THE BRITISH JOURNAL

OF

OPHTHALMOLOGY

JULY, 1943

COMMUNICATIONS

CHOROIDAL DETACHMENT

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INTERNATIONAL ophthalmology has recently given much thought to the treatment of detachment of the retina. This paper deals with a poor relation, namely detachment of the choroid, and like the poor relation it occupies a position of insignificance in text-books where it is as often as not ignored entirely or briefly dismissed with a few words. Yet, like the poor relation, although in the background, it may be the cause of a great deal of trouble. In 1868 Knapp reported the history and pathological examination of a case of choroidal detachment which he had removed by mistake for sarcoma. It occurred in the era when the classical iridectomy was much in favour for acute glaucoma and it is little wonder that many eyes came to be enucleated for tumour when, after the oedema of the cornea had improved following an iridectomy, a choroidal detachment became visible. Several eyes also suffered the same fate in connection with cataract about that time. Graefe and Liebreich were early observers, along with Michel (1878), Beyes (1878), Hjort (1882), Hay (1880), Groenouw, Elschnig (1891), Story (1891), and Devereux Marshall (1895). Their cases were all associated either with cataract extraction or with iridectomy which by this time was in general use. In 1900 the interest of Fuchs resulted in a classical paper and by 1902 he had seen 37 cases of choroidal

detachment which had occurred on 23 occasions after 493 cataract extractions and on eleven occasions after 14 iridectomy operations for acute glaucoma. The trephine at this time was not being used to any great extent. He formulated a theory that the aqueous passed through a rent into the suprachoroidal space separating the choroid and retina together.

This was not entirely accepted, notably by Dor: another school supported the theory of choroidal exudation. Further pathology was discussed by Augstein (1901), Biette (1901), Axenfeld (1902) and Demaria (1904).

The filtration age of glaucoma subsequently followed with the advent of the Elliot trephine and the Lagrange sclerectomy.

Schur in 1913 reported on the occurrence of three cases of choroidal detachment following the Elliot trephine operation. Maschler in 1920 had previously reported choroidal detachment of a persistent type which followed a trephine operation, whilst Hagen in the following year had found that 76 per cent. followed the trephine operation and 22 per cent. were noted in cataract cases in an analysis of 66 cases of choroidal detachment.

In 1930 Rubert systematically examined a series of 50 cases of chronic glaucoma 48 hours after trephine operation at Riga and found that 50 per cent. showed detachment of the choroid: he remarked that the separation was peripheral and more often nasal than temporal and more pronounced in elderly people.

By this time, an opinion was rapidly gaining support that choroidal detachment was an occasional occurrence with an invariable good prognosis. Up to 1921 experimental work was limited to that of Meesman who was able to demonstrate choroidal detachment in the absence of high tension, by means of a persistent corneal fistula, resulting in hypotony and choroidal exudation.

More recently in 1934, Dor described a case of glaucoma in which a bilateral trephining was carried out. A choroidal detachment occurred two months after the operation in one eye and against his own convictions but in deference to those of several colleagues, he enucleated the eye for sarcoma thereby repeating the mistake of his father in 1896. His conclusions were that choroidal detachment is of much greater frequency than is generally recognised; that it is often confused with choroidal sarcoma, and that diascleral transillumination is no certain guide in differential diagnosis. Pathological appearances showed interstitial choroidal haemorrhages, general oedema of the choroid, and sub-choroidal exudation without blood. Other spontaneous choroidal detachments have been described by Meller, Fleischer, Bussy and Würdemann.

And so to the present time, when sterility in the literature is largely responsible for the discrepancies which occur in international text-books, some giving a good prognosis, others a bad prognosis, whilst in others no mention at all is made.

There are several theories of which mention only is made as to the cause of these choroidal detachments. There is that of Haab who believed detachment to be a cyst; of Velhagen that there were cyst-like detachments in the epithelium of the ciliary body and of Lindemann that the detachment was a swollen and blood-stained cortical mass in the vitreous. Hudson's theory is that a serous exudate arises from the choroidal blood vessels, particularly from the choroidal veins and that under conditions of abnormal low tension, aided by negative pressure, free fluid transudes which is absorbed when the tension becomes re-established. These views are not entirely acceptable to-day. The theory of Fuchs seems to be the most rational, but one objection to this is that Heine has observed only one case of choroidal detachment in many hundreds of cases of cyclodialysis.

