

Fundus changes after traumatic hyphaema

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The role of trauma as a cause of retinal detachment has been widely discussed (Shapland, 1934; Knapp, 1943a; Gruber, 1963; Thiel and Kilian, 1963; Tulloh, 1968). Hyphaema is an indication of direct contusion to the eye and it was felt that a study of the retinal changes in this group would be worth while.

Material and methods

Sixty cases of traumatic hyphaema due to non-perforating injury were admitted during a 3-year period ending in June, 1971. Eight patients were not available for out-patient observation and this study deals with the remaining 52 cases.

The majority of patients were admitted to hospital and confined to bed except for toilet facilities. All were examined by indirect ophthalmoscopy whilst in the ward but mydriatics were not used apart from this. More extensive examination with scleral depression and the three-mirror fundus contact lens was deferred until a month after the injury.

Results

Seventeen of the 52 cases had fundus abnormalities (Table).

Table *Fundus findings in 52 cases of hyphaema*

Scattered retinal pigmentation	9
Retinal dialyses	2
Retinal holes	2
"White with and without pressure"	2
Retinal schisis	1
Vitreo-retinal condensation	1
Total	17 (33 per cent.)

COMMOTIO RETINAE

Five patients were noted to have this condition when the retina was first examined. In four of these the retinal periphery was involved, but in the fifth the macula was oedematous. All five patients developed chorio-retinal pigmentation within a month. Four others were found to have such pigmentation during the follow-up study. Although the patient with macular pigmentation had visual acuity reduced to 3/60 (Fig. 1, opposite), the others had no symptoms and no retinal breaks were found to occur in these areas.

RETINAL DIALYSES

Case 1 (Fig. 2, overleaf)

A 23-year-old man was struck on the left eye by the corner of a sheet of hard paper. He was admitted with a 3-mm. hyphaema and discharged after 7 days. When he was seen a week later

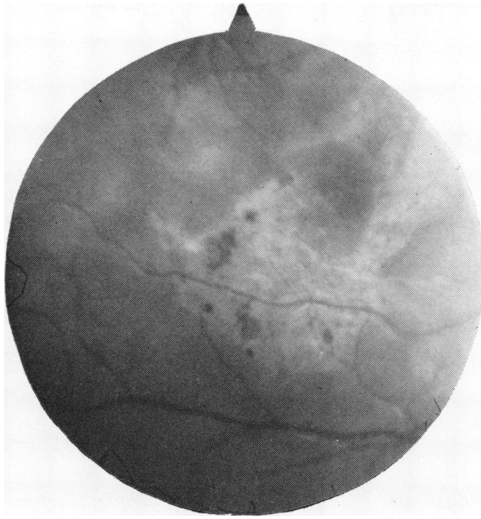


FIG. 1 *Traumatic chorio-retinal scarring at macula*

the retinal clinic he was found to have a flat lower temporal retinal dialysis which was later sealed off by cryotherapy.

Case 2 (Fig. 3)

A 14-year-old boy was struck on the left eye by a golf-club and admitted with a 4-mm. hyphaema. He was found to have a flat dialysis in the lower temporal quadrant when his fundus was examined a week later. The dialysis was sealed with cryotherapy.

