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Iris involvement in leukaemia

S. S. JOHNSTON AND C. F. WARE

Royal Victoria Hospital, Belfast

Involvement of the eye and the adnexa in leukaemia is not uncommon, and one half of patients can expect involvement at some stage of the disorder. The literature contains numerous reports of these conditions and a wide range of ocular structures may be affected, but iris involvement is relatively rare. Allan and Straatsma (1961) found two cases out of 76 with eye involvement studied pathologically after death and Auvert, Hurel, and Theron (1968) found three out of 143 cases of leukaemia studied pathologically.

The clinical picture has been well described by Duke-Elder (1966). Iris infiltration may be either nodular or diffuse. Nodules are ill defined and extend up to the pupil margin. Diffuse infiltration gives rise to iris discolouration and heterochromia. Vascular congestion is common and rupture leads to hyphaema and bloodstaining. Leukaemic cells in the aqueous are deposited as keratic precipitates and hypopyon which is greyish white. There may be hyphaema overlying hypopyon and it is not surprising that secondary glaucoma is a frequent sequel.

A similar picture may occur in the reticuloses. Reese (1963) found three cases out of 171 with iris involvement.

We have found only thirteen cases of iris involvement reported in any detail in the literature, mostly American and French.* Of these, four were cases of leukaemia and nine of reticulosis, such as malignant lymphoma and reticulum-cell sarcoma. No detailed report was found in the British literature.

It is proposed to describe in detail the case of a child with bilateral iris involvement in acute lymphoblastic leukaemia and to discuss the significant features in conjunction with thirteen previously published cases.

Case report

A baby girl born on September 23, 1969, was 2 years old when the eyes first became involved.

She was first admitted to hospital for investigation of a chest infection in December, 1970. The systemic manifestations of leukaemia were then observed and the diagnosis of acute lymphoblastic leukaemia was confirmed by peripheral blood and bone marrow examination.

After 4 weeks, remission was obtained with Vincristine (Oncovin) and steroids, and she remained well for 4 months when relapse occurred. This time a further 6 weeks elapsed before the peripheral blood and bone marrow were clear.

At the beginning of September, 1971, the child lost her appetite and became restless, and although the blood picture was normal, it was noticed that her left eye was red and watering.

EXAMINATION

Heterochromia was present, the right iris being blue and the left a muddy orange-red in colour.

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Address for reprints: S. S. Johnston, F. R. C. S., Ophthalmic Department, Royal Victoria Hospital, Grosvenor Rd., Belfast, N. Ireland BT12 6BA

*Heath (1948), Weekers and Prigot (1950), Cooper and Riker (1951), Thomas, Vitte, and Guidat (1954), Marcus (1963), Deitch and Wilson (1963), Reese (1963), Kearney (1965), Fonken and Ellis (1966), Gusak (1970).

The right eye was white but a fleshy vascularized nodule was present in the iris below involving the inferior pupillary margin (Fig. 1).

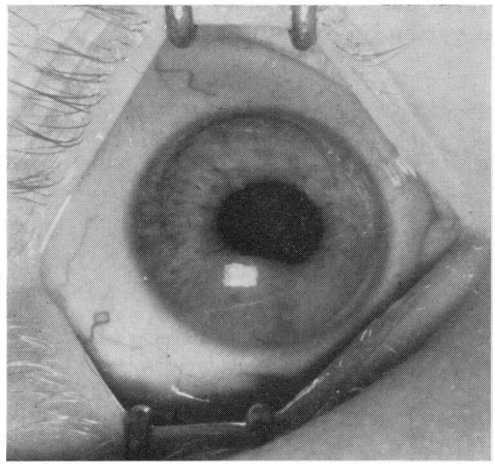

FIG. 1 *Right eye, showing fleshy nodule below*

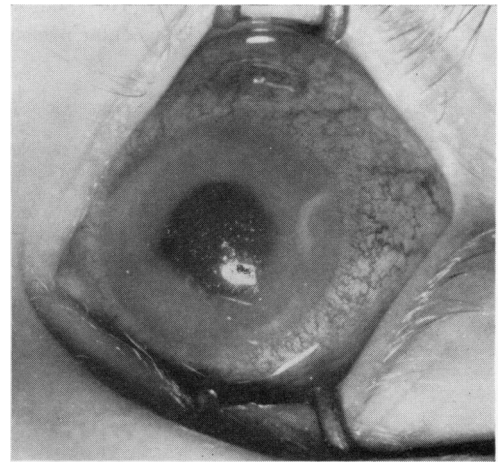

FIG. 2 *Left eye with iritis and secondary glaucoma*

The left eye was much injected and the cornea hazy. The iris architecture was difficult to make out and the beginning of a hypopyon was seen below and laterally. Posterior synechiae were also present (Fig. 2).

