in intraocular pressure, equatorial stretching, and posterior displacement of the iris-lens diaphragm. This results in tearing of structures near the angle and anterior chamber bleeding.<sup>12</sup> Bleeding may also occur from direct rupture of iris vessels. Hyphaema can occur in isolation but is often associated with signs of contusion at other sites within the eye (corneal abrasion,

pupillary sphincter rupture, iridodialysis, traumatic cataract, or glaucoma secondary to angle recession). Traumatic hyphaema may initially mask signs of significant posterior segment trauma of the eye (retinal commotio, tears, dialysis, and detachment). The high incidence of hyphaema (87.5%) reflects the predominantly blunt nature of sports trauma, although penetrating injuries do occur (two cases in this study). The hyphaema incidence for all types of injury in the Scottish ocular trauma study was significantly lower at 47.8% ( $p < 0.01$ ).

Eye injury suffered while playing sport affects, predominantly, young men, and, although most injuries are minor and achieve good visual recovery, the potential for severe visual loss is always present. Most sports associated eye injuries are preventable,<sup>8</sup> and participants should be aware of the potential for ocular injuries in the sports they play and the protective measures that are available. In particular, a British Standard for eye protection in squash has recently been set, and standards for other sports are being worked on to ensure that all protectors are "safe". The cost in terms of time lost from work or study is often significant in the age group affected by these injuries,

as is the cost to the health service for hospitalisation and surgery.

This study has been valuable in providing information on the incidence and severity of sports related ocular trauma, as this is important when measures to help reduce the incidence of these injuries are considered.

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