GLAUCOMA FOLLOWING RADIOTHERAPY*

BY

R. F. JONES

St. Bartholomew's Hospital, London

THE occurrence of glaucoma in an eye after irradiation has been the subject of few reports. It is proposed to review briefly those cases that have been described and to present another with its own peculiar features.

Birch-Hirschfeld (1921a, b) reported a case of a man aged 61 who received radiotherapy for a wart on the right upper lid. The conjunctiva became thickened and its vessels dilated and tortuous, and a thin vascularized pannus appeared on the upper part of the cornea, which became opaque and resulted in blindness. An ocular tension of 40 mm. Hg (Schiötz) was recorded, and histology revealed a cupped disc; the angles were not described.

Peter (1924) reported a case of glaucoma following treatment of a conjunctival carcinoma by radiotherapy. No details of the angle or disc were given; the blood vessels were said to be normal.

Bothman (1940) described a case of glaucoma in a man aged 63 who had received large doses of x rays for a squamous-cell carcinoma of the lateral canthus that invaded the orbit. Detailed histological findings were recorded and it was concluded that there was a dispersion of the anterior uveal tract pigment which was deposited in the trabecular spaces. He also stated that the blood vessels were normal, that there were no peripheral anterior synechiae, and that the disc was cupped.

Fry (1952) described the case of a 5-year-old child who received a total of 10,160r for a malignant orbital tumour. Here there was corneal ulceration, secondary glaucoma, and cystic degeneration of the retina, and the angle was obliterated by peripheral anterior synechiae.

Case Report

A woman aged 40 first attended hospital in November, 1954, complaining of right nasal obstruction; a large polyp was found and removed, and it was shown histologically to be a mucoid adenocarcinoma. Between December, 1954, and January, 1955, the area was treated by radiotherapy. Later a right Caldwell-Luc operation and removal of the right middle turbinate bone was undertaken, and as a recurrence of the carcinoma was

* Received for publication December 2, 1957.

found in the middle turbinate, a partial posterior fenestration of the right side of the palate was performed with intercavity irradiation by radium.

The patient noted that the right eye was dry and the vision blurred in April, 1956, and sought an opinion on May 7, 1956, after 3 weeks of visual disturbance.

The right lashes and eyebrow were absent, the visual acuity was 6/9 with correction, and dilated tortuous conjunctival and scleral vessels were noted. Many dilated vessels, some of which were varicose, were observed in the iris. The disc and fundus were normal and the peripheral field full to 1/330 white. The ocular tension (Schiötz) was 32 mm. Hg in the right eye and 27 mm. Hg in the left. Gonioscopy showed the angles to be of medium width. In the right angle, especially above, there was an extensive network of newly formed tortuous blood vessels, which occupied the angle and overlaid the peripheral iris. The left eye was quite normal and there was no evidence of glycosuria. Unfortunately the patient became apprehensive of further procedures and tonography could not be performed. Guttae pilocarpine 1 per cent. three times daily for both eyes were prescribed.

On June 11, 1956, the ocular tension had reached 45 mm. Hg and the fundus could still be seen. There was no evidence of a central retinal vein thrombosis.

A week later the visual acuity had deteriorated to 6/36 and corneal oedema was present. The ocular tension was then 50 mm. Hg, and no view of the fundus was possible. The fundus has remained hidden since that date. The patient was now in pain and consented to enter hospital. It was considered that the vascularity of the iris was a contraindication to the usual type of filtration operation, and cyclodiathermy was performed on June 21, 1956.

After this, ciliary injection, corneal oedema, and an anterior chamber flare developed, and the ocular tension remained between 42 and 45 mm. Hg (Schiötz) although pilocarpine and Diamox were administered. Later a hyphaema appeared. On July 17, 1956, cyclodiathermy was repeated, the patient became free of pain, and the tension fell to 22 mm. Hg.

The visual acuity is now counting fingers, there are degenerative changes in the cornea, dilated vessels are more obvious because of iris atrophy, the pupil is adherent to the anterior lens capsule, and the lens has developed opacities. A complete ring of peripheral anterior synechiae is present.

Comment

In previously reported cases glaucoma was secondary to the deposition of pigment in the trabecular spaces, or to the formation of P.A.S. secondary to other pathological procedures occurring in the irradiated eye.

Theoretically, the radiotherapy could have disturbed the inflow-outflow balance by producing an occlusion in the anterior ciliary veins, in the vortex veins, or in the central retinal vein. The relationship between rubeosis and vessel formation in the angle, and central retinal vein thrombosis, to glaucoma has been established (Smith, 1955). In the present case, the fundus was normal when the tension was raised and was unlikely to have been elevated secondary to a venous thrombosis. Apart from being obliterated following the radiotherapy the vortex veins could have been involved in a recurrence of the tumour and obliterated in that way. There is no evidence that this has occurred. Irradiation could have also caused obliteration of the trabecular spaces and exit channels.

In this case histological findings are not available, but the finding of dilated, tortuous, varicose newly formed vessels in the iris and angle following

radiotherapy may be considered the causative factor in the onset of glaucoma. It is unfortunate that tonography was not performed, since this might have differentiated between a mechanical obstruction to outflow and the possibility that the vasodilation had increased the formation of aqueous, *i.e.* a hyper-secretion glaucoma.

The other pathological changes in the eye may be attributed in part to the late manifestations of irradiation and operative procedures.

I am indebted to Mr. J. H. Dobree for permission to publish this report.

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