Aetiology of perforating eye injury

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Abstract

This study addresses the aetiology of perforating ocular injury in childhood and possible preventative measures. Data have been collected from the casenotes of 143 patients presenting over a 10 year period to a single ophthalmic unit. Injuries occurred most often in a domestic setting (34%) or with a child at play (19%) and showed an overall four to one ratio of boys to girls. Sports injuries accounted for 15% and assault for 8% of all injuries. A changing pattern of ocular injury is evident: road traffic accidents constituted 6% of injuries, compared with 31% in a similar study published in 1976. The role of litigation is discussed, particularly with regard to firearms, which accounted for 8% of injuries. It is concluded that the most important factor in the prevention of perforating ocular trauma is parental awareness, 53% of injuries occurring with the child in a domestic setting or at play.

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Perforating ocular trauma is a leading cause of monocular visual loss,¹ with about 50% of all perforating eye injuries affecting children.^{2,3} As in adults, many paediatric eye injuries are potentially preventable,^{4,6} there being obvious implications for education, legislation, and safety regulations. Although data are available from other countries^{7,8} there are few recent accounts of the aetiology of perforating injuries in the UK.²

Subjects and methods

The study group consisted of all children of 16 years or younger admitted to the Birmingham and Midland Eye Hospital, Birmingham with perforating eye injuries from September 1979 to August 1989 inclusive. Casenotes were traced for all but two patients and a record made of age, sex, cause of perforation, and circumstances of the injury.

Results

Of the 143 children included in the study there were 114 boys and 29 girls, a ratio of 3.9 boys to one girl. The mean age of the group was 9 years and 4 months.

Table 1 gives the causes of injury, subdivided into eight main aetiological groups. The distribution of perforating injuries, using the same eight aetiological groupings, between groups aged 3 years or less, aged 4-10 years, and aged 11-16 years is shown in table 2. 'Domestic' injuries included all those occurring in or around the home and involving common domestic objects or situations. This is regarded as distinct from 'at play' when children were using implements not usual to a domestic setting, or

involved in activities not typical of home life. Of the 27 cases of injuries sustained at play, 13 were caused by a sibling of the injured child.

Table 3 gives a more detailed breakdown of domestic injuries. Sports injuries included those sustained in both organised and 'social' events. Accidents involving any sort of firearm have been classified separately. Table 4 gives a more comprehensive analysis of sports injuries.

Discussion

The purpose of this study is to identify aetiological factors in paediatric perforating ocular injury such that informed and rational comment can be made on possible preventative measures. The scale of the problem is well recognised, paediatric injuries in general accounting for between 30 and 50% of all cases of ocular trauma^{9,10} and constituting a leading cause of non-congenital unilateral blindness.¹¹ With particular reference to perforating eye injuries, nearly 50% of injuries affect children.^{2,3}

The approximate four to one ratio of boys to girls in this series corresponds closely with other studies of serious ocular trauma.^{4,5,10} The male preponderance is more marked in injuries sustained in a domestic setting, in those involving firearms, and in cases of assault. The large number of boys sustaining perforating injuries in the home is particularly notable. Although many of these may only have been prevented by increased parental vigilance, it is worth noting the number of 'hammering' injuries and the danger of sharp plastics.

The 12 cases of firearms injury consisted of seven airgun pellets, four exploding shotgun

Table 1 Aetiology of perforating ocular injuries in children (n=143)

Aetiology	Boys	Girls	Total No (%)
Domestic	44	4	48 (34)
At play	19	8	27 (19)
Sports	13	8	21 (15)
Assault	12	0	12 (8)
Firearms	11	1	12 (8)
School	7	2	9 (6)
Road traffic accident	5	3	8 (6)
Non-accidental injury	3	3	6 (4)
Total No	114	29	143

Table 2 Perforating ocular injuries in different age groups of children (n=143)

