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IRIDOSCHISIS WITH MULTIPLE RUPTURE OF STROMAL THREADS*

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THIS remarkable clinical picture is characterised by local division of the iris stroma into two layers, the anterior of which floats in the aqueous. Some of the anterior-stromal fibres rupture, and their distal ends float freely in the anterior chamber.

A search of the literature has revealed eight previously recorded cases: Schmitt (1922)⁴; Drabkin (1923)⁵; Sander (1925)⁶; Vogt (1926)⁷; Schoenberg (1927)⁸; Imre (2 cases, 1927)⁹; and Dollfus (1927)¹⁰.

Six of these patients were between 65 and 94 years of age, with otherwise normal eyes or senile cataract. The seventh, that of Vogt, aged 70 years, had chronic cyclitis. The iris in each case (to use Sander's expression) "looked as if teased by a crochet needle," the change being most marked in the lower half. No biopsy was performed, or theory of aetiology developed, except that Vogt suggested gravity tended to localise the change to the lower part of the iris.

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The eighth case, that of Schoenberg, was a man aged 51 years, with deep cupping of the disc from chronic glaucoma, and would appear to fall into another group altogether, as traumatic ruptures were found throughout the whole thickness of the iris following a dive into water from a height of 108 feet. The curly stromal threads tended to remain attached to the sphincter rather than the periphery of the iris.

Our own case showed advanced changes of the first type, in both eyes. Excision of one eye for absolute glaucoma has allowed of the first biopsy of the condition for which we would propose the name "Iridoschisis" (iris splitting). A biopsy of iris removed at a preliminary iridectomy was promised by Dollfus in his case, but no further record can be found of this in the French literature so far.

Clinical picture

The patient was a woman aged 76 years, osteo-arthritic, but otherwise healthy. In addition to a fixed determination "to have no more operations," she had a poor memory, which made it difficult to obtain a history. No detailed early records are available of the case, but Dr. R. C. Jameson of Leeds, her family doctor, stated from his notes that in 1924 she had bilateral iritis, followed in 1928 by bilateral iridectomy for glaucoma.

It has proved impossible to establish whether, in fact, the so-called iritis was an early glaucoma or not. The iridectomy was of the broad basal type, and not a trephining.

When next examined in 1940 for failing vision, and recurrent ocular pain, both eyes showed a complete broad basal iridectomy, a nuclear cataract, normal optic discs, and senile macular degeneration. She had a normal tension (20 mm. Schiötz), vision of 6/24 with $+1.0/-2.5$ axis 90° , and a curious change in the lower part of the iris resembling plants floating in a pool. The threads were arcuate, but not curled as in Schoenberg's case. The impression of floating seaweed or plants was heightened by the glaucous colour of the iris fronds arising from the dark rock-brown of the stroma, and waving slightly with the movement of the eye. The photographs 1 and 2 show this very well.

The patient was demonstrated to the North of England Ophthalmological Society in December, 1940, under the title of "Iridoclasia spontanea."

The patient failed to return to hospital owing to fear of operation, until July, 1944. She then attended with intense pain and complete blindness in the left eye due to absolute glaucoma. The oedema of the corneal epithelium was so marked that the lower half of it had separated from Bowman's membrane, forming a

small bag containing fluid. Excision under local anaesthesia and convalescence were uneventful.

The condition of the other eye was unaltered, except for an increase in the cataract, which had reduced the vision to 6/60. The tension was still within normal limits, and the iris condition unchanged.

Anatomical findings

As, after fixation in formol, the cornea displayed a dense yellowish opacity precluding slit-lamp examination of the iris, it was excised close to the limbus, and the eye placed in a glass trough with parallel walls. This allowed both slit-lamp examination, and photography at high magnification by reflected light, as shown in Figs. 1 and 2.

The iris tissue is generally atrophic, and the anterior layer preserved on either side of the upper part of the iris coloboma only (Fig. 1). Elsewhere it is represented by thin floating membranes in the extreme periphery between 6 o'clock and 9 o'clock, and in the temporal half by a fragile greyish tissue like the finest lace. Filmy greyish threads are visible both embedded in and floating in front of the red-brown posterior layers of the lower half of the iris.

