

Sussex Eye Hospital sports injuries

P T S GREGORY

From Queen Alexandra Hospital, Cosham, Portsmouth

SUMMARY To assess the prevalence of sports eye injuries in our area a register was kept over the 18 months from October 1982 to March 1984. Squash, association football, badminton, and tennis were the main offenders. The severest injury was from a golf ball, involving a fractured zygoma. There was one retinal dialysis, and one lens dislocation requiring extraction. Spectacles were broken in six cases and a contact lens in one. Glass fragments needed operative removal in one case, but there were no penetrating injuries. The value of eye protection, not worn by any of our patients, is emphasised.

Despite the assurance of a past president of the Wimbledon Squash and Badminton Club that 'badminton and squash are low in the table of eye injuries', such accidents are on the increase. We were interested to estimate the ocular morbidity from these and other sports. The value of certain eye guards has been established in several sports, and our data strongly support their use. No doubt the decision to wear eye protection should remain with the individual, but we consider the dangers of sport should be more fully appreciated by the public.

Material and methods

All sports injuries presenting to the Sussex Eye Hospital between 1 October 1982 and 31 March 1984 were entered in a register. Three outpatient notes were untraceable, but the register showed these to be minor injuries only. Hospital notes were available for all other cases and our data are derived from these.

Results

Table 1 summarises the numbers and percentages of patients in various groups. As expected from previous reports,² squash was responsible for the most casualties. However, soccer and badminton each produced more admissions to hospital (soccer 7, badminton 4, squash 3). When combined, soccer and rugby football produced more casualties than squash

(combined football 25, squash 24). Combining squash with other racket sports restores the lead (combined rackets 51, combined football 25).

Seventeen patients (18.3%) were admitted to hospital. Criteria for admission cannot be precisely defined, but the commonest indication was macroscopic hyphaema, as a precaution against secondary haemorrhage. Thus 16 of the 20 cases of macroscopic hyphaema were admitted, and only one admission did not have a macroscopic hyphaema.

Initial loss of visual acuity was scored as the number of line difference between the two eyes on the Snellen chart. We then extrapolated beyond 6/60 by adding one line for counting fingers, two for hand movements, and three for perception of light only. This is a questionable statistical manoeuvre, but seems reasonably consistent within this survey and has been used before.³ The mean number of lines lost per patient was calculated for each sport. Golf scored the highest figure (5.5), but only two players were involved. Badminton and soccer were also higher scorers than squash (badminton 2.43, soccer 2.05, squash 1.65). Visual recovery was generally good: in only three cases was the last recorded acuity more than two lines worse than the other eye. One tennis player was known to be amblyopic in the injured eye. His acuity loss was scored as zero. Amblyopia was also suspected in two sportsmen who saw worse with their uninjured eyes. Their acuity loss was also scored as zero.

Of our patients 75.3% were male, presumably reflecting greater participation by males than females rather than greater male accident-proneness. The sports in which women predominated were badmin-

Correspondence to P T S Gregory, FRCS, Eye Department, Queen Alexandra Hospital, Cosham, Portsmouth PO6 3LY.

Table 1 Distribution of patients in categories according to sport

	Squ	Soc	Bad	Ten	Rug	Cri	Bas	Hoc	Gol	Mar	Kar.	Lax	Total	Percent
Total	24	19	16	11	6	5	3	3	2	1	1	1	92	100
Admit	3	7	4	1	0	0	0	0	1	1	0	0	17	18.5
Not	21	12	12	10	6	5	3	3	1	0	1	1	75	81.5
Male	18	19	6	9	6	4	1	2	2	1	1	0	69	75.0
Female	6	0	10	2	0	1	2	1	0	0	0	1	23	25.0
Ball	17	15	11	11	1	5	1	2	2	1	—	0	66	72.5
Bat	5	4	5	0	5	0	2	1	0	0	—	1	23	25.3
Unknown*	2	0	0	0	0	0	0	0	0	0	0	0	2	2.2
Av. Age	31	25	37	30	25	23	14	16	32	13	27	?	28.5	—
In. Ac. Loss	1.65	2.05	2.43	1.09	1.33	1.20	0.00	0.67	5.50	1.00	0.00	0.00	1.71 (mean)	—
Hyphaema	3	6	7	1	1	0	0	0	1	1	0	0	20	21.7
H. Admit	3	6	4	1	0	0	0	0	1	1	0	0	16	(80.0)
Ret. Abn.	4	8	0	3	1	0	0	0	1	0	0	0	17	18.5

Sports Squ=Squash. Soc=Association football. Bad=Badminton. Ten=Tennis. Rug=Rugby football. Cri=Cricket. Bas=Basketball. Hoc=Hockey. Gol=Golf. Mar=Marbles. Kar=Karate. Lax=Lacrosse.

