RADON TREATMENT OF CARCINOMA OF THE CHOROID

To Professor S. L. Baker I am grateful for his interest and helpful criticism. I am indebted to Mr. H. C. Taylor of the Department of Pathology, Manchester University, for the photomicrographs.

REFERENCES


RADON TREATMENT OF SECONDARY CARCINOMA OF THE CHOROID.∗

Post-Mortem Observations

BY

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In September, 1937, I reported the use of radon seeds in the treatment of secondary carcinoma of the choroid in a woman 41 years old. The report described the appearance of growth in the sole remaining eye during March, 1936, the other having been removed for the same condition in January, 1936, and its treatment by radon with disappearance of growth for a period of seven months, and the similar treatment of a further metastasis in the same eye in October, 1936.

The subsequent history is of some interest and is briefly stated thus:—

January, 1937. Vision was 6/12 (i) and there was no evidence of the presence of choroidal growth. A severe reaction of the choroid, similar to that already present in the lower half of the eye, appeared and continued. The retina remained flat but, with the passing of time, became infiltrated with choroidal pigment derived from the stippled pigment in the affected area. The whole macular region was involved and it was surprising how central visual acuity could be maintained. However, the patient continued to maintain vision of 6/12 and could thread her own needles with suitable glasses.

In March, 1937, the patient had severe attacks of vomiting,

and pain in the left leg and thigh, and was admitted to hospital for a month. During this time she improved, but X-rays showed rarefaction of the bones of the pelvis on the left side. In May, 1937, vision in the right eye was 6/6 part and there was no choroidal tumour. The patient appeared to be better in general health and by July, 1937, had put on 1 stone 6 lbs. in three months. In August, 1937, the right disc seemed a little paler and vision was 6/9 part. The forward migration of choroidal pigment into the retina was becoming very marked. In November vision was 6/12, but weight was two stone better than in April at 9 stone 12 lbs.

In January, 1938, vision had fallen to 6/18, but there was no change in the fundus to account for this and it was thought that retinal degeneration must be slowly increasing. The patient complained at this time of pain in the right arm and X-rays of the spine showed decalcification of the body of the seventh cervical vertebra. In May, 1938, vision had fallen to 6/36, though there was no appreciably visible change in the fundus picture. On July 16th the patient was re-admitted with a left hemiplegia and in a sinking condition, and died on July 25th, 1938, six years after the removal of the primary growth from the breast and two and a half years after the appearance of metastatic choroidal growth. For two years good vision in the sole remaining eye was maintained and the gradual failure of vision during the last six months of life was subsequently traced to an extra-ocular cause. As an example of local treatment this case must be considered to have been successful in so far as it maintained vision in a patient who would otherwise necessarily have been totally blind.

**Post-Mortem Observations**

*General.*—Extremely widespread carcinomatosis was found involving almost all the viscera except the kidneys, uterus and the gut.

*Central Nervous System.*—A small hard scirrhous growth was found on the upper surface of the right optic nerve, involving the optic chiasma and extending towards the floor of the third ventricle (Fig. 2). There was a further mass the size of a marble in the right half of the cerebellum and several masses growing from the falx cerebri in the superior longitudinal fissure, one in this position about the size of a walnut pressing on the medial aspects of the pre-Rolandic gyri. An area of softening of recent origin was seen in the left parietal region close to the superior longitudinal fissure.

Section of the right optic nerve at the position where it passed over the deposit just in front of the chiasma showed a marked
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flattening of the nerve, and atrophy of the part in immediate contact with the tumour (Figs. 2 and 3). The latter, however, was well defined and showed well-marked formation of acini; it did not appear to be infiltrating the optic nerve itself though it is possible that some infiltration had occurred along the meningeal sheaths of the nerve. The part of the nerve more distal from the growth was not infiltrated.

The Right Eye was removed, together with the optic nerve throughout its intra-orbital and intra-foraminal length and the whole of the orbital contents.

