TRAUMA IN RETINAL DETACHMENT

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THE purpose of this investigation is to demonstrate the part played by trauma in the aetiology of retinal detachment.

Material

The material comprised 251 patients attending the Retinal Detachment Clinic at the High Holborn Branch of Moorfields Eye Hospital, London, who were selected according to a method to be described below.

The control cases were 106 patients without retinal detachment drawn from routine Out-Patient Clinics at the same hospital.

Methods

We are interested here mainly in the alleged association between direct or indirect trauma to the eye and the immediate or delayed development of retinal detachment.

However, the mechanism of detachments after perforating injuries is so well known that such cases were excluded from the investigation, together with aphakic detachments and those following other intra-ocular operations.

Each patient was questioned as to the occurrence of direct trauma to the eye or indirect trauma (to the head or other parts of the body). Sufficient time (10 minutes) was given for the patient to recall any incidents which were of significance. It is recognized that a positive or negative history in any particular case may not be accurate, but since such considerations applied both to the test (detachment) and control (normal) series, the method is sufficiently reliable on these grounds. Moreover, it is just such a history of trauma which has been indicted in the past, and it is this which we are investigating.

With regard to direct trauma, a positive history was admitted if the patient remembered receiving any blow on the eye, however small. Such injuries were classified in the test (detachment) series as immediate or remote: producing symptoms of a detachment within one month of the injury or at any time afterwards. The cases in the control (normal) series, since they were of comparable age, had an equal chance of having incurred such injuries.

With regard to indirect trauma, a positive history was admitted if the patient remembered receiving any blow on the head. Blows on, or sudden movements of, the body were also included if such an incident was considered to have produced a sudden movement of the head. Indirect injuries were also classified as immediate or remote, and again the control (normal) series had an equal chance of having incurred such injuries.

All the cases were allocated to one of three groups according to their refraction: high myopes (over -6); low myopes (-0.25 to -6); and hypermetropes and emmetropes.

In the detachment series only unilateral cases and one eye from bilateral cases were included in the investigation, so that the similarity of fellow eyes might not affect the result.

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For the same reason only one eye from each normal patient was included. In addition, cases were selected to fall as nearly as possible into the same refractive groups as those in the detachment series.

To avoid observational bias, the observer was unaware, as far as possible, of the presence or absence of a retinal detachment in each case until the history of trauma had been obtained.

Results

Of the 251 cases of retinal detachment (156 males; 95 females), 88 (35 per cent.) gave a positive and 163 (65 per cent.) a negative history of trauma according to the definitions outlined above.

Of the 106 normal cases (67 males; 39 females), 27 (25 per cent.) gave a positive and 79 (75 per cent.) a negative history of trauma (Fig. 1, opposite).

It was found that the patients and controls were not strictly comparable in age and sex distribution, and the detachment patients were therefore matched with controls according to the following method. Each series was first classified in 10-year age groups from 0 to 80 years for males and females separately, according to the age at the time of the investigation. Cases from each sex and age group in the control series were then paired with cases from the same group in the test series until all the controls were exhausted. In this way 106 test cases (67 males; 39 females) were matched with the 106 controls, and the history of trauma in these two series is shown in Table I.

There would thus appear to be a slight preponderance of cases with a positive history of trauma in the test series. However, a χ^2 test reveals no statistically significant difference between the two series in this respect ($\chi^2 = 3.142$; $n = 1$; $P < 0.10 > 0.05$). There is thus no evidence of an association between trauma and retinal detachment in general.

With regard to the age distribution, the mean age of the males was 43.82 ± 18.06 (67 cases) in the test series and 45.49 ± 17.24 (67 cases) in the controls. A "t" test showed no significant difference between the series ($t = 0.549$; $n = 132$; $P > 0.10$). The mean age of the females was 50.10 ± 14.34 (39 cases) in the test series and 48.82 ± 17.26 (39 cases) in the controls, and a "t" test again showed no significant difference between the two ($t = 0.357$; $n = 76$; $P > 0.10$).

The sex distribution was identical in the two series.

The distribution of the three refractive groups was comparable in the two series (Table II).

TABLE I
HISTORY OF TRAUMA IN TEST AND CONTROL SERIES

Series	History of Trauma		
	Positive	Negative	Total
Test	40	66	106
Control	27	79	106
Total	67	145	212

TABLE II
REFRACTION IN TEST AND CONTROL SERIES

Series	Refraction			Total
	+D. to -0.25 D	-0.25 to -6.00 D	Over -6.00 D	
Test	38	31	37	106
Control	35	26	45	106
Total	73	57	82	212

A χ^2 test showed no significant difference between the two series with regard to refraction ($\chi^2 = 1.342$; $n = 2$; $P < 0.90 > 0.50$).

In view of the fact that a slight but statistically insignificant difference was found between the test and control series with respect to the incidence of trauma, further analyses were carried out.

(1) Sex.—The incidence of trauma in the 67 males in each series was examined.

A positive history of trauma was obtained in 28 cases in the test series and sixteen in the control series (Fig. 2, opposite). A χ^2 test showed a significant difference ($\chi^2 = 4.094$; $n = 1$; $P < 0.05 > 0.02$); there is thus definite evidence of an association between trauma and retinal detachment in males.

FIG. 1.—Incidence of trauma in 251 cases of retinal detachment (test series) and 106 other cases (control series).

FIG. 2.—Incidence of trauma in males (67 in each series).

FIG. 3.—Incidence of trauma in females (39 in each series).

FIG. 4.—Incidence of trauma in 88 cases of retinal detachment under and over 40 years of age.