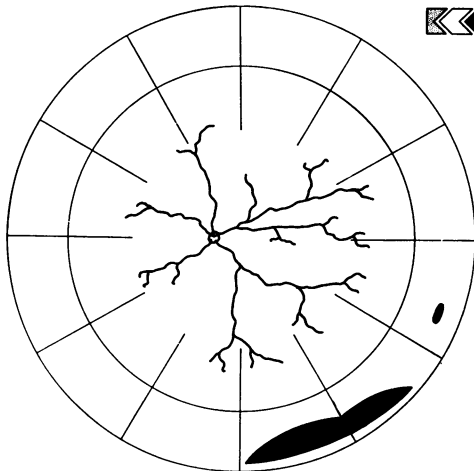


FIG. 2 *Flat lower temporal dialysis*

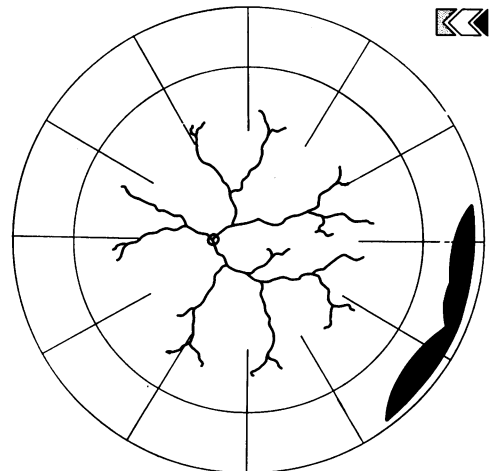


FIG. 3 *Flat lower temporal dialysis*

ROUND RETINAL HOLES

Case 3 (Fig. 4, overleaf)

A 20-year-old man was admitted with a small hyphaema after a blow from a piece of asbestos on his right eye. When he was examined later he was found to have a small, flat, round retinal hole with a free operculum in the lower temporal equatorial region. This was treated with cryotherapy.

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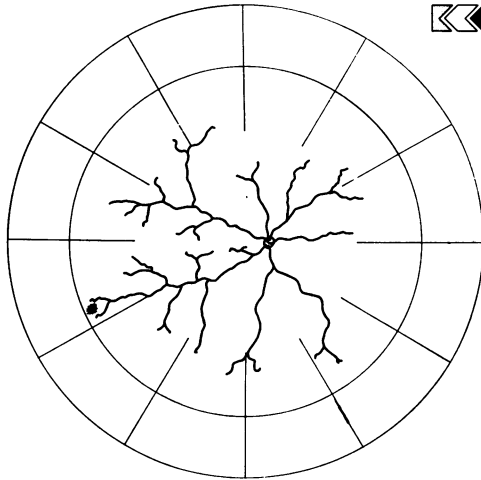


FIG. 4 Round, lower temporal equatorial retinal hole

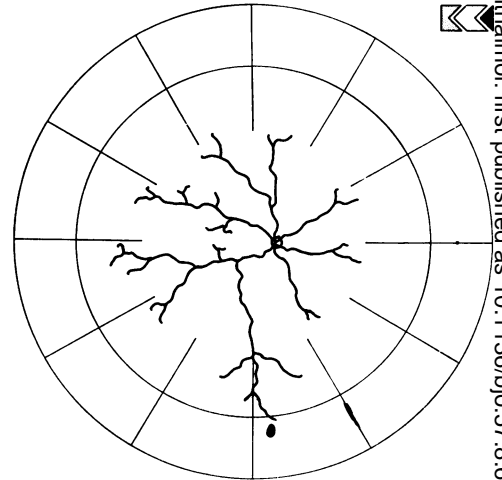


FIG. 5 Round, peripheral retinal hole at 6 o'clock

Case 4 (Fig. 5)

A 12-year-old girl had a 5-mm. hyphaema after a blow by a chestnut on her right eye. When examined later she was found to have a small, round, flat retinal hole without operculum in the far periphery below. The hole was sealed with cryotherapy.

“WHITE WITH AND WITHOUT PRESSURE”

Case 5 (Fig. 6)

A 20-year-old man had a small hyphaema after a squash-ball injury to his right eye. He was seen later in the clinic and found to have an area of “white with and without pressure” in the upper temporal periphery.

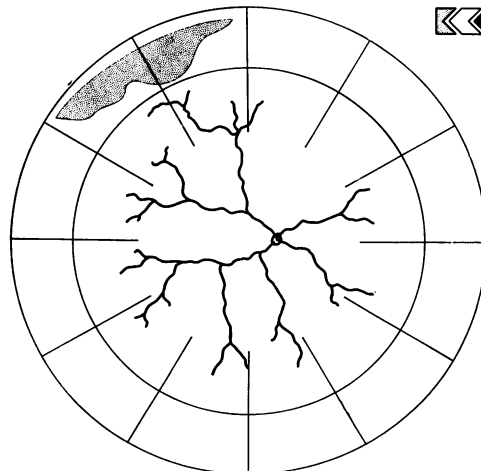


FIG. 6 Upper temporal area of “white with and without pressure”

