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Eye injuries in sports

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In a retrospective study from 1988 to 1998, eye injuries were found in 553 patients. Seventy-six (13.7%) of these injuries were associated with sport. The mechanism of trauma was for the most part a ball (71.1%) or a club (13.2%). Most eye injuries occurred in soccer (35.5%), which is, by far, the most widespread sport in this region of Norway. A disproportionately high number of the injuries occurred in floorball (17.1%), bandy (13.2%), and squash (10.5%). The rules in these sports may, in theory, be strict enough to prevent eye injuries in most cases. However, these rules are often neglected in informal activities. Strategies for educating the general public about the potentially serious effect of eye injuries in sports exposed to such risk are of great importance.

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Despite the ocular reflexes and protective position of the globe, eye injuries occur frequently. Indeed, eye injuries are a common cause of visual impairment (1). In keeping with the trend toward physical fitness, various sports have become an important cause of eye injuries (2–4). In particular, there is an increased risk of eye injuries in sports involving small balls, clubs or frequent body contact (3, 5–9).

In Norway, traditional ball sports are handball (i.e. European team handball), soccer, bandy and ice-hockey. However, with increasing world-wide communication, sports are becoming more international. Consequently, several "new" sports are gaining popularity. For sports with old traditions, rules have been introduced for eye protection, and general knowledge about the risk of eye injuries in these sports may be adequate. For example, in ice-hockey, eye wear protection is used to a great extent even in informal activities. However, sports recently introduced are more unorganised. Initially, these sports are followed by a few enthusiasts, with no concern about safety.

In the last decade we have noticed some "new" sports causing eye injuries. Thus, we conducted this study to identify the incidence of eye injuries in different sports. We also looked into the mechanism of trauma, the effect of the injuries, the outcome and the socioeconomic costs.

Material and methods

From a data file, the casualty records of all patients admitted to the eye department of the Central Hospital of Buskerud between 1 January 1988 and 31 December 1997 for the management of an eye injury were identified. Until 1991, only inpatients were recorded in the data file. Thereafter, both in- and outpatients were included. The number of inhabitants in Buskerud is about 230 000, and the eye department serves the whole county.

From the records of patients with eye injuries, all cases with eye injuries associated with sport were extracted and included in the study. The details of age, sex, sports involved, mechanism of injury, circumstances surrounding the sports activity, extent of trauma, complications, number of visits, absence from work, and final outcome were noted. Due to poor documentation in the records, the use of eye wear protection was not included in the study.

Information about the number of members in different sports was collected from the Buskerud Athletic Federation. It can be expected that this distribution of athletes roughly represents the spread of sports activities in the county.

The Man-Whitney test was used for statistical analyses.

Results

During the 10-year period, a total of 553 eye injuries was identified. Of these, 76 (13.7%) were associated with sport. There were 63 male (82.9%) and 13 female (17.1%) patients. The mean age was 25.1±12.1 years (range, 7–59 years). For male and female patients, the mean age was 25.5±11.9 years and 23.5±13.2 years, respectively. This difference was not statistically significant.

Table 1. The distribution of eye injuries in different sports between 1 January 1988 and 31 December 1997

Sport	88	89	90	91	92	93	94	95	96	97	Total(%)
Soccer	2	2	2	3	4	1	3	3	2	5	27 (35.5)
Floorball				2	2	4		3	1	1	13 (17.1)
Bandy			1	1		2	1	1	3	1	10 (13.2)
Squash		1			1	3	2		1		8 (10.5)
Handball				1	2					2	5 (6.6)
Golf							1			1	2 (2.6)
Skiing	1			1							2 (2.6)
Others		2		2		2	2	1			9 (11.8)
Total	3	5	3	10	9	12	9	8	7	10	76 (100)
Outpatients				6	6	6	7	4	4	7	40 (52.6)
Inpatients	3	5	3	4	3	6	2	4	3	3	36 (47.4)

Table 1 shows that the total frequency of sports-related eye injuries was approximately constant during the study period. Soccer dominates as the most common sport involved. The term "others" includes tennis, volleyball, badminton, jogging, swimming and orienteering. The mechanisms of injury, in most cases a ball or a club, are shown in Fig. 1.

The ocular diagnoses are shown in Fig. 2. Bulb contusions dominate as the most frequent eye injury (86.8%). This diagnosis includes hyphema, traumatic iris injury, vitreous hemorrhage, and commotio retinae. In the only case with a perforation of the eye ball, the injury was due to a ski pole. Five patients (6.6%) required surgery: one cataract extraction, one repair of ruptured globe, two sutures of the palpebrae, and one repair of retinal detachment.

The circumstances surrounding the sports activities are shown in Fig. 3. In the 26 cases of informal activities, 8 cases occurred at school, and 1 case in a military camp. In the last 17 cases, the injuries occurred during other informal activities.

