The eye and the seatbelt in Wessex

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SUMMARY  The records of all 373 patients undergoing surgery for perforation of an eye at the 10 eye units in the Wessex Regional Health authority (except the Isle of Wight) during February 1980 to January 1984 were examined. There were 86 admissions as a result of road traffic accidents (RTAs), and 287 admissions arising from other accidents. The estimated annual incidence of perforating eye injuries as a result of RTAs has decreased by 73% following legislation for the compulsory wearing of seatbelts by drivers and front seat passengers. There is no evidence that this abrupt fall in the incidence of injury can be satisfactorily attributed to any other factor.

Every eye surgeon practising in the United Kingdom will have seen patients whose eyes were damaged in road traffic accidents (RTAs). Canavan et al., reporting the results of a 10-year survey of eye injuries in Northern Ireland, found that nearly a third (30.2%) of perforating eye injuries stemmed from such accidents. The victims are characteristically in their 20s or 30s, and their eyes are usually damaged as their heads move downwards on to the jagged lower remnants of a shattered, toughened windscreens. This has lead Du Fourmentel and Moully to use the graphic phrase 'the guillotine of the windscren.' This mechanism explains why these patients so often have a horizontal band of facial lacerations, and it also explains perforation of both eyes.

Despite the great advances in microsurgical repair of such eyes the visual outcome is frequently disappointing. Lavergne reports that in one series of 97 patients with perforated eyes 29% of eyes eventually lost all 'functional vision.' In Canavan and colleagues' study, the most frequent reason for an eye being excised was damage incurred in an RTA (27-8% of all enucleations).

Australia led the way in countering many types of RTA injuries by the introduction of seatbelt legislation in 1971. The succeeding years a marked reduction in injuries has been reported from many countries. Legislation relating to the compulsory wearing of seatbelts by both driver and front seat passenger came into force in the United Kingdom on 31 January 1983 and is due to be reviewed by Parliament early in 1986.

Blake has reported that many people working in eye departments have recently noted an apparent decrease in the number of patients with eyes perforated in RTAs. We set up this study to discover the extent of this suspected trend, for, as Mackay has pointed out, the final test of the effectiveness of the legislation is the change in the number of casualties.

Three major considerations influenced the choice of the population for the study. First, we chose to investigate perforating eye injuries rather than lesser ocular injuries because of their worse visual prognosis. Secondly, we aimed to identify all cases in the study period. Thirdly, we needed to choose a study period long enough for the pattern of cases over time to be clear but short enough for other factors influencing the incidence rate of injuries to remain fairly stable. The period used is three years before and one year after the introduction of legislation—that is, 1 February 1980 to 31 January 1984.

Material and methods

In each of the 10 eye units on the mainland of the Wessex Regional Health Authority (RHA) the theatre books were used to identify all cases of perforating eye injuries. In each case the patient's name, unit number, and date of operation were used to trace the corresponding medical records. These records enabled all the cases of perforating eye injuries to be identified and subsequently divided into those resulting from an RTA and those from other causes. For RTAs we recorded the date of the accident, the age and sex of the patient, and other medical information.

Additional data have been obtained or derived
Table 1  Eye injury and related data for February 1980 to January 1984 inclusive

<table>
<thead>
<tr>
<th>Accident year</th>
<th>Cases with penetrating eye injury</th>
<th>Population (m)</th>
<th>Index of average daily vehicle flow GB (1977 = 100)†</th>
</tr>
</thead>
<tbody>
<tr>
<td>February-January</td>
<td>RTA</td>
<td>Non-RTA</td>
<td>of Wessex RHA* aged 15 and over</td>
</tr>
<tr>
<td>1980–1</td>
<td>34</td>
<td>70</td>
<td>2:20</td>
</tr>
<tr>
<td>1981–2</td>
<td>24</td>
<td>75</td>
<td>2:22</td>
</tr>
<tr>
<td>1982–3</td>
<td>21</td>
<td>70</td>
<td>2:24</td>
</tr>
<tr>
<td>1983–4</td>
<td>7</td>
<td>72</td>
<td>2:26</td>
</tr>
</tbody>
</table>

† Hampshire Police authority data (available on request).
§ Estimated from Table 2.20 Transport Statistics, Great Britain. HMSO: 1972–82; and data supplied by University of Birmingham Accident Research Unit.

Discussion

We decided that scrutiny of theatre registers was the best method of identifying cases of perforating eye injury because patients with such injuries are virtually always dealt with surgically. This involved examining the records of the 10 specialist eye units and those of the general theatres where patients were sometimes treated in an emergency.

We noted not only cases of repair of a perforation but also cases of an intraocular foreign body; the removal of sutures; enucleation and evisceration; and any instance where the entry in the register did not make clear what operation had been carried out. We listed 1201 entries in this way. We were unable to trace the notes for 39 (3.2%) of cases. However, these omissions were spread equally over the four years in question and hence do not lead us to suspect that any bias has been introduced into our study.

This system of retrieval also gave us the number of non-RTA perforating eye injuries. Reference to column 3 of Table 1 shows that these numbers remained steady throughout the four years. With no known change in the factors causing non-RTA injuries this is the expected pattern, and it supports the hypothesis that data recording and retrieval have been consistent over the study period.

Column 2 of Table 1 shows an abrupt drop in eye perforations coinciding with the introduction of seatbelt legislation. This could be attributed either to a change in the population exposed to risk of accidents giving rise to these injuries or to a change in the nature and circumstances surrounding each accident or a combination of these changes.

The magnitude of the population exposed to the risk of an RTA leading to a perforating eye injury has remained relatively stable over time. The adult
wearing of seat belts is a direct cause of the dramatic reduction in the annual incidence of perforating eye injuries in road traffic accidents.

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References