Cause	Age 0-3 years	Age 4-10 years	Age 11-16 years	Total No
Domestic	6	13	29	48
At play	14	11	2	27
Sport	3	7	11	21
Assault	0	2	10	12
Firearms	0	2	10	12
At school	0	3	6	9
Road traffic accident	2	2	4	8
Non-accidental injury	2	3	1	6
Total	27	43	73	143

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Table 3 Causes of domestic injuries (n=48)

Cause	No of injuries
Collision with object	12
Fall onto object	6
Hammering	6
Sharp plastics	5
Coat hanger	2
Broken window	4
Dog	2
Metal tape measure	2
Others	9

Table 4 Causes of sports injuries (n=21)

Sport	Boys	Girls	Total No
Darts	9	6	15
Fishing	2	1	3
Swimming	1	1	2
Archery	1	0	1
Total	13	8	21

cartridges, and one starting pistol accident. A previous study showed 75% of airgun injuries to occur in those less than 17 years of age¹²; it is also recognised that airgun pellets carry a poor visual prognosis when the globe is directly affected.^{3,6,12} Ten of the 12 firearms injuries occurred in the upper age range of 11–16 years. This same age group showed an increased tendency to sports injuries and assault.

Of the 21 cases of sports injury, 15 involved darts. A common presentation was the ricochet of a dart from the board, the injured party being a nearby observer. Fishing injuries were due to hooks, and the two sports injuries sustained while swimming were caused by elasticated goggles.

Surprisingly few cases occurred during school time, the figure of 6% being half that recorded in a similar study in Israel.⁸ Significant ocular injuries do of course occur at school, but most would be expected to be non-perforating and are therefore excluded from this study.

There were eight cases of perforating ocular trauma after road traffic accidents. Constituting 6% of the total, this represents a dramatic decrease from the 31% documented by Eagling in a similar study in 1976.² Two of the cases involved children aged 3 years or less. The numbers recorded in this study would undoubtedly have been influenced by the seat belt campaigns of the 1970s, the subsequent legislation of 1982, rear seat belts, and improvement in the safety characteristics of car windscreens. With more recent advances in the design of children's car seats, this number should decrease further.

The results of this study re-emphasise the often forgotten fact that the home is fraught with potential dangers, especially for a curious and active child. One third of all perforating injuries occurred in a domestic setting, and although it is unrealistic to envisage all domestic injuries as potentially preventable, parental awareness appears paramount in the possible reduction of this figure. Further attention could be paid to the design of furniture and home appliances in avoiding sharp edges and protrusions, particularly when at eye level for a toddler or small child. In the United States it is not unusual to recommend the wearing of eye protection, even a plano spectacle prescription, in cases of signifi-

cant amblyopia. It may be appropriate for health workers in this country to adopt a similar practice.

Darts and firearms, perhaps the most obvious of potential dangers, together accounted for nearly 25% of perforating injuries. The law currently prevents the sale of airguns to those less than 17 years of age, although a 14 year old is legally entitled to borrow or receive an airgun as a gift and to use it unsupervised. A child under the age of 14 is allowed to use an airgun while on private property and under the supervision of someone who is 21 years old. Whatever the official legal position, many adults continue to regard airguns as little more than harmless toys. Stricter legislation on the handling, as well as the sale, of such weapons would be a logical step forward in the prevention of a particularly devastating form of ocular injury. Four of the firearms injuries occurred when children deliberately attempted to explode shotgun cartridges. These cannot be bought without a shotgun certificate, but subsequent safety depends on the responsible behaviour of adults. The dart injuries re-emphasise the importance of parental awareness and vigilance in the prevention of ocular injuries. Legislation is inappropriate, but it would be possible to include a simple statement on safety with each new set of darts, and to draw attention to the hazards of ricochet, which may occur in the most orderly of games.

The overwhelming impression gained from individual case reports is the prime importance of parental care and awareness. Although legislation has a significant role in many aspects of safety, the single most important factor in the prevention of paediatric perforating injury is probably parental education.

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