The collarette has disappeared entirely. By diaphanoscopy five irregular ragged approximately oval areas of atrophy can be detected closer to the pupil than the periphery. The pupil adheres to a silvery cataractous lens by posterior synechiae, and ciliary processes can be seen through the coloboma.

After antero-posterior division of the globe, three portions of iris were removed. The first was embedded in gelatine preparatory to staining for fat, the second for flat section in paraffin, and a third larger portion in celloidin.

Physiological fatty changes of senile origin were found in the periphery of the cornea, the sclera, ciliary body, and in Bruch's membrane. The atrophic iris tissue was, contrary to expectation, free from fat.

The iris cleft illustrated in Figs. 3 and 5, is approximately parallel to the posterior sheath and reaches to the root of the iris at the dilator level. Similar centripetal clefts at an oblique angle reach the ciliary region terminating in the pigmented layer (Fig. 6). The superficial pigmented iris tissue in front of this is thickened.

At the point where the pigmented operculum ends, the dilator muscle is interrupted by irregular heavily-pigmented tissue from which very loose, scanty, irregular, stromal tissue radiates in a fanlike fashion, not unknown in dark pigmented irides (Fig. 7).

Elsewhere the cleft is less extensive, tending to resemble normal iris crypts.

Here and there free threads appear in the sections (Figs. 3 and 4) completely separated from other iris tissue, and containing a blood vessel with well-preserved and thick, glassy, endothelium, whose lumen is filled with red blood corpuscles.

The dilator is not only well preserved, but at one point hypertrophied, and a thickening of the nuclei to 6-8 rows is observed (Fig. 5).

The sphincter fibres were seen on one slide only, and were normal. The posterior part of the eye did not reveal any pathological changes.

Discussion

Our case appears to be in a much more advanced stage than those previously described. While it is difficult to say with certainty whether the causation is senile or traumatic, the involvement of the *entire* iris in both eyes would appear to diminish the likelihood of operative trauma, and assign the case to the senile group.

The cleavage of the iris in this particular plane may have an anatomical basis, as E. Fuchs has described a certain degree of separation of the anterior and posterior iris stroma, which is potential (*i.e.*, a thinning of the tissue) rather than actual.

A mechanism for such separation suggested by Eisler² is that the posterior stromal lamella being less cell-rich than the anterior, may contract more easily than the latter, which is stiffer and richer in cells. The result is a thinning of the intermediate layers, which we assume may ultimately rupture as in our case.

The fanlike radiation of iris fibres from points in the dilator near the iris root is physiological, and can be detected in normal irides. In our case this area appeared to be scarred, as not only was the pigment irregularly distributed, but the fibres were distorted, in a crisscross fashion, suggestive of scar tissue contraction (Fig. 6).

While the dilator muscle is undamaged, the curious local multiplication of its nuclear layers is worthy of mention, as seemingly it has not been previously recorded.

We cannot offer any explanation of this change.

It is noteworthy that each free stromal thread is centred on a blood vessel containing red corpuscles.

As slit-lamp appearances suggest that many of these fibres have ruptured spontaneously, it is peculiar that in no case record of the senile group is spontaneous hyphaema mentioned. The explanation probably lies in the structure of the iris vessels.

The vessels of the normal iris are in the unique possession of a

FIG. 2.
Stereoscopic view of iris.

FIG. 3.
Cleft in iris containing two threads. X60.

FIG. 4.

Isolated thread showing blood filled vessel. Longitudinal section.

FIG. 5.

Double cleft and local thickening of dilator.

FIG. 6.

Fanlike loose tissue arising from dilator.

FIG. 7.

Fanlike tissue in a gelatine frozen section. Sudan staining negative.

double coat separated by a relatively large space filled with gossamer-like tissue. The outer adventitial coat is continuous with the iris stroma (Wolfrum)¹. This arrangement makes for the greatest freedom of movement (Wolff)³. The wall itself is normally so much thicker than that of the vessels of the ciliary body and choroid, that pathologists (often in our opinion erroneously) describe them as being sclerotic, when they are in fact normal.

The decreased tendency to haemorrhage is well shown by the relatively slight incidence of haemorrhage following iridectomy, where a multitude of small vessels are divided, compared with cyclodialysis, where the thinner-walled vessels of the ciliary body are disturbed.

