

## MACULAR COLOBOMA: HISTOLOGICAL REPORT

BY

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THE literature on macular coloboma contains six histological reports. With the exception of one case—that of Rintelen reported in abstract—none is free from objection and none barring the doubtful exception of Deyl's case and the inadmissible case of Janku, refers to a case observed clinically.

(1) Bock (1885). This report concerns the accidental discovery of ectasia at the posterior pole of the two eyes in a man who died, aged 32 years, from pneumonia. No clinical details were available.

(2) Deyl (1898). In a boy who died, aged 5 years, there was hydrocephalus and cleft palate. Clinically there had been observed pale discs in both eyes and a central non-excavated lesion 5 D.D. wide in the left eye; in between this lesion and the disc there was a pale red area with greyish lesions containing vessels.

(3) Van Duyse (1898). In this case a cyclopean eye with two lateral (macular) colobomata forms the basis of the report.

(4) Parsons and Coats (1906). In a female child there was observed at birth an orbital swelling which ultimately led to the death of the child after operation at 9 months. Clinically the right eye was smaller than the left and showed coloboma of the optic nerve, together with other fundus abnormalities "difficult to examine, and the interpretation . . . also difficult." Post-mortem the orbital tumour proved to be an encephalocele, growing from a highly abnormal brain, whilst the eye defects consisted of (1) a cystic bulging on the nasal side of the disc; (2) a large coloboma of the nerve entrance, and (3) "a defect of pigment epithelium in the macular region corresponding with the white patch seen with the ophthalmoscope in this situation;" the fovea itself was intact.

(5) Janku (1923). This study dealt with the eyes of a hydrocephalic boy, aged 11 months [?16 months]. The brain was not examined histologically, and the eyes were studied because Janku considered they showed macular colobomata. Widespread inflammatory reactions were found and parasitic cysts  $14 \times 22\mu$  to  $24 \times 30\mu$  were present. Janku held that in his case an inflammatory lesion of the choroid leading to congenital macular coloboma had been set up by intra-uterine infection with a parasite. This case must now be regarded as inadmissible. Apart from the fact that clinically the diagnosis of coloboma is doubtful, the recent study by Wolf and Cowen has established a distinct

clinical entity—encephalitozoic encephalomyelitis—a widespread neurological affection caused by intra-uterine infection by a protozoan. Janku's case is regarded by them as the first recorded instance of this affection. That ocular complications are not an essential feature of this affection is suggested by their reference to another case report.

(6) Rintelen (1934). From the brief report available it is not clear whether the condition was observed clinically. Histologically all the layers at the site of the coloboma were thinned. The choroid was either completely absent or present as a thin layer of pigmented connective tissue; the sclera was reduced to one-third of its thickness; the pigment layer of the retina was missing and at the margins of the coloboma the retina formed an arch. Over the coloboma, only the innermost layers of the retina could be made out. There was no evidence of any inflammatory reaction, and Rintelen regarded failure of development of the pigment layer as the primary fault, the choroidal defect as a secondary feature and the changes in the sclera and retina as the consequences of the choroidal defect.

In addition to these six reports there is a clinical and histological observation by Wexler and Last of coloboma of the optic disc in a (unilaterally) highly myopic eye which also showed changes at the macula, regarded by the authors as probably myopic in origin rather than of the type of congenital coloboma. The retina and choroid over the macular area were poorly developed, laminated fibres of the supra-choroidea appeared to have replaced the choroid for the most part.

Apart from these observations on human eyes there are also the histological findings reported by Hess for the right eye of a rabbit, and by Zimmermann for the left eye of a dog.

These anatomical studies of doubtful material do not go beyond the finding of absence to varying degrees of the pigment epithelium, choroid and retina, except that in Parsons and Coats' case the defect was confined to the pigment epithelium only. Deyl held that his case supports the view of Lindsay Johnson, that colobomata are caused by choroidal naevi. Reviewing the cases of Bock, Deyl, Hess and Zimmermann, Ida Mann in 1926 concluded that they present evidence in favour of macular coloboma being due to intra-uterine inflammation—a reading that is not warranted either by the validity of the material or the findings reported.

