

OPHTHALMOLOGICAL COMPLICATIONS OF MULTIPLE MYELOMATOSIS*

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OWING to improved methods of diagnosis, the incidence of multiple myelomatosis has increased markedly in the last 10 years. Its manifestations are widespread, but those involving the visual apparatus have received little attention. It is therefore proposed to review the ophthalmological complications of this disease.

Method of Study

In an account of the neurological aspects of myelomatosis (Clarke, 1954b) it was found convenient to divide the ophthalmological manifestations into:

- (1) Vascular changes in the retina,
- (2) Myeloma of the inner eye,
- (3) Papilloedema,
- (4) Ocular nerve palsies,
- (5) Orbital myelomata,
- (6) Involvement of the optic pathways.

(1) Vascular Changes in the Retina.—The incidence of these events is unknown but changes severe enough to produce marked visual impairment are rare. A haemorrhagic tendency occurs in 33 per cent. of cases of myelomatosis (Sapper, Turner, and Moscovitz, 1953), and in most of those with retinal involvement, bleeding elsewhere in the body is present. Although investigation of this bleeding tendency has not been extensive, a frequent abnormality is an increase of serum proteins with a specific rise in the gamma globulin fraction. Waldenström (1952) has indicated the role of hyperproteinaemia in myelomatosis and has shown that it encourages auto-agglutination of the blood. The development of vascular complications anywhere in the body may thus be compared with the sequence of events observed in the retina. First, the venous blood flow becomes sluggish, and this can be induced or aggravated by pressure on the eyeball (Foord, 1935). There is then occlusion of small veins and venules with retinal haemorrhages and ultimately thrombosis of the central retinal vein.

Examples of each of these processes have been described in the literature.

Retinal Haemorrhages.—These were found by Snapper and others (1953) in 9 per cent. of cases. They may be punctate (Ellinger, 1899; Schindler, 1943; Foreman and Mettier, 1947) or flame-shaped (Ellinger, 1899; Rosenthal and Vogel, 1938; Foreman and Mettier, 1947; Loge and Rundles, 1949), the former usually being wide-spread. Bonnet (1947)

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has produced the only detailed account and a coloured plate of this ocular complication; the haemorrhages were larger and more numerous at the periphery although also involving the maculae. The eyes were unequally involved. Subhyaloid haemorrhages have been recorded only once (Cosin, 1935); the retinal appearances in the patients of Bing (1936) and Boston (1903) were probably due to associated hypertension of renal origin.

Thrombosis of the Central Retinal Vein.—This was observed by Wintrobe and Buell (1933) and Foreman and Mettier (1947), and a full case reported is given by Walsh (1947). A haemorrhagic glaucoma, found occasionally after retinal vein occlusion, occurred in one patient (Jochmann and Schumm, 1901).

Central Retinal Artery Thrombosis.—Although this is often cited as a complication of myelomatosis, there is no evidence in the literature that it has taken place. The case usually quoted in support (Venturi, 1901) did not have this lesion.

The clinical features do not differ from those associated with other types of retinal haemorrhages. Evidence of the generalized disease is usually present and frequently in an advanced stage so that the prognosis is very poor.

(2) **Myeloma of the Inner Eye.**—The only example (Stock, 1918) concerns a painful, blind eye examined pathologically. The tumour lay in the vitreous and was thought to have originated from the choroid. No clinical details are available, so the diagnosis of myelomatosis cannot be made with certainty.

(3) **Papilloedema.**—Increased intracranial pressure due to intracranial extension is occasionally encountered with myelomata of the skull or convexity dura mater (Clarke, 1954a) and at least eight cases have been recorded. Papilloedema is one of the features of this group and the bony lesions are usually large. Two cases (French, 1947; Clarke, 1954a) had papilloedema and other signs of an intracranial space-occupying mass but the myelomata did not involve bone. Differentiation from any other type of cerebral tumour could not be made therefore without histological examination.

An orbital myeloma may produce unilateral disc engorgement (Lapointe, 1929; Christophe and Divry, 1940), but other signs of an intra-orbital lesion are present.