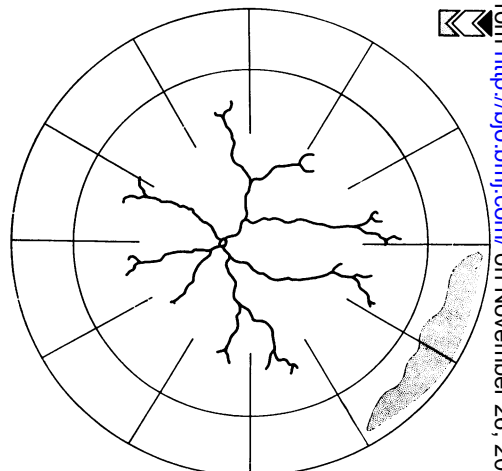


FIG. 7 Lower temporal area of “white with and without pressure”

Case 6 (Fig. 7)

A 25-year-old man with a 6-mm. hyphaema due to a golf-ball injury to his left eye was found to have an area of “white with and without pressure” in the lower temporal periphery.

RETINAL SCHISIS

Case 7 (Fig. 8)

A 14-year-old boy struck on the left eye by a paper pellet had a total hyphaema on admission, and six further haemorrhages during his 4-week stay in hospital. A month later he was found to have a large area of retinal schisis with massive pigmentary disturbance above. He was followed-up for 6 months when the schisis was found to have extended. A decision was made to treat this area with cryotherapy and, in view of the extensive chorio-retinal damage, surgical exposure was thought advisable rather than the application of the cryoprobe transconjunctivally. At operation the sclera over the area of schisis was found to be markedly thinned resembling a partial thickness rupture of the globe. The lesion has not progressed since cryotherapy.

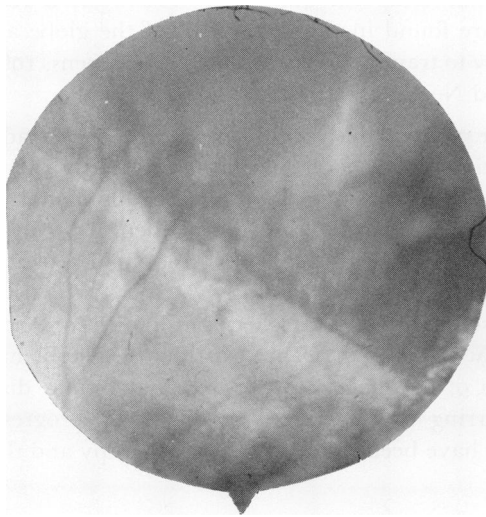


FIG. 8 Area of schisis with dense chorioretinal pigmentation (above)

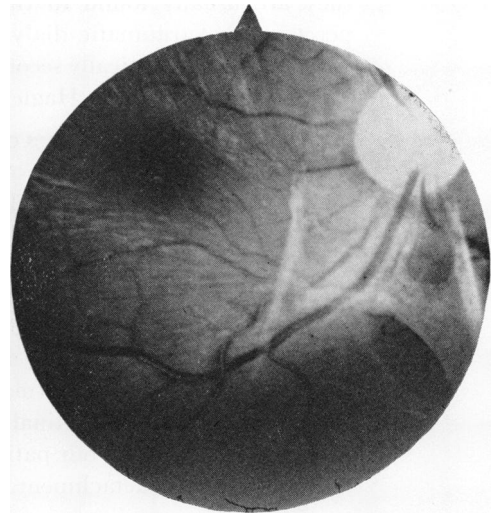


FIG. 9 Preretinal vitreous condensation below disc

VITREOUS HAEMORRHAGES

Case 8 (Fig. 9)

A 15-year-old boy, who had been struck on the right eye by a book, was admitted with a total hyphaema and tension of 50 mm. Hg. The hyphaema and raised tension settled without surgical intervention and he was seen to have a dense vitreous haemorrhage which slowly cleared over the succeeding few months. A year later the visual acuity had improved to 6/9 but he was noted to have a sheet of vitreous condensation below the disc. This probably represents the residue of the original vitreous haemorrhage.