*Case Report.*—The patient from whom the eye here described was removed, was a man aged 52 years, seen when unconscious and dying from cerebral thrombosis. The right eye was emmetropic and normal; the left was myopic to about 6 dioptries and showed a typical non-pigmented macular coloboma excavated

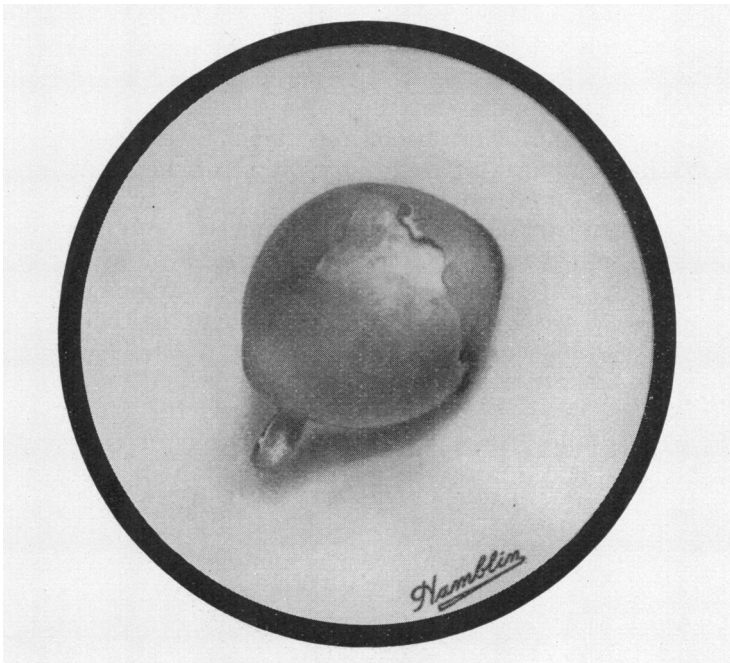
to at least 20 D. There were no changes associated with myopia apart from a small temporal crescent, separated by healthy tissue from the macular coloboma; the condition was distinctly a macular coloboma and not a generalised staphyloma posticum verum.

The eye was excised *in toto* and hardened in formalin. There was a distinct bulging of the sclera in the macular region, this bulging area being clearly separated by a normally shaped sclera extending to the disc (Fig. 1).

*Histological examination.*—From the point of view of discussion of the aetiological factors concerned in the condition of macular colobomata the histological picture is somewhat disappointing since the changes present are so extensive as to make it difficult to base suggestions concerning aetiology on them.

Of the coats in the region of the coloboma the choroid shows the most marked and the retina the least marked changes. Scleral changes whilst prominent do not compare with those seen in the choroid.

In the area corresponding with the region of greatest bulging the choroid is represented by a thinned stratum of connective tissue devoid of blood vessels and showing pigment in small amount only. This avascular zone appears to be limited to a



Wet specimen of eyeball.

small area measuring some 3-4 mm. only. Elsewhere, however, the choroid shows marked changes: blood vessels are few in number but extremely large and distorted appearing as flattened channels rather than tubular structures: the choriocapillaris is almost entirely deficient throughout. Pigment, whilst present, is deficient and irregularly distributed.

The retina shows secondary changes only from distortion of the globe and the condition of the optic nerve. Actually it is rather surprisingly well preserved.

The sclera, on the other hand, shares with the choroid, though to a lesser degree, histological changes which are very marked. Almost throughout, but most marked posteriorly, is a generalised ectasia: the fixed cells of the sclera are virtually absent so that the whole structure appears almost non-nucleated. Elastic tissue is present in small amount only, and for the most part the scleral coat is made up of collagenous fibrils. The episclera appears normal.

The optic nerve shows a complete lack of nerve fibres, degeneration being complete.

The changes described in this case, whilst similar in many respects to those met with in the case of the typical choroidal colobomata, show also a completely avascular zone corresponding with the position of the macular region. Moreover, the retina is less affected in the present instance than it would be with so extensive a choroidal coloboma of the typical variety.

So far as inferences are justified from the histological examination of this specimen it would appear probable that the condition is one associated with defective vascularisation rather than with any changes of a purely inflammatory character.