(4) **Ocular Nerve Palsies.**—The commonest sequel of invasion of the base of the skull by a plasma cell myeloma is the paralysis of an ocular nerve (Clarke, 1954a) which is brought about by direct pressure of the tumour; invasion of the nerve never occurs. Of 25 such cases seventeen presented this complication and other cases not included in this series may be mentioned (Venturi, 1901; Laesecke, 1927; Hellner, 1938; Snapper and others, 1953). The following is another example:

Case Report

A housewife, aged 76, was admitted to hospital complaining of backache for 2 years, considerable weight loss, increasing pallor, and double vision. Two weeks before admission, she awoke to find that she had diplopia accompanied by intermittent headache; analysis of the former symptom was not possible.

Examination.—Her general condition was poor and there was a complete right external rectus palsy. Ocular examination revealed no other abnormalities and the other systems were normal. Blood pressure 180/90.

Investigations

X-rays of the skull and long bones showed multiple areas of rarefaction.

Blood, 64 per cent. haemoglobin and 3.1 million per cmm. red cells; urea was 300 mgm. per cent.

Urine, no Bence-Jones proteinuria.

Bone marrow biopsy, suggestive of myelomatosis.

Progress.—The patient's condition deteriorated steadily, although paradoxically, the cranial nerve palsy improved. This also occurred in the cases of Hammer (1894) and Sparling and others (1947). The patient died 6 weeks after admission but an autopsy was not permitted.

There are 23 cases with cranial nerve palsies and the frequency of each is shown in the Table.

TABLE
 FREQUENCY OF OCULAR NERVE PALSIES IN 23 CASES
 (INCLUDING ONE EXAMPLE EACH OF BILATERAL THIRD
 AND SIXTH NERVE PALSIES)

Cranial Nerve	3	4	6
Number of Times each Nerve Palsy occurred	8	7	20

The commonest nerve to be involved is the sixth, and on one occasion (Langdon, 1939) both nerves were affected. The third and fourth nerve palsies are less frequent; once the former was bilateral (Delmas-Marsalet and others, 1951), and an isolated fourth nerve palsy occurred only once (Laesacke, 1927). In six cases, the ocular nerve palsy occurred alone, but in all the others a varying number of cranial nerve palsies accompanied it. Four patients (Massachusetts, 1934; Christophe and Divry, 1940; Calvet and others, 1950; Snapper and others, 1953) had complete ophthalmoplegia on one side.

Generalized myelomatosis is usually to be found in these cases if looked for adequately. On occasions, this ocular complication may be the presenting feature of the disease and other evidence appears only later. Treatment as a whole is inadequate, but as far as the ocular palsies are concerned spontaneous remission may occur as in the present case.

(5) Myeloma of the Orbit.—It is possible to have a primary myeloma of the orbit where the patient has the features of an orbital neoplasm and the lesion is found to have arisen from the walls or contents of the orbit. A secondary type also exists where the patient notices a para-orbital mass due to a bone or mucosal lesion which later invades the orbit. Either lesion may be the presenting feature of what later turns out to be multiple myelomatosis. Both types have been described elsewhere (Clarke, 1953). It is of some importance to differentiate them from the plasma cell granuloma occurring in the same region.

(6) Involvement of the Optic Pathways.—The optic nerve may be directly involved by a basal myeloma; this occurred in eight of 25 cases (Clarke, 1954a). In three, there was complete unilateral blindness (Langdon, 1939; Christophe and Divry, 1940; Walsh, 1947) and in the others varying degrees of amblyopia were discovered. Chiasmal compression occurs (Clarke, 1954a) and various visual field changes have been encountered. The only example of an homonymous hemianopia is

that of James and Turner (1952), in which case it was due to a large myeloma of the occipital bone, but this complication could probably be detected more commonly if careful visual field charting were carried out in patients with skull myelomata.

Therapy in these cases is determined by the state of the generalized disease and by the degree of skull involvement. If neither is extensive, local surgical measures should be undertaken to preserve vision.

Conclusions

- (1) Ophthalmological complications of myelomatosis are numerous.
- (2) They include direct involvement of the ocular nerves, orbit, and central pathways by plasma cell myelomata. Any one of these events may be the first indication of the disease.
- (3) Vascular changes in the retina are probably due to serum protein disturbances.
- (4) Papilloedema may occur through increased intracranial pressure.

Summary

Ophthalmological aspects of multiple myelomatosis are considered and it is found that the retina, choroid, optic disc, ocular nerves, orbit, optic nerve, or central visual connections may be affected. Examples of each are cited and a case of diplopia due to sixth nerve palsy is described.

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