CASE REPORT

Leukaemic infiltration of the optic nerve head: a rare site of initial relapse

Shailaja Bhat Shenoy,¹ Thoiba Karam,² Karthik Udupa,³ Bhavna Nayal⁴

¹Department of Ophthalmology, Kasturba Medical College, Manipal University, Manipal, India
²Kasturba Medical College Manipal, Manipal, Karnataka, India
³Department of Medical Oncology, Kasturba Medical College, Manipal University, Manipal, Karnataka, India
⁴Department of Pathology, Kasturba Medical College, Manipal, Manipal University, Manipal, Karnataka, India

Correspondence to
 Dr Shailaja Bhat Shenoy,
 bhat_shailu@yahoo.com

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SUMMARY

A 24-year-old male patient with acute lymphoblastic leukaemia (ALL), in complete remission, presented with the symptoms of gradual onset painless diminution of vision in the right eye (OD) of 2-month duration. On examination, best-corrected visual acuity in OD was finger-counting at 1 m and near vision was less than N₃₆. Anterior segment examination was normal, except for the presence of relative afferent pupillary defect in OD. Fundus examination showed optic disc oedema, peripapillary and vitreous haemorrhage, dilated and tortuous veins over the disc and presence of subretinal infiltrates and subretinal fluid around the optic disc. Clinical picture was suggestive of leukaemic infiltration of the optic nerve head. Cytological analysis of the cerebrospinal fluid did not show any abnormal cells or blasts. Vitreous biopsy from OD was suggestive of leukaemic infiltration. After radiotherapy, the leukaemic infiltrates regressed and visual acuity improved to 6/6, N₆ in OD.

BACKGROUND

Optic nerve head as a rare site for recurrence of acute lymphoblastic leukaemia (ALL) should be kept in mind by ophthalmologists and oncologists. Early detection of relapse and prompt initiation of treatment can prevent irreversible vision loss as well as systemic morbidity and mortality.

CASE PRESENTATION

A 24-year-old male patient presented to ophthalmology department with the symptoms of gradual onset painless progressive diminution of vision in the right eye (OD) since 2 months. Four years ago

he had been diagnosed with ALL pre B cell type, had received conventional chemotherapy (BFM-95 protocol) and cranial radiotherapy (18 Gy in 10 fractions) and was in complete remission for 15 months. He was on maintenance therapy with 6-mercaptopurine (which does not cross the blood-brain barrier due to efflux) and methotrexate.

On examination, best-corrected visual acuity in OD was finger-counting at a distance of 1 m and near vision was less than N₃₆ and in the left eye (OS) was 6/6, N₆. Relative afferent pupil defect was noted in OD. The rest of anterior segment examination was normal in both eyes. Dilated fundus evaluation OD showed optic disc oedema, peripapillary and vitreous haemorrhage, dilated and tortuous veins over the disc and presence of subretinal infiltrates and subretinal fluid around the optic disc. Left eye fundus was normal (*figure 1*). Clinical picture was suggestive of leukaemic infiltration of the optic nerve head in OD. Possibility of residual leukaemic cells in the vitreous disseminating into the optic nerve was also kept in mind.

INVESTIGATIONS

Blood counts were normal and no blast cells were seen in peripheral smear.

Cytological analysis of the cerebrospinal fluid and bone marrow did not show any abnormal cells or blasts.

Vitreous biopsy from the right eye showed features consistent with leukaemic infiltration (*figure 2*).

Ultrasound scan of OD showed mass lesion overlying the optic nerve of high surface reflectivity and moderate internal reflectivity suggestive of leukaemic infiltrate over the optic nerve head (*figure 3*).

Figure 1 Fundus image of OD showing optic disc oedema, peripapillary and vitreous haemorrhage, dilated and tortuous veins over the disc and presence of subretinal infiltrates and subretinal fluid around the optic disc.