This difference did not apply to the 39 females; a positive history of trauma was obtained in twelve test cases and eleven controls (Fig. 3).

(2) *Age*.—The cases of retinal detachment were divided into those under and over 40 years of age. There were 88 of the former (66 males; 22 females) and 163 of the latter (90 males; 73 females). To make the two series comparable with regard to sex distribution, 66 males and 22 females were selected randomly from the over-40 group and the history of trauma in each age group was compared statistically. In those under 40 years, 53 cases gave a positive and 35 a negative history of trauma, while in those over 40 years the numbers were 23 positive and 65 negative (Fig. 4).

TABLE III

INCIDENCE OF TRAUMA BY REFRACTIVE GROUP

Refraction	History of Trauma		
	Positive	Negative	Total
High Myopes	14	44	58
Low Myopes	27	47	74
Emmetropes/ Hypermetropes	38	49	87
Total	79	140	219

metropes and hypermetropes. This was confirmed statistically ($\chi^2 = 6.1$; $n = 2$; $P < 0.05 > 0.02$). Thus trauma is more likely to be a causative factor in non-myopes than in myopes.

A χ^2 test showed that there was a significant difference between the two series ($\chi^2 = 19.476$; $n = 1$; $P < 0.001$). There is thus evidence of an association between trauma and youth in retinal detachment.

(3) *Refraction*.—219 cases were included in this investigation. Table III shows the numbers of cases with a positive and negative history of trauma in the three refractive groups defined above; there is an apparent increasing association between trauma and detachment as we go from the high myopes to the em-

Discussion

It has long been assumed that trauma (excluding perforating injuries and operations) is a precipitating cause of retinal detachment, but the evidence on which such an assumption has been based is scanty and inconclusive. Shapland (1934) found a history of trauma in 26 per cent. of detachments, Dunnington and Macnie (1935) in 30 per cent., Knapp (1943) and Massin (1954) in 13 per cent., Dollfus and Clop (1956) in only 10 per cent. The present writer's figures are 35.2 per cent. But these results prove nothing. What we must know is the incidence of trauma in a series of normal controls, a matter which has not been mentioned by previous observers.

The present investigations show that there is no evidence of an association between non-perforating direct or indirect injuries and immediate or delayed retinal detachment in general, but a definite association between trauma of this type and detachment in males, though not in females. This cannot be due to the fact that males are more liable to injury because of their more strenuous occupations or leisure activities, since such a consideration would also have applied to the control series and this was not so. Moreover, the proportion of normal males with a positive history of trauma (24 per cent.) was less than that of females with a positive history of trauma whether with detachment (31 per cent.) or without (29 per cent.). There must, therefore, be a susceptibility to the effects of trauma in males. It will be recalled that detachments resulting from anterior dialyses in young people are sometimes caused by the bursting of congenital retinal cysts (Joannides, 1947; Juler, 1947; Charamis, 1947; Sabbadini, 1947; Shapland, 1949; Jaeger, 1955), and that most of the pedigrees demonstrating the hereditary nature of this condition show X-chromosomal inheritance (Hamilton, 1946; Leffertstra, 1948; Feigenbaum, 1950; Sorsby, Klein, Gann, and Siggins, 1951; Levy, 1952). It has been the author's experience that detachments of this type usually occur in males.

It is therefore suggested that the preponderance of cases with a positive history of trauma in males is due to the inheritance of a retina in which there is a congenital cyst or other defect rendering it peculiarly susceptible to injury.

Analysis of the age incidence of detachment has shown a definite association between trauma and the younger age groups (under 40), an association which was suggested by Shapland (1949) and Jaeger (1955). This cannot be due to the fact that youth is more liable to trauma, for such a consideration would also have applied to the control series and this was not so. Possibly those in the older age groups are more likely to forget traumatic incidents, but on the other hand they will have had a longer time in which to suffer an injury.

It would seem that the explanation must lie in the susceptibility of the younger eye to the effects of trauma. The most likely possibility is a congenital weakness and it may be suggested here that the congenital cyst or other defect which predisposes to the formation of an anterior dialysis accounts for the susceptibility of the younger eye to the effects of injury.

With regard to the incidence of trauma in the different refractive denominations, we have seen that there is more likely to be an association between trauma and detachment in non-myopes than in myopes.

Moreover, the proportion of cases with a positive history of trauma (25 per cent.) in the series of high myopes with detachment is similar to that of normal cases with a positive history of trauma (25.47 per cent.).

It can thus be said that trauma is a causative factor in non-myopic but not in myopic detachments. This confirms the view of de Vincentiis (1955), for he also believed that trauma was a greater factor in non-myopes than in myopes.

Summary

251 cases of retinal detachment and 106 normal cases were investigated by taking appropriate case histories with a view to establishing the presence or absence of an association between trauma and detachment.

Differences between age groups and refraction groups were examined, and the results analysed statistically. The following conclusions were reached:

(1) There is no evidence that detachments in general are precipitated by non-perforating direct or indirect trauma.

(2) A difference between the sexes exists; there is a definite association between trauma and detachment in males, but not in females. This has been shown to be due to the susceptibility of some male eyes to the ill-effects of injury, and it is concluded that this is consequent on the inheritance of a retina in which there is a congenital cyst or other defect predisposing to the type of detachment associated with an anterior dialysis.

(3) Age is a factor in the incidence of trauma, the younger eye (under 40 years) being more susceptible to the effects of trauma than the older eye (over 40). The probable explanation again lies in the presence of an inherited congenital retinal defect.

(4) Trauma is a causative factor in non-myopic but not in myopic detachments.

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