Benign melanoma of the choroid

Recognition of malignant change using clinical photographic techniques

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The elucidation of "tumours" in the fundus is undoubtedly facilitated by photographic methods of investigation. The wide variation in morphology that may occur in choroidal neoplasma, whether benign or malignant, primary or secondary, and the difficulties that arise in distinguishing similarities between these and inflammatory and degenerative masses in the fundus together make clinical diagnosis extremely difficult. Biopsy being impracticable, clinical investigative methods of ascertaining the true pathology have great potential.

Clinical photography, particularly fluorescein fundoscopy, can be of considerable value in this respect, but it is important to recognize that, while each category of tumour tends to show characteristic features, individual departures from the accepted pattern may occur. For this reason such variants should be recorded and related to the underlying pathology so that they may be interpreted correctly.

Case report

A 38-year-old white female noted a deterioration of vision in the right eye in November, 1967. She was referred to the Huddersfield Royal Infirmary where she was fully examined. The corrected visual acuity was hand movements in the right eye and 6/6 in the left. A pigmented swelling was noted below the right macula. The possibility that this mass was malignant was considered and the patient was referred to other ophthalmologists for further opinions. Generally the patient had no significant medical history and on examination and investigation no other abnormality was found, though a marked nodularity of both breasts was commented upon.

The "second" opinions were inconclusive, the general feeling being that the lesion was probably a malignant choroidal melanoma, though a metastatic breast tumour was also suggested as a possible diagnosis.

She was then referred to the Retinal Photograph Clinic at the Manchester Royal Eye Hospital for a photographic investigation of the fundus, the results of which are presented here. The diagnosis was that this mass represented malignant change in an extensive naevus of the choroid. It was advised that the eye be enucleated, and this was done. The patient remains fit and well 12 months after the operation.

Methods

The fundus was examined by direct and indirect ophthalmoscopy, by transillumination, by stereoscopic colour photography, by fluorescence photography, and by infrared colour photography. A Zeiss fundus camera suitably modified for each purpose was used with Kodachrome 11 for the colour photography, Ilford FP4 film for the fluorescence photography, and Kodak infrared aero Ektachrome film for the infrared photography. The full details of methods are described elsewhere (Rosen, 1968).

Results

(1) OPTHALMOSCOPY revealed a dark mass, irregularly raised to the temporal side of the optic disc and below. Increased pigmentation of the fundus was visible around the disc and towards the macula, above which a few punctate hard exudates were seen but no haemorrhages were present.

(2) TRANSILLUMINATION was not really helpful. Parts of the mass were transilluminable.

(3) STEREOSCOPIC COLOUR PHOTOGRAPHY was valuable in presenting a magnified brilliantly clear view of the lesion which could be studied conveniently in conjunction with the fluorescence photographs. Irregular swelling was a prominent feature of the lesion which was clearly seen to be behind the retina. Some retinal oedema was apparent in places, and in the papillo-macular region there appeared to be shallow serous detachment of the retina.

(4) INFRARED COLOUR PHOTOGRAPHY The contrast between the lesion and the normal fundus was heightened by this method of photography. The normal fundus appeared yellowish whereas pigmented tissue appeared purple-red. An extensive pigmented zone encircled the optic disc. Temporal to the disc and inferiorly areas of mottled pigmentation differentiated this part of the lesion from the uniformly pigmented remainder.

FIG. 1 *Right fundus mid-venous phase. 15 seconds after injection. Retinal capillaries full of dye. Note capillary dilatations along inferotemporal vessels and degree of tumour swelling indicated by the out-of-focus appearance of some surface vessels.*

(5) FLUORESCIN PHOTOGRAPHY In the early venous phase of the retinal circulation of fluorescein, there was background mottled fluorescence from the choroid in the region between disc and macula (Fig. 1). Some capillaries associated with the inferotemporal vein were seen to be dilated, while the immediately successive pictures showed that these dilations were also present in a zone between the superior and inferior temporal vessels and that they were a source of leakage of fluorescein (Figs 2 and 3). Subsequent viewing showed fluorescein staining of the retinal oedema, subretinal exudate, and oedema of the optic disc particularly on the temporal side (Figs 4 and 5). The larger part of the pigmented lesion was seen as an avascular mask obscuring choroidal fluorescence, clearly demarcated from its irregularly raised segment and the normal fundus, and was particularly evident above, below and to the nasal side of the disc (Fig. 4).

FIG. 2 *Right fundus. 21 seconds. Retinal staining in the region of the dilated capillaries is marked. Fluorescence from drusen overlying the pigmented lesion is also seen.*

FIG. 3 *Right eye. 30 seconds. Lower aspect of neoplasm. Staining of retina above contrasts with an area of depigmentation below which is transmitting choroidal fluorescence.*

FIG. 4 *Right fundus. 51 seconds. View of naevus above the optic disc, again masking the choroidal fluorescence which is seen above.*

FIG. 5 *Right fundus. 4 minutes. Massive staining of retinal and disc oedema with fluorescein.*

Conclusion

This lesion probably represents malignant change in a sector of a benign melanoma. The usual pattern of choroidal fluorescence in such lesions is not seen, either because the vasculature of the malignant sector is poorly developed or because it is masked by the overlying intense retinal fluorescence.