Figure 2 Histopathology of the vitreous aspirate showing monotonous population of medium-sized lymphoid cells with few showing nucleus indentation suggestive of leukaemic infiltration.

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Figure 3 Ultrasound scan of OD showed mass lesion overlying the optic nerve of high surface reflectivity and moderate internal reflectivity suggestive of leukaemic infiltrate over the optic nerve head.

Figure 4 Fundus image showing regressed optic nerve infiltrates.

DIFFERENTIAL DIAGNOSIS

Disc oedema secondary to raised intracranial tension.

Endogenous endophthalmitis.

Intraocular inflammations, infectious and non-infectious, were considered in the differential diagnosis.

TREATMENT

Patient received three-dimensional cranial radiotherapy (18 Gy in 10 fractions over 2 weeks).

OUTCOME AND FOLLOW-UP

On follow-up, 1 month after radiotherapy leukaemic infiltrates had begun to regress.

On last follow-up, 1 year after the initial relapse visual acuity had improved to 6/6, N₆ with complete regression of the infiltrates (figure 4).

Currently, he is on maintenance therapy with 6-thioguanine and oral methotrexate and is in complete remission.

DISCUSSION

Ocular involvement in leukaemia is either due to direct invasion by neoplastic cells or secondary to haematological abnormalities associated with leukaemia such as anaemia and hyperviscosity.¹ Ocular involvement is seen in 50% of the patients with leukaemia.² Leukaemic infiltration can occur in the orbit, eyelid, retina and optic nerve.¹ Leukaemic infiltration of the optic nerve is relatively rare³ and is considered to be indicative of central nervous system (CNS) involvement. Active bone marrow disease is usually present when there is optic disc involvement.³

With an increase in survival of patients with leukaemia, CNS relapses are on the rise.⁴ Isolated optic nerve infiltration as an initial sign of relapse is quite rare.⁴⁻⁸ Lin *et al* have reported three cases of leukaemic infiltration of the optic nerve head in patients with systemic remission. Optic nerve is considered a pharmacological sanctuary from leukaemia therapy.⁴ Inadequate penetration of the intrathecal drugs to the retrobulbar optic nerve can result in relapses.⁴

When there is leukaemic infiltration of the optic nerve, it is important to treat the optic nerve as well as the rest of the CNS because optic nerve is one of the sites of CNS leukaemia.⁴ A combination of radiation and intrathecal chemotherapy is probably the best approach for the treatment of optic nerve infiltration.⁴ Early administration of high dose of focal irradiation is effective in reducing the leukaemic cells in the optic canal and allows the cytotoxic drugs to reach the cerebrospinal fluid (CSF) to attack the neoplastic cells.⁶ Optic nerve is relatively insensitive to irradiation therapy, whereas leukaemic cells are quite radiosensitive.⁴ It is important to differentiate direct optic nerve infiltration from papilloedema as the latter will not be benefited by radiation therapy.¹ Delay in the initiation of treatment can result in interference with vascular supply of optic nerve or pressure necrosis of the nerve resulting in irreversible vision loss.¹ Administration of intrathecal methotrexate can be considered in patients with high risk of relapses. Intravitreal methotrexate administration can also be another option.

In summary, the present case highlights the possibility of isolated optic nerve relapse in the absence of CNS or bone marrow involvement. To the best of our knowledge, ours is the first case where the diagnosis of optic nerve infiltration was confirmed by the vitreous biopsy even though the CSF analysis was negative. Good visual recovery could be achieved due to timely diagnosis and treatment which prevented irreversible vision loss and systemic relapse.

Learning points

- ▶ Optic nerve head as a rare site for recurrence of ALL should be kept in mind by ophthalmologists and oncologists.
- ▶ Vitreous biopsy helps in accurate diagnosis when the CSF analysis is negative for leukaemic cells.
- ▶ Early detection of relapse and prompt initiation of treatment can prevent permanent vision loss and systemic morbidity and mortality.

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Competing interests None declared.

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