Categories Admit=number admitted. Not=number not admitted. Ball=number struck by ball. Bat=number struck by other agent.

Av. Age=average age of patients. In. Ac. Loss=Initial average acuity loss. Hyphaema=number with hyphaema.

H. Admit=number admitted with hyphaema. Ret. Abn=Retinal abnormality.

*Excludes the one karate player.

ton (10F, 6M), basketball (2F, 1M), and lacrosse (1F, 0M).

All but one of the 13 sports were ball games, the exception being karate. In the ball games 65 patients were hurt by the ball. The other 27 patients were mostly injured by the appropriate implement, but bodily contact was sometimes responsible, notably in rugby football, where the ball caused only one of the six injuries.

Perhaps surprisingly, the oldest casualties were not golfers but badminton players, with squash casualties the third oldest. Possibly the risk of injury in the more active sports increases with age. The oldest casualty was a 72-year-old male badminton player, the youngest a 9-year-old male footballer. Seventeen casualties were children under 16.

Of the retinal abnormalities oedema was the commonest finding, usually at the posterior pole. Footballers were most often affected (8/19 cases). Haemorrhage was noted in seven cases, entering the vitreous in two. There were two cases of choroidal rupture, and one of retinal dialysis which required plombage.

Broken glass was confined to squash players (two spectacles broken) and badminton (four spectacles and one contact lens broken). One of the squash players needed operative removal of glass fragments from his cornea and conjunctiva, but there were no penetrating injuries. One badminton player still has glass in his cornea and sees 6/9 with that eye, 6/6 with the other. There were two cases of diplopia, associated with a fourth nerve palsy in the karate player and a fractured zygoma in a golfer. Both failed to attend for review.

Discussion

With increasing leisure, sport has become more popular and sports injuries more frequent. In Glasgow in 1923 only seven out of 1000 eye injuries treated as 'indoor patients' were adult sports injuries.⁴ In Northern Ireland in 1976 the equivalent figure was 84 out of 2032 admissions.⁵ Recently in Bristol 2.5% of all cases of casualty eye trauma were caused by sport.⁶ Our figure over 18 months was 0.58%. More alarmingly, in Massachusetts from 1960 to 1980, 3% of all enucleations followed sports injuries, though about half of these involved airguns, which are less popular in Great Britain.⁷ In 1978 in the United States it was reported that 12% of all eye injuries were related to sport and recreation equipment, and that the number of injuries from the 10 most hazardous sports had increased by 58% over the preceding five years.⁸

The intrinsic risk of six sports, in terms of the number of eye injuries per 100 000 playing sessions, has been estimated from data obtained in the 1977 General Household Survey.² Squash was the most dangerous sport, and also carried the highest rate of admission per injury. Our experience is that, while squash produced most casualties, severer injuries resulted from golf, badminton, and football. Neither here nor in Southampton did any squash player suffer long term visual loss, but in Malaysia, where 63 eye injuries from badminton were recorded over five years, 36.5% of injured eyes ultimately saw only 6/12 or worse.⁹

The efficacy of suitable eye protection has been confirmed in the field and in the laboratory. Since

1977 in the United States eye protection has been mandatory for high school and college ice hockey.⁸ An estimated saving of 70 000 eye injuries and \$10 000 000 annually has resulted.¹⁰ Similar Canadian legislation produced a fall in reported eye injuries from 253 to 90 in a two-year period.¹¹ In the laboratory, Fiegelman fired racquet balls at 65 miles per hour (105 km/h) at a variety of eye guards mounted on a model head fitted with a pressure transducer as an eye.¹² (A racquetball is larger and softer than a squashball.) All open (lensless) guards failed, being either penetrated or displaced. All spectacles, glass or plastic, failed because the lens or frame shattered. Only polycarbonate plastic safety lenses never shattered, and Fiegelman recommends this material for frames as well as lenses. No lensless guard passed American or Canadian safety tests,¹³ and such guards may give a false sense of security, encouraging dangerous play.¹⁴

A drop-ball test confirmed the general belief that minus lenses are more fragile than plus ones, though not where central thickness is equal.¹⁵ This is important, as nearly all sportsmen who wear glasses are myopes, the hypermetropes generally being young enough to accommodate for sport without correction. Thus in Ingram and Lewkonja's series of 21 squash eye injuries all eight spectacle wearers were myopes, and all four penetrating injuries were in spectacle wearers.¹⁶ It must be emphasised that standard spectacles or contact lenses offer no protection in these sports, but greatly increase the chance of penetrating injury. Moreover the impression that experience reduces the likelihood of injury is not supported by the evidence.¹⁷⁻¹⁹

Effective eye guards are not easily obtained in our area. Inquiries at all the main Brighton sports shops found only two selling such guards, and these were the lensless variety. Only one or two are sold per month, and always to people who have already been injured. Unfortunately, of our two patients making their second visits with sports eye injuries, neither had got around to buying a guard. We did eventually discover one optician in Brighton who knew where to obtain polycarbonate guards, but there was insufficient demand to stock them.