Barkan lists four classes of choroidal detachment :

1. Tear of the ciliary body with the aqueous percolating into the suprachoroidal space. (Simple type).
2. Traction on the choroid and retina by organising masses in the vitreous. (Traction type).

FIG. 1.

Simple choroidal detachment 48 hours after trephine operation.

3. Sub-choroidal haemorrhage. (Degenerative type).
4. Massive choroiditis with sub-choroidal exudate. (Inflammatory type).

The choroidal detachment which is the subject of this paper in particular is the first or simple type.

Meller has classified this simple type of choroidal detachment into (i) immediate, (ii) delayed, and (iii) spontaneous.

The following case is an example of the immediate and common type. It is illustrated by Fig. 1.

FIG. 2.

The same choroidal detachment 3 days after trephine operation.

The patient was a woman of 61 years who had been trephined for chronic glaucoma simplex by the classical method. Forty-eight hours after operation the condition of her eye was as shown in Fig. 1 with a large detachment of the choroid in the temporal half. The usual appearance is well seen. The swelling shows no folds and has a sharply cut edge; occasional patches of pigment show up distinctly towards the ora serrata. The dark colour of the swelling distinguishes the condition from a simple spontaneous retinal detachment. No holes or tears are seen. At this time there was no filtration bleb and no formation of the anterior chamber. Fig 2

shows the condition three days later and by the end of the week the detachment had disappeared, coincident with re-formation of the anterior chamber and good filtration.

The second type of Meller's classification is the delayed choroidal detachment which is illustrated by Fig. 3. This patient was a man aged 64 years who had been operated on by double trephine for glaucoma three years previously. The result had been satisfactory but suddenly there came a deterioration of

FIG. 3.

Delayed choroidal detachment 3 years after successful trephine operation.

vision probably caused by the rupture of an ectatic bleb. Fig 3 shows the condition which was found at that time. There was almost a total peripheral choroidal detachment except for an area at "12 o'clock." With this there was hypotony, no anterior chamber, and marked miosis. Operative treatment, as will be described later, resulted in the complete disappearance of these choroidal detachments in ten days with the restoration of the field.

I regret that I have no example to describe of the spontaneous type as these cases are extremely rare. Meller and Fleischer report the only cases which I have been able to find.

It was decided to carry out experimental and clinical investigations into the cause and treatment of choroidal detachments in animals and man. In animals, an endeavour was made to produce detachment of the choroid by trephining a cat's eye at various levels of increased intra-ocular pressure.

The cat was anaesthetised by chloralose and the tension of an eye raised to 40, 60 and 80 mm. Hg by injecting saline into the vitreous chamber.

A 2 mm. trephine opening at the limbus was made in the usual manner and the choroid examined ophthalmoscopically at half-hour intervals for four hours, and subsequently on the following three days. Results were unsatisfactory and no detachment of the choroid was produced in any animal.

In man the routine procedure was to examine the fundus of every case of trephine, cataract, and iridectomy within 48 hours of operation. In all there were sixty eyes with cataract extraction, both of extra and intra-capsular type, and eighty eyes which had had a trephine operation. Six were cases of iridectomy for sub-acute glaucoma. Two choroidal detachments were noticed amongst the

FIG. 4.

Result of prolonged detachment of the choroid and delayed reformation of anterior chamber.

cataract cases in the extra-capsular group, both of the immediate type and in the upper temporal area, and both subsided without untoward result. In the eighty trephine cases, 18 showed choroidal detachments of various sizes three days after operation. Of these 18 cases two resulted in a long convalescence with delayed reformation of the anterior chamber and hypotony. One healed without filtration and the other showed capsular changes and subsequent lens opacity. Fig. 4 illustrates the unfortunate end-result of the latter case. The tag from the anterior capsule passing to the posterior surface of the cornea is seen below. In this case the anterior chamber did not reform for three weeks and persistent hypotony was maintained. In one case of absolute glaucoma an experimental trephine was done and a choroidal detachment was produced by sub-choroidal haemorrhage, resulting in heterochromia of the iris from blood staining and persistent subnormal tension. No choroidal detachment was noted after broad iridectomy in the four cases of acute glaucoma.

Gradle has reported two cases lasting three weeks following detachment of the retina treated by Larssen diathermy. I have not been able to discriminate this type of choroidal detachment.