Twenty-eight patients (36.8%) were absent from work at least one week. The mean absence for these 28 patients was 2.8±4.8 weeks (range, 1–25 weeks). The number of visits to the hospital varied from 1 to 20 (mean, 2.8±3.0).

All patients reported that they had normal vision prior to injury. Eight patients (10.5%) suffered permanent visual loss due to the eye injury. The details of these patients are summarised in Table 2.

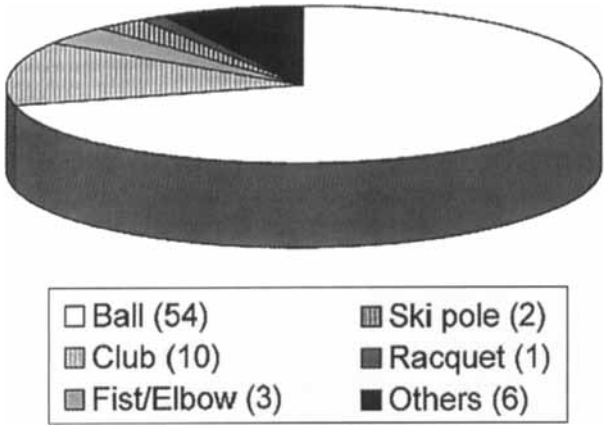

Fig. 1. The mechanism of sports-related eye injuries ($n=76$)

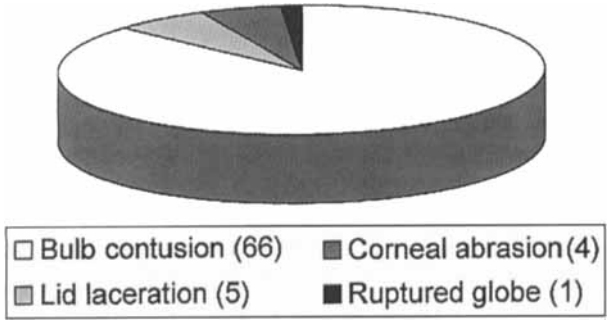

Fig. 2. The type of sports-related eye injuries ($n=76$).

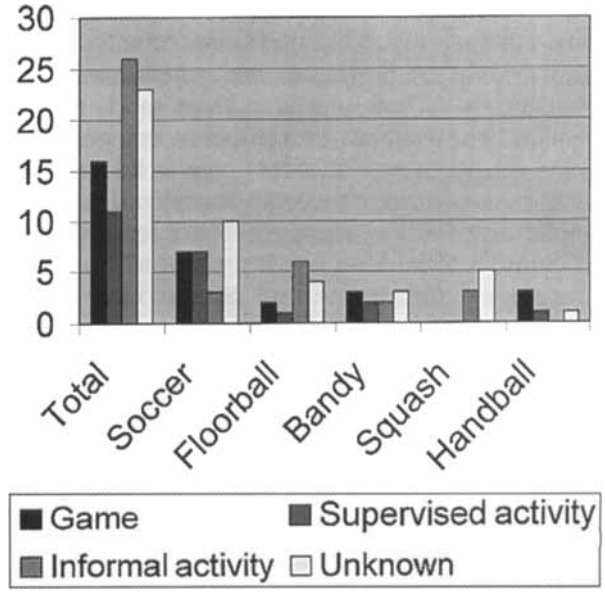

Fig. 3. The circumstances surrounding the sports causing eye injuries.

Table 2. Details of the patients with permanent visual loss due to sports-related eye injuries

Patient (year)	Sport	Mechanism	Activity	Ocular complication	Final vision
1 (1989)	Soccer	Ball	Informal	Optic nerve lesion	Fingercount 0.5 m
2 (1990)	Bandy	Club	Supervised	Lens lux., Choroidal rupture	6/12
3 (1991)	Floorball	Club	Game	Lens lux., Cataract op., Glaucoma	6/7.5
4 (1992)	Handball	Ball	Game	Macular scar	6/7.5
5 (1993)	Floorball	Club	Informal	Choroidal rupture, Glaucoma	Fingercount 2 m
6 (1994)	Squash	Ball	Informal	Vitreous hemorrhage	6/7.5
7 (1997)	Soccer	Ball	Informal	Retinal detachment	6/7.5
8 (1997)	Golf	Ball	Informal	Optic nerve lesion	6/30

Discussion

With increasing leisure time, sports activities have become very popular in modern societies. In Oslo, Norway, Klyve found that the frequency of sports-related bulb contusions increased from 12% during 1968–69 to 36% during 1990–91 (4). In the present study, these injuries accounted for 13.7% of all eye trauma. In other studies the frequencies range from about 10% to 40% (5,6). The frequency will necessarily vary depending on the distribution of sports activities, type of industries and admission routines. In this study, the frequency represents a minimum estimate. However, with the exception of trivial injuries, one may expect that most sports-related eye injuries in the county are referred to our eye clinic.

In accordance with other studies, we found that the eye injuries occurred predominately in young men (5–9). In this study the mean age was 25 years. Furthermore, ball (71.1%) or club (13.2%) contact accounted for the majority of injuries, as found in several previous reports (3, 5–9).