Discussion

COMMOTIO RETINAE

Cox, Schepens, and Freeman (1966) described large irregular retinal breaks in areas of chorio-retinal degeneration after trauma, but in our experience commotio retinae does not give rise to retinal tears—indeed the chorio-retinal scarring which results probably gives rise to sufficient adhesion to prevent such a possibility. We feel that patients with this change in the retinal periphery do not require continued examination.

RETINAL DIALYSES

About 14 per cent. of all detachments are due to retinal dialysis (Shapland, 1934; Leffertstra, 1950; Cameron, 1960; Donaldson, 1967; Tassman, 1967; Hagler and North, 1968), the detachment being typically shallow, slowly progressive, and occurring in the younger age groups (Hagler, 1965).

There are three main aetiological factors involved in the development of a dialysis:

- (a) A small number of dialyses have been noted to develop from retinal cysts in the lower temporal periphery (Shapland, 1945; Duke-Elder, 1949), but they are rare.
- (b) Trauma is the cause of about 20 per cent. of dialyses (Leffertstra, 1950) and, again, they are usually found in the lower temporal quadrant. However, a relatively high percentage of traumatic dialyses are found in the upper half of the globe and an upper nasal dialysis is classically secondary to trauma (Weidental and Schepens, 1966; Tassman, 1967; Shanahan, 1967; Hagler and North, 1968; Ruiz, 1969).
- (c) The majority of dialyses occur spontaneously in the lower temporal quadrant without a definite history of trauma or retinal cyst, this being developmentally the weakest part of the retinal periphery (Tulloh, 1965). Supporting this developmental factor is the frequent finding of bilateral lower temporal dialyses, the incidence of bilateral dialyses being variously reported as between 4 and 20 per cent. (Shapland, 1932; Hagler and North, 1968; Hollwich, Junemann, and Damaske, 1969).

It is probable that the two dialyses described in this series fit into the second (traumatic) category, but it is difficult to say what part a pre-existing developmental weakness may have played in the formation of the dialyses. It is felt that retinal dialyses should be isolated by chorio-retinal scarring as they are very likely to progress to retinal detachment. Both of our patients have been treated with cryotherapy and there has been no sign of retinal detachment.

ROUND RETINAL HOLES

A review of the literature shows that about 5 to 8 per cent. of asymptomatic eyes have a retinal break (Okun, 1961; Byer, 1967; Rutnin and Schepens, 1967), and about 75 per cent. of these are round retinal holes. In one large series (Byer, 1967) these holes were associated with lattice degeneration in 50 per cent. of cases.

Most authors believe that these holes should not be treated but should be kept under observation. However, there are reports of flat retinal breaks which ultimately lead to detachment, sometimes years after the break was first noted, though most of these cases either had symptoms of "floaters" or "flashes" or a history of detachment in the fellow eye (Granström, 1943/44; Colyear and Pischel, 1956; Knapp, 1943b). There are also reports of serious complications after the treatment of flat tears, some by means of diathermy (Sédan, 1965) and some by cryotherapy (Shanahan, 1967; Delaney, 1971).

Points which various authors regard as indications for treating flat retinal breaks are:

- (1) Symptoms of "floaters" or "flashes".
- (2) History of detachment in the fellow eye.
- (3) Lack of any chorio-retinal pigmentation around the break.
- (4) An attached operculum with vitreous traction.
- (5) Large tears (rather than small round holes).

In a series of 204 normal eyes Rutnin and Schepens (1967) found seventeen round holes and fifteen of these were in the region of the ora serrata, only two occurring in the equatorial region. However, in a series of 160 cases of retinal detachment secondary to contusion, Cox and others (1966) described round retinal holes in the equatorial region in about 17 per cent. of cases and many of these had overlying opercula. These equatorial traumatic holes were most commonly found in the lower temporal quadrant.