It is suggested that the basis of the change here described is an aggravation of the physiological senile atrophy of the intermediate tissue of the iris. We cannot entirely exclude the atrophic effect of lytic substances in the aqueous, originating in glaucomatous metabolism in our own case, but in the absence of this disease from the other recorded cases we feel that this plays only a secondary part, if at all, to purely senile changes.

Ultimately, the thick-walled vessels only connect the two layers of the iris, the anterior of which finally becomes detached.

In cases of extreme iridoschisis like ours, the vessel-containing threads rupture, and float in the aqueous.

As the vessel wall is more rigid in old age, these threads remain moderately straight, or slightly curved. In younger people, for example, the case described by Schoenberg, their greater elasticity tends to make them curl. Senile vessels are, on the other hand, friable and tend to rupture.

Summary of case

A clinical and histological description is submitted, of unusual iris changes in a woman aged 75, with long standing glaucoma.

These changes consist of a deep cleft between the anterior and posterior stroma layers of the iris, parallel to the latter. The anterior layers are largely atrophic, and such tissue as remains splits up into fibres which are centred on a blood-containing vessel. These fibres are attached to the ciliary portion of the iris, and are freely floating distally in the aqueous.

We suggest the name of "Iridoschisis" for these changes.

The clinical and histological findings suggest that the mechanism of these changes is the exaggeration of a physiological ageing process of the iris, in which the middle layers become atrophic. Subsequently the two layers are separated, and finally the threads of the anterior layer which remain and contain a blood vessel, rupture, and float freely at one end.

The basic change is senile, but the process may be aggravated by proteolytic enzymes (Lysins) in the aqueous, the product of glaucomatous metabolism.

REFERENCES

1. WOLFRUM.—*Handbuch des. Augenheilkunde, Graefe-Saemisch-Hess.* Teil 1, Band 1, Abt. 2, Kap. 3, p. 197.
2. EISLER.—*Anat. des Auges. Kurzes Handbuch der Augenheilk.*, Vol. I, p. 91.
3. WOLFF, E.—*Anatomy of the eye.* Second edition, p. 65.
4. SCHMITT.—*Klin. Monatsbl. f. Augenheilk.*, Vol. LXVIII, p. 214, 1922.
5. DRABKIN.—*Ibid.*, Vol. LXXI, p. 188, 1923.
6. SANDER.—*Ibid.*, Vol. LXXIV, p. 729, 1925.
7. VOGT.—*Ibid.*, Vol. LXXVII, p. 710, 1926.
8. SCHOENBERG.—*Arch. of Ophthal.*, Vol. LXVI, p. 538, 1927.
9. IMRE, J.—*Ibid.*, Vol. LXVI, p. 539, 1927.
10. DOLLFUS, A.—*Bull. Soc. d'Ophthal. de Paris*, p. 170, 1927.

PERIARTERITIS NODOSA AFFECTING THE EYE*

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PERIARTERITIS nodosa is a rare and usually fatal disease of blood-vessels first described by Kussmaul and Maier in 1865, and subsequently treated at considerable length in the literature, chiefly, in consequence of its baffling symptomatology, by pathologists. It is exceptional for recognition to be possible during life unless subcutaneous nodules occur which on biopsy show the characteristic changes.

Occasionally the ophthalmologist is given an opportunity to assist in the diagnosis, but there are very few of the published cases where the ophthalmoscope has revealed more than a quite ordinary albuminuric retinitis. Yet in a very important percentage of the eyes which the pathologists have examined, they have discovered inflammatory disease of the choroidal and ciliary vessels, and it is a matter for regret that more ophthalmoscopic observations have not been made. The case we shall describe may throw some light on the ophthalmoscopic appearances which may occur in the disease.

It is not intended in this paper to enter into a discussion of periarteritis nodosa in its general manifestations. There is no agreement on the pathogenesis of the condition, but as to the pathological changes which occur there is no difference of opinion. The name is descriptive of the changes seen in the larger vessels, particularly those with vasa vasorum, but the ophthalmologist is concerned rather with vessels of smaller calibre.

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