In the present study, most eye injuries occurred in soccer (35.5%). However, this does not necessarily mean that soccer is the most dangerous sport causing eye injuries. In Buskerud, soccer is by far the most popular sport; of all members in Buskerud Athletic Federation, soccer players account for about 25%. Next to soccer, skiing accounts for 12%, handball for 10%, and tennis for 2%. This distribution has been stable during the 10 years of this study. In Norway, floorball is included in the bandy federation. During the study period, the members of this federation accounted for about 2%. In 1989, there were only a few floorball players in Norway. Since then the distribution between bandy and floorball has changed, as floorball now represents the majority of the members in the bandy federation. The other sports involved in eye injuries in this study are each represented by less than 1%. Bearing in mind the distribution of different sports in the county, the present study shows that there is a disproportionately high number of eye injuries occurring in floorball (17.1%), bandy (13.2%), and squash (10.5%).

There was an apparent peak in the incidence of eye injuries caused by floorball during the period from 1991 to 1994. At that time, the sport was relatively new in the country. In the beginning, this sport was for most part unorganised, followed by a few people not concerned about protection and rules. As time has passed, the sport has become enormously popular. Today, in accordance with increasing popularity, the sport has become more organised. The rules in floorball are quite strict concerning close contact and the use of the club. Thus, even though eye wear protection is not mandatory, few eye injuries occur during organised play, as illustrated in the present study; in the 9 cases in which the circumstances surrounding the eye injury were known, the injury occurred only in 3 cases during games or supervised activities (Fig. 3). However, in spite of the increasing number of organised floorball clubs, this sport is still very popular among people not organised in any athletic association. In these situations, the rules are probably often neglected. The tendency towards fewer eye injuries in floorball in the last few years hopefully means an acceptance of the rules, even in informal activities.

Bandy accounted for 13.2% of the eye injuries in the present study. Most of these injuries probably occurred when the players did not wear eye protection. Previously, eye wear protection was mandatory in organised activities in Norway. Last year, however, this protection was no longer required in senior players in order to comply with international rules. This means that one may anticipate an increasing number of eye injuries in bandy players in the future.

Squash is a relatively new sport in Norway, and the sport is quite popular among unorganised players. In accordance with other authors, we found that squash is a frequent cause of eye injuries (5, 8, 10). Squash is a high-risk sport as regards eye injuries, due to the combination of the small ball, high speed, the racquet and close quarters. In this sport, eye wear protection should definitely be mandatory. Further, as this play often is informal, it is of great importance that the general public are informed about the risk of eye injuries in squash, and encouraged to wear proper eye protection.

We were not able to obtain information about the circumstances surrounding all the eye injuries. However, it is striking that out of the 53 cases in which the type of activity was recorded, 26 cases occurred during informal games. This means that even though eye protection rules are required in several sports, the rules are often neglected in unsupervised activities, illustrating the importance of educating the general public about eye injuries in sport.

Sports-related eye injuries may result in serious complications. In the present study, most of the injuries were bulb contusions. This trauma increases the risk of developing complications later in life, such as glaucoma, cataract, or retinal detachment. In addition, the primary trauma may cause permanent visual loss. There are several studies reporting eye injuries with irreversible visual loss caused by sports activities (5, 6, 9). In the present study, 10.5% of all the eye injuries resulted in reduced visual acuity. Sports-related eye injuries are in principle preventable. Could the cases of permanent visual loss in the present study have been avoided? The answer is easy: yes, if eye wear protection was required in all types of sports. However, this is a rather unrealistic expectation. Cumbersome eye protection will undoubtedly be rejected by the players in sports such as soccer and handball. Further, as mentioned earlier, the relatively high frequency of eye trauma in these two sports are more a function of their popularity in the area rather than a reflection of a high-risk sport. In sports in which the eye injuries are disproportionately high, as in sports with small balls, clubs or close contact, eye wear protection must be seriously considered. Out of the 8 injuries with permanent visual loss, 4 cases occurred in squash, bandy or floorball. Here, the serious eye injuries might have been prevented by the use of eye wear protection. However, eye wear protection and game rules may be neglected in unorganised activities. Out of the 8 cases, 5 occurred in informal activities. Thus, strategies for increasing the awareness of the risk of eye injuries in the general public are crucial.

Sports-related eye injuries have economic and social consequences, as well as individual costs. In spite of the high rate of pupils or students in the present study, as many as 36.8% of all patients were absent from work. The mean absence was 2.8 weeks, and as long as half a year for one patient.

In conclusion, sports-related eye injuries occur for the most part in young men. Sports involving small balls or clubs are of particular risk. The injuries may cause permanent visual loss and have socioeconomic consequences. A large part of the injuries occur in unorganised activities. The coaches and the representatives of athletic associations, as well as the general public, should be educated in the potential sight-threatening effects of these injuries.

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