No growth was found in the extra-ocular contents of the orbit. The eye itself was sectioned after being fixed in 5 per cent. formalin (Fig. 1). The general appearance of a cross section of the eye was not abnormal, but the sclera was unusually
tough on sectioning. The retina was flat and no tumour apparent microscopically. (Fig. 4.) On microscopic section the appearances were of great interest especially as an example of the effect of local radiation. The lens itself was free from opacity; this contrasts strikingly with the frequency of cataract formation following the use of deep X-ray therapy near the eye. The retina was remarkably healthy in appearance though some slight degeneration of the bacillary layer was observed at the posterior pole. It appeared to have suffered little from the absence of a

normal choroidal circulation. The choroid in the posterior half of the globe was almost totally absent, only a few degenerated pigment cells remaining. A clear space separating the retina from the sclera indicated the position of the original choroid. Passing forwards, the space became gradually more vascular and behind the pars plana assumed an almost normal appearance.

The sclera showed little, if any, hyaline degeneration as is usually found in fibrous tissues after irradiation. The innermost layers of the sclera showed surprisingly the presence of a fine linear infiltration by carcinoma cells (Fig. 5) which, although showing no tendency to the formation of glandular tumour masses, appeared healthy and did not give the impression of being cells damaged
**FIG. 5.**

Infiltration of sclera by carcinoma cells: the retina fairly normal.

**FIG. 6.**

Linear infiltration of inner part of sclera by carcinoma cells: absence of choroid.
by radon therapy (Figs. 6 and 7). Whether these cells were quiescent remnants of the choroidal tumour last irradiated some twenty-one months before death, or whether they represent infiltration reaching the eye along the optic nerve sheaths, and derived from the tumour situated above the optic nerve immediately in front of the chiasma, is difficult to say, but pathological opinion is in favour of the latter course. If this be the case it must be presumed that, had the patient survived much longer, further recurrence of metastasis in the eye would have become clinically apparent.

The optic nerve showed a considerable degree of vacuolation and an excess of neuroglial tissue. The degree of optic atrophy was, however, far from complete. No infiltration of the immediately retro-ocular portion of the nerve by growth was found.

In the light of the post-mortem findings the gradual failure of vision during the last six months of life appears to have been due to pressure on the right optic nerve by metastatic growth situated intracranially. It must be confessed that this was not appreciated clinically and that the failing vision was presumed to be the result of defective nutrition of the retina following on the widespread choroidal atrophy at the posterior pole, hence charts of the visual field during this period were not taken. The retina,
however, remained histologically healthy in appearance and visual fields would doubtless have showed a pressure atrophy spreading up from the lower field.

Conclusions
Radon therapy for secondary carcinoma of the choroid, in the case described, proved clinically effective over a period of two years and four months. During the major portion of this period good vision was maintained.
Ultimately failure of vision was due to intracranial complications involving pressure on the optic nerve.
Radon may prove to be of value as a curative form of treatment in an otherwise hopeless condition and should be considered as an alternative to enucleation of the eye.

CONGENITAL FAMILIAL CATARACT WITH CHOLESTERIN DEPOSITS

BY
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The hereditary factor in many eye diseases has been frequently observed. Of these diseases cataract affords the best example. Nettleship has published details of twenty-two families in which lamellar cataract was found in several generations. The same author and Ogilvie recorded an extraordinary series of discoid post-nuclear cataract in a family called Coppock. Hence the name of Coppock cataract was given to it. On the other hand we frequently find isolated crystals embedded in transparent lenses, chiefly in the peripheral part of the lens under the posterior capsule. This condition according to Pellaton is found in 28 per cent. of clear lenses. Cholesterin crystals are not infrequently found in different types of senile, traumatic and complicated cataracts. Burdon Cooper thinks that cholesterin crystals are extremely common in glycosuria, while tyrosin is the commonest crystal to be found in senile forms.
Goulden and other observers have also described the presence of fine crystalline opacities showing green and blue iridescence in thyroid dysfunction, post-operative tetany, Mongolian idiocy and myotonia atrophica. In such cases the crystals are situated chiefly in the anterior and posterior layers of the lens cortex. Doggart reported having seen at Moorfields members of three generations aged twenty years and upwards, in a large family, suffering from
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