It would seem that Case 3 would readily fit into the group of post-traumatic retinal breaks though the peripheral hole in Case 4 may well have existed prior to the trauma. It may be argued that the latter case should not have been treated, but it was felt that cryotherapy would avoid subjecting the patient to endless out-patient supervision, bearing in mind the low rate of complications encountered with treatment and the fact that the patient was only 12 years of age.

‘WHITE WITH AND WITHOUT PRESSURE’

The phenomenon of “white with pressure” was first described by Schepens. It is seen on indenting the retinal periphery; the depressed area, instead of appearing reddish-orange as in the normal eye, takes on an opaque white appearance; in particularly marked cases the area has a white appearance even without indentation, this lesion being termed “white without pressure”. These white areas usually have a geographical outline posteriorly which is well demarcated from the surrounding normal retina (Schepens and Regan, 1965). The significance of these areas is not fully understood, but histological examination of a case of “white with pressure” has shown the lesion to coincide with an area of marked retinal atrophy with vitreo-retinal adhesion and a retinal tear at the posterior margin of the zone of atrophic retina (Watzke, 1961). Clinically, cases of “white with pressure” have been shown to correspond to areas of vitreo-retinal adhesion, particularly in eyes with posterior vitreous detachment. Vitreous can often be traced to the posterior limit of the “white with pressure” area.

The “white with pressure” sign has been noted in areas of retinoschisis (Shea, Schepens, and von Pirquet, 1960) and in the retinopathy of prematurity (Tassman and Annesley, 1966), and is a common finding in the periphery of fundi with cystoid degeneration particularly in the elderly; it has also been described as a normal finding peripheral to the equator in Negro eyes (Schepens and Regan, 1965). Rutnin and Schepens (1967) found “white with pressure” in 31.9 per cent. of normal eyes, but the incidence was only 4.5 per cent. in the second decade whereas it was 66.7 per cent. in the eighth decade. It would appear that Cases 5 and 6 in our series match the incidence found in normal eyes in the second decade.

RETINOSCHISIS

This condition is often classified into two main types—degenerative and idiopathic. However, there are several causes of secondary retinoschisis, and it was felt that Case 7 was definitely related to trauma, particularly as marked scleral thinning was found to overlie the area when it was treated. Careful study with the three-mirror contact lens did not reveal a hole in either layer of the schisis, and thus the extension of the lesion appeared to be an increase in the schisis rather than the formation of an associated retinal detachment.

VITREOUS HAEMORRHAGE

This is not a very common finding in cases of traumatic hyphaema, but it is commonly found in cases of total hyphaema particularly when the intraocular pressure is significantly

elevated (Brodrick and Hall, 1971). Some degree of vitreous condensation and gliosis is liable to be found when the haemorrhage clears as was seen in our Case 8.

Conclusion

Injury sufficient to cause hyphaema warrants detailed examination of the retinae of both eyes. A suitable time for this is a month after the trauma. If retinal changes have occurred they will be visible at this time. Thus, patients with no retinal pathology do *not* require repeated re-examination. However, the patient may require continued observation on account of recession of the anterior chamber angle and the possible later development of secondary glaucoma.

Patients with commotio retinae do not appear to suffer any serious consequences unless the macular area is involved and secondary changes develop. The management of retinal breaks is more contentious. Retinal dialyses merit treatment which should be aimed at sealing off the break from neighbouring retina. The treatment of small round tears can be left to the discretion of the surgeon, but it is unrealistic to expect indefinite follow-up from young patients—on account of this it was decided to treat the lesions in our two cases. Retinoschisis is a condition in which the natural history of progression is poorly documented—most cases can be safely watched unless there is clear evidence of spread. Similarly, areas of “white with pressure” can be safely observed.

Summary

The retinal findings in 52 cases of patients who suffered from traumatic hyphaema are presented. Seventeen of these had fundus abnormalities (Table) and these are discussed in relation to the trauma.

We wish to thank Mr. Dermot Piense for permission to examine his patients and Mrs. S. Tant for secretarial assistance.

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