(6) PATHOLOGICAL EXAMINATION OF RIGHT EYE

Macroscopic examination

The opened globe showed around the optic nerve head a small flat pigmented zone which was slightly raised below and to the temporal side of the disc.

Microscopic examination (Figs 6-8)

FIG. 6 Posterior fundus, showing choroidal melanoma surrounding optic nerve head. On the nasal side (left) the lesion is flat and benign, whereas on the temporal side malignancy has occurred so that the tumour is slightly raised, with oedema and some shallow detachment of the overlying retina. Haematoxylin and eosin. $\times 12.5$

FIG. 7 Section bleached to remove melanin pigment, showing the rounded cells with abundant cytoplasm of the benign melanoma which contrast with the compact spindle-shaped cells of the malignant tumour. Haematoxylin and eosin. $\times 180$

FIG. 8 Retina overlying malignant tumour, showing dilated capillaries, oedema, and disorganization, while melanoma cells are beginning to invade the outer retina. Masson trichome. $\times 120$

Within the choroid but sparing the choriocapillaris there is a plaque of round or ovoid cells which have generally abundant cytoplasm containing large amounts of melanin. The surface of the plaque is flat with no disturbance of the overlying retina and, while the optic disc is completely encircled, the nerve head is uninvolved. These appearances are characteristic of a naevus or benign melanoma.

On the side of the disc corresponding to the inferotemporal region, the plaque is elevated and in part replaced by a melanoma of low grade malignancy arising from the outer layers of the choroid and pushing the benign lesion in front of it. The cells are uniformly spindle-shaped with extremely scanty pigment content, while reticulin is prominent in the stroma of the tumour. The overlying choriocapillaris is largely obliterated and in places Bruch's membrane is destroyed with malignant tissue invading and replacing the pigment epithelium of the retina. There is no appreciable scleral invasion, no infiltration of scleral vascular channels, and no evidence of extraocular extension. A little shallow detachment of the overlying retina is seen with accumulation of serous exudate in the subretinal space. The retina itself is oedematous, many of the vessels are dilated, and there are areas of marked disorganization.

Apart from a little hyalinization of the processes of the ciliary body and a minor degree of cystoid degeneration in the peripheral retina, the remaining structures of the eye appear normal.

Conclusion

Malignant melanoma of choroid arising within a pre-existing benign melanoma (naevus)

Comment

Snyder, Allen, and Frazier (1967) described three types of appearances of malignant melanoma by fluorescein photography. Basing their opinion on a limited number of cases, they indicated how confusion in interpretation of the fluorescence photographs may arise with the inconsistent appearances of tumours and other fundus masses. In the case of malignant melanomata they showed that these tumours may be brightly fluorescent, poorly fluorescent, or non-fluorescent, though in the latter instance they described a solitary case which was a melanoma of the ciliary body. They discussed a number of the variables which contribute to the complex fluorescence patterns.

In recording the fluorescence of malignant melanomata as ranging from bright to nil, Snyder and others (1967) used fluorescence at the choroidal level as their criterion, though in discussion they considered amongst their variables fluorescence of subretinal and soft exudates. The case examined by us is important because the significant fluorescence was retinal in origin, any fluorescence from the choroid being obscured thereby except in the earliest pictures.

This case is also important because it supports the contention that malignant melanomata may arise from previously benign tumours. Reese (1963) and Naumann, Yanoff, and Zimmerman (1966) believed on clinical and histological grounds that this was not an uncommon occurrence. Reese found that the malignant tumour was often surrounded by a flat zone of more mature and more deeply pigmented tumour tissue and that in such cases the malignant melanoma arose from the outer layers of the choroid which is where benign melanomata are usually to be found. Both these findings were features of the present case.

A further point of the utmost importance from a diagnostic standpoint is the close correlation observed between the benign and malignant lesions as recognized histologically and the clinical photographic findings.

The prominent retinal vasculopathy demonstrated photographically was reflected in the histological demonstration of dilated vessels, oedema, and subretinal exudate, although it is also possible that the latter was derived in part from the choroidal circulation.

The retinal vascular changes that are illustrated have not been shown clinically hitherto in malignant melanomata on the choroid and it is therefore important to recognize this feature on account of its diagnostic significance. Furthermore, this case illustrates the value of photographic techniques in the clinical diagnosis of fundus tumours.

Summary

Malignant change developing within a sector of a benign melanoma of the choroid was suspected clinically, a suspicion which was reinforced by fluorescein fundoscopy combined with stereoscopic and infrared colour photography. Enucleation was carried out and the diagnosis was confirmed by histopathological examination. Whereas the benign parts of the melanoma failed to fluoresce throughout, the malignant area showed strong fluorescence which developed in the retinal arteriovenous phase due to abnormalities in the overlying retinal vessels.

This investigation was supported in part by a research grant from the United Manchester Hospitals. Our thanks are due to Mr. Peter Wilson, F.R.C.S., of Huddersfield Royal Infirmary, for referring this patient to us and for subsequently providing us with the enucleated eye and to Prof. Norman Ashton for his comments and suggestions during the preparation of this paper.

Fundus photography and processing by Emanuel Rosen, The Retinal Photographic Unit, Manchester Royal Eye Hospital.

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