The following day examination under anaesthesia was carried out.

The intraocular pressure was 16 to 12 mm. Hg (Schiøtz) in the right eye and 6 to 38 mm. Hg in the left.

The vitreous was clear and the fundi appeared normal.

Treatment

A subconjunctival injection of Prednisolone (Codelsol) 3 mg. and methylprednisolone (Depo-Medrone) 8 mg. was given to each eye. Atropine and Predsol drops and acetazolamide (Diamox) 62·5 mg. three times a day were started.

At this time the peripheral blood was clear, but as the child was drowsy and irritable with neck stiffness, a lumbar puncture was carried out. The cerebrospinal fluid contained 1,640 leucocytes and primitive white cells. Intrathecal methotrexate 2.5 mg was started and given at weekly intervals.

A week later the left eye was less red, but the intraocular pressure was still raised (6 to 38 mm. Hg Schiøtz) and a definite hypopyon was present. A further subconjunctival injection of prednisolone (Codelsol) 10 mg. was given to the left eye.

Progress

Both eyes were white and quiet 2 weeks later and the intraocular pressure was normal. Cerebrospinal leucocytes were 30 per c.mm in number and the peripheral blood was clear.

There was a mild flare-up of uveitis in the right eye in the middle of October which settled after a few days' local therapy with Predsol drops.

Course

At the beginning of November, 1971, the peripheral blood was still clear but meningeal involvement was shown by irritability, tremor, and a count of 44 leucocytes per c.mm in the cerebrospinal fluid, 50 per cent. of them being in blast form.

There was bilateral exacerbation of the iris involvement and a further examination under anaesthesia was carried out in the middle of November.

Hyphaema and blood staining of the cornea were present in the right eye and the intraocular pressure was 35 mm. Hg (Schiøtz). There was a large creamy hypopyon below in the left eye (Fig. 3) and the intraocular pressure was 45 mm. Hg (Schiøtz).

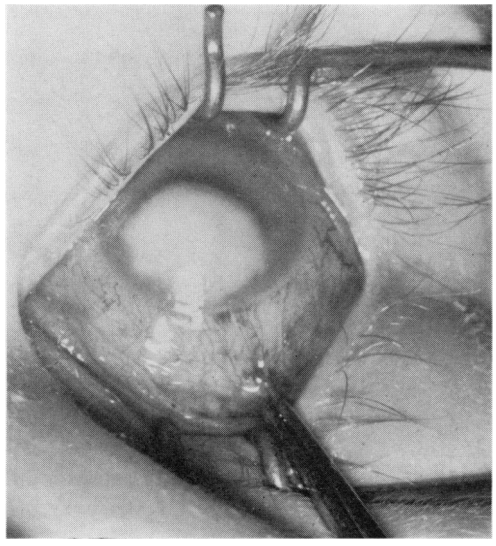

FIG. 3 *Left eye 2 months later with large creamy hypopyon*

Subconjunctival prednisolone 10 mg. and Depo-Medrone 10 mg. were given to both eyes and local mydriatics and steroids and oral acetazolamide 62·5 mg. three times a day were again started.

The eyes were again examined under anaesthesia 10 days later and were found to be improved. The intraocular pressure was normal. Further subconjunctival injections of short-acting and long-acting steroids were given.

A few days later the child's general condition suddenly deteriorated and almost 80 per cent. blast cells were found in the peripheral blood. She became drowsy and irritable, and there was bleeding from the mouth. It proved impossible to examine the eyes at this stage.

Termination

The patient died on December 2, 1971, and permission for *post mortem* pathological examination was refused.

Discussion

Acute leukaemia is common in the first decade of life, so that it is not unexpected to find iris involvement in a child. Our own case falls into this group. However, out of the four previously reported cases of acute leukaemia only two were in children, the other two patients being aged 65 or above.

Statistically one can deduce little from this, but it is obvious that iris involvement in acute leukaemia can occur in young and old alike and it seems unlikely to be any less frequent in older than young irides. In the reticuloses the same argument applies. Here the age bias is reversed, because the reticuloses are more common in adults (only two out of nine cases reported in the first decade).