Seatbelt legislation has survived initial unpopularity to reduce traffic related eye injuries by an estimated 75%.²⁰ It is time pressure was brought to bear on the ever increasing number of sportsmen to save themselves unnecessary eye damage. First class cricket has begun to make protection acceptable in this country, and other sports should follow its lead.

An editorial in the *British Medical Journal* in 1973 chose to continue playing squash 'naked eye', but hoped an efficient eye hospital would be accessible.²¹ This position should be reconsidered. Eye protection for dangerous sports should be the norm, not the exception.

The help and encouragement of Mr A F Harden are gratefully acknowledged.

References

- 1 Blonstein JL. Eye injuries in sport. *Practitioner* 1975; **215**: 208-9.
- 2 Barrell GV, Cooper PJ, Elkington AR, MacFayden JM, Powell RG, Tormey P. Squash ball to eye ball. *Br Med J* 1981; **283**: 893-5.
- 3 Fenton PJ, Gardner ID. Simultaneous bilateral intraocular surgery. *Trans Ophthalmol Soc UK* 1982; **102**: 298-301.
- 4 Garrow A. A statistical inquiry into 1000 cases of eye injuries. *Br J Ophthalmol* 1923; **7**: 65-80.
- 5 Canavan YM, O'Flaherty MJ, Archer DB, Elwood JH. A 10-year survey of eye injuries in Northern Ireland, 1967-76. *Br J Ophthalmol* 1980; **64**: 618-25.
- 6 Vernon SA. Analysis of all new cases seen in a busy regional centre ophthalmic casualty department during a 24 week period. *J R Soc Med* 1983; **76**: 279-82.
- 7 Diamond GR, Quinn GE, Pashby TJ, Easterbrook M. Ophthalmologic injuries. *Clin Sports Med* 1982; **1**: 469-82.
- 8 Bell JA. Eye trauma in sports: a preventable epidemic. *JAMA* 1981; **246**: 156.
- 9 Chandran S. Ocular hazards of playing badminton. *Br J Ophthalmol* 1974; **58**: 757-60.
- 10 Vinger PF. Sports eye injuries—a preventable disease. *Ophthalmology (Rochester)* 1981; **88**: 108-13.
- 11 Pashby TJ. Eye injuries in Canadian hockey, phase II. *Can Med Assoc J* 1977; **117**: 671-7.
- 12 Fiegelman MJ, Sugar J, Jednock M, Read JS, Johnson PL. Assessment of ocular protection for racquetball. *JAMA* 1983; **250**: 3305-9.
- 13 Easterbrook M. Eye injuries in squash and racquetball: an update. *Physician Sportsmed* 1982; **10**: 47-56.
- 14 Bishop PJ, Kozey J, Caldwell G. Performance of eye protectors for squash and racquetball. *Physician Sportsmed* 1982; **10**: 63-9.
- 15 Christianson MD, Parker JA, Arndt J. Material and thickness: the important factors in the impact resistance of spectacle lenses. *Can J Ophthalmol* 1977; **12**: 300-3.
- 16 Ingram DV, Lewkonja I. Ocular hazards of playing squash rackets. *Br J Ophthalmol* 1973; **57**: 434-8.
- 17 Easterbrook M. Eye injuries in racquet sports: a continuing problem. *Can Med Assoc J* 1980; **123**: 268-9.
- 18 Doxanas MT, Soderstrom C. Racquetball as an ocular hazard. *Arch Ophthalmol* 1980; **98**: 1965-6.
- 19 Thackray J. How to score fewer racquet sport eye injuries. *Sightsaving* 1982; **51**: 2-6.
- 20 Vernon SA, Yorston DB. Incidence of ocular injuries from road traffic accidents after introduction of seatbelt legislation. *J R Soc Med* 1984; **77**: 198-200.
- 21 Editorial. A ball in the eye. *Br Med J* 1973; **ii**: 195-6.

Accepted for publication 23 January 1986.