### *Discussion.*

The older views on the causation of macular coloboma can be dismissed briefly as they have been dealt with by Parsons in 1906 and by Ida Mann in 1927, whilst the arguments in favour of secondary fissures as the cause of a typical coloboma have been reviewed recently by Rones.

(1) Developmental failures.—One view was the attempt to link up macular coloboma with typical choroidal coloboma by assuming that the macula is developed in the choroidal cleft which by rotation comes to lie horizontally. Apart from the fact that embryologists no longer admit this theory of rotation, the existence of both macular coloboma and typical choroidal coloboma in the same eye (cases of Wood and of Horton) invalidates this argument.

Other embryological theories postulate localised failure in the neural ectoderm, or in the pigment layer, as also abnormal development of the mesoderm. Treacher Collins implicated localised absence of posterior ciliary vessels, thus regarding colobomata as localised choroideremia.

(2) Inflammation.—That some macular “ colobomata ” are of post-natal origin cannot be doubted. The tuberculous nature of some of these lesions has been demonstrated by Funccius, by Meisner and by Harrison Butler amongst others. It is argued that intra-uterine inflammation explains the others. Ida Mann holds the pigmented coloboma to represent irritative and the non-pigmented destructive lesions.

(3) Trauma.—Trauma is a factor in macular changes that are hardly distinguishable from colobomata. The cases of Lagrange and the illustrations in Würdemann can be instanced. That birth injuries and haemorrhage are the cause was suggested by a number of observers.

(4) Naevus formation.—Lindsay Johnson held that typical colobomata represent choroidal naevi in varying stages of shrinkage. The indented edge and lobulated appearance of some lesions he held to be evidence in support of this view. As already mentioned Deyl held that the histological appearances in his case supported Johnson's theory. More recently this view has been upheld by Hoeg.

None of these theories is free from serious objection, Treacher Collins' view probably being the least unsatisfactory. The hereditary nature of macular coloboma militates against such factors as inflammation and trauma, whilst the association of skeletal defects with macular coloboma as a familial affection reported previously (Sorsby, 1935) suggests a mesodermal origin for coloboma. As far as it goes the histological evidence does not contradict the conception of Treacher Collins of macular coloboma as a localised choroideremia. This conception though it does not help to explain some of the features of macular coloboma—such as the presence of pigment in some cases and its absence in others, to mention only one—is of value not only because it represents an actual ophthalmoscopic observation, but also for the reason that it helps to link central colobomata with colobomata situated elsewhere outside the choroidal cleft. Furthermore, the absence of a scotoma in some of the cases of macular coloboma is best explained by invoking a lesion which affects the retina only secondarily and to a variable degree.

The view that macular colobomata are the result of defective localised vascularisation gains some support from the cases of familial central choroidal angio-sclerosis recently published in this

Journal (Sorsby, 1939). The fundi in two brothers whose eye trouble dated back to the early twenties showed a sharply-circumscribed central area in which the choroidal vessels were sclerosed. It is suggested that these cases of choroidal sclerosis are allied to macular coloboma—coloboma on the one hand and “senile” macular degeneration due to choroidal sclerosis on the other, representing the two extremes of a continuous range of dystrophy in which the two cases of central choroidal sclerosis with onset in early life form a connecting link.

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## THE OPHTHALMOLOGICAL COMPLICATIONS OF LEONTIASIS OSSEA

BY

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LEONTIASIS was the name given to certain forms of leprosy of the face, in which disease the thickened, seamed lips give the appearance of a lion's muzzle. In 1896, the name “leontiasis ossea” was coined by Virchow to describe a group of diseases which cause hyperostosis of the skull and facial bones. Specimens in many museums showed what different shapes these skulls might assume, but it was not until 1923 that any classification was attempted. In that year, Mr. Lawford Knaggs published an article in the *British Journal of Surgery* which is still the final word on the subject, and it is from that article that much of the information and three of the pictures reproduced here are obtained.

It is now clear that there are two types of hyperostosis:—

1. Creeping periostitis of the bones of the face and skull.
  2. Diffuse osteitis of the bones of the face and skull.
- a. General. b. Circumscribed. c. Local.