Unlike the reticuloses, eye involvement in leukaemia originates from the systemic condition and, as one would expect, four out of the five cases were bilateral. Only a small group of the reticuloses, three out of nine, had both eyes affected.

For the same reason the focal nature of a reticulosis causes iris involvement to be the presenting sign. This was so in seven of the nine reticulosis cases, although the diagnosis was not made until a much later stage in the disease.

In contrast, our case and all the other reported cases of leukaemia did not develop iris involvement until after the systemic disease had been discovered.

The case reported is of the acute lymphoblastic type, as were three of the four previously described. The exception was a case of acute monocytic leukaemia reported by Kearney (1965).

Lymphatic leukaemias are the most common of the acute leukaemias in childhood. Auvert and others (1968) found that 76 out of 143 cases of eye involvement were of this type.

Allen and Straatsma (1961) found that one-fifth of their cases of leukaemia and reticuloses were caused by acute lymphatic leukaemia.

A review of the literature showed no difference in the ocular signs described between the leukaemias and the reticuloses.

Our own case, apart from the difference between the right and left eyes, exhibited almost the whole spectrum of signs—nodularity, heterochromia, hypopyon, hyphaema, and bloodstaining.

In the group reviewed, four eyes had hypopyon, three hyphaema, three hypopyon and hyphaema, three heterochromia, three nodular iritis with keratic precipitates, and two large iris nodules, and one presented with bloodstaining of the cornea. This varied presentation means that the differential diagnosis covers a wide spectrum of conditions, such as uveitis, unsuspected trauma, juvenile xanthogranuloma, retinoblastoma, retinoschisis, and persistent hyperplastic primary vitreous.

The intraocular pressure was measured in ten of the cases previously described and was found to be raised above normal in one or both eyes in every case. Hypopyon or hyphaema or both were present in eight out of eleven eyes and uveitis with keratic precipitates in the other three. The secondary glaucoma, as in our case, was presumably due to malignant and blood cells blocking the angle and infiltrating the trabecular meshwork rather than to anterior synechiae (Weekers and Prijot, 1950).

Glaser and Smith (1966) reported a case of chronic lymphatic leukaemia presenting as one of open-angle glaucoma, and implicated an infiltration at the limbus, blocking the aqueous outflow channels. The iris was not involved.

It is of interest in our case that, on two separate occasions when the irides were involved, the peripheral blood was clear. However, the cerebrospinal fluid was involved, causing meningeal leukaemia. The cerebrospinal fluid findings were rarely mentioned in previously reported cases. Fonken and Ellis (1966) described a case which appeared to be in remission at the time of presentation but the central nervous system was involved as exotropia developed and the symptoms cleared after treatment with intrathecal methotrexate.

Deitch and Wilson (1963) reported a case of reticuloendotheliosis with bilateral iris involvement. The cerebrospinal fluid and meninges were found to be infiltrated with lymphocytes at autopsy.

The anterior uveitis in our case was successfully treated with short-acting and long-acting steroids given subconjunctivally and locally, in addition to acetazolamide (Diamox) to

control the secondary glaucoma. Auvert and others (1968), without giving any detail, mention the use of retrobulbar cortisone in one case and the successful use of subconjunctival amethopterine combined with radiotherapy in a bilateral case with secondary glaucoma.

Radiotherapy was used successfully in five eyes affected with leukaemia and one with reticulosis. The treatment varied from five consecutive daily doses of 50 r, well below the minimal amount required for progressive cataract formation, to 850 r over 6 days and 1000 r at 10 20-sec. sittings. Cooper and Riker (1953) used paracentesis to control the intraocular pressure in a unilateral case of malignant lymphoma.

Both steroids and radiotherapy have a special affinity for suppressing lymphoid cells, in particular cells of immature or abnormal type. We feel that, because of its ease of use and availability, subconjunctival or retrobulbar and intensive local steroids may be tried initially and radiotherapy used only if these should fail. Carbonic anhydrase inhibitors are used in conjunction to control the secondary glaucoma.

The use of intrathecal carcino-chemotherapeutic agents, if meningeal involvement is present, may also be a useful adjunct to therapy.

Finally, although the outcome of the disease is often rapidly fatal, active ophthalmic treatment seems well worth while, foi in the case described effective relief of pain was achieved.

Summary

A case is described of acute lymphoblastic leukaemia with bilateral iris involvement. The diverse signs, differential diagnosis, and therapy of this rare complication are discussed. A number of previously reported cases are summarized and compared with a series of cases of iris involvement in the reticuloses.

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