As the result of investigations into this condition the following conclusions as to aetiology have been reached:—

1. That detachment of the choroid is primarily due to a forward movement of the diaphragm, consisting of ciliary body, suspensory ligament and lens. This probably results in a tear near the ora serrata. In order that such a movement forward be possible, there must be a sudden loss of the anterior chamber and to my mind this is the primary cause and not the result of a choroidal detachment. In the case of a trephine operation, a choroidal detachment of the immediate type is always associated with a leak either from the conjunctival flap or from the trephine bleb. It was possible to demonstrate this frequently by Seidel's fluorescein test. The fluorescein, whilst flowing over the conjunctiva remained green, but as soon as it came in contact with the leaking aqueous from the flap, precipitation occurred and a fine streak of the usual bright green colour could quite easily be detected.

2. Individual technique in the trephine operation has no bearing. It occurs in cases of 2mm. and $1\frac{1}{2}$ mm. trephines, with complete iridectomy or with peripheral iridectomy, and irrespective of initial tension. My feeling is that the reason a choroidal detachment occurs in some trephines and not in others is due to a difference in the depth of the anterior chamber. It is more prone to occur in those cases of chronic glaucoma where the anterior chamber is deep, thereby allowing a greater forward movement of the iris-lens diaphragm.

3. When the peripheral tear in the choroid heals, the aqueous

then passes into the anterior chamber. If the conjunctival flap is sealed and has no leak, the anterior chamber re-forms and the filtration bleb appears. The fluid in the choroidal detachment is subsequently absorbed.

Treatment of choroidal detachment is almost generally ignored in all text-books. In a personal communication with the late Colonel Elliot, he said that he felt the best thing to do was to get the patient out of bed, and was of opinion that most cases righted themselves. Meller reports one case treated by diathermy, while Verhoeff has suggested scleral puncture to release the sub-choroidal fluid. This has not been found to be successful and that is to be expected.

The most satisfactory form of treatment seems to be associated with a closure of the fistula in the conjunctival flap. In the case of delayed choroidal detachment (Fig. 3) all that was done was to demonstrate a leak close to the trephine hole. This was subsequently covered by a vizor conjunctival flap and the choroidal detachments slowly absorbed within ten days.

There are one or two sequelae of choroidal detachment which must be borne in mind. First of these is the fact that when a trephine case has had a choroidal detachment of prolonged duration the trephine bleb is usually flat and filtration is subsequently scanty. Secondly if the anterior chamber remains unformed for longer than a week, an attempt should be made to seal the leak and to refill the anterior chamber with saline, as there is then a real risk of anterior capsular changes by contact.

These investigations were carried out in 1938 during my tenure of the Lang Research Scholarship at the Royal London Ophthalmic Hospital, to the Trustees of which I express my gratitude. Delay in publication is due to war service.

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THE RELATION OF RIBOFLAVIN TO THE EYE. A REVIEW ARTICLE

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RIBOFLAVIN became of immediate interest to ophthalmologists after the publication by Sydenstricker, Sebrell, Kleckley and Kruse (1940) of the paper in which they describe the ocular signs of ariboflavinosis in man. In fact, so much interest was aroused that a year later the Science News Supplement to Science (1941) carried a report from an eye specialist in Maine that 80 per cent. of people examined showed evidence of both past, chronic or new signs of deficiency of riboflavin. If the eye specialist made a return trip at the present time it is doubtful if he would reach the same conclusion, since the last two years have been spent in defining the true signs of riboflavin deficiency in man and animals.

Uncomplicated riboflavin deficiency in man probably never occurs. The diet is, in practice, always deficient in more than one of the vitamin B complex constituents. In the series of cases described by Sydenstricker, nicotinic acid, thiamin, ascorbic acid and cod liver oil were added to the diet in order to make the deficiency of riboflavin the dominating one. Ocular signs may be noticeable before other disorders. The patient seems usually to complain of photophobia and dimness of vision, and on examination circumcorneal injection is seen, and, to quote Sydenstricker *et al.*, "The earliest change that can be recognised with the slit-lamp is marked proliferation and engorgement of the limbic plexus with the production of great numbers of very narrow capillary loops which outline the extreme margins of the scleral digitations and obliterate the normal narrow avascular zone between the plexus and the sclerocorneal junction. . . . The cornea is actually invaded first by very small capillaries arising from the apexes of loops surrounding the scleral digitations. . . . Such capillaries lie just