Ocular Manifestations in Children with HIV Infection in Dar es Salaam, Tanzania

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Summary
A study of ocular lesions among 62 HIV seropositive and 47 HIV seronegative children admitted to the paediatric ward of Muhimbili Medical Centre was conducted. The prevalence of ocular manifestations was 38 per cent among the HIV seropositive children and 25 per cent among HIV seronegative children. While conjunctival lesions were common in both groups, fundus and corneal lesions were more common in HIV seropositive children. The common lesions were macular oedema, haemorrhages and sheathing of retinal vessels. In addition, HIV seropositive children had a 10 per cent prevalence of abnormal visual acuity compared with HIV seronegative children who had a 6 per cent prevalence. This study showed that ocular manifestations of HIV is high in African children and can be confounded by nutritional status. The commonest non-ocular manifestation was pulmonary tuberculosis and malnutrition. Children with HIV infection should have an ocular examination.

Introduction
Acquired immunodeficiency syndrome is caused by the HIV virus, the definition of which has been difficult in children. Clinical signs and symptoms have been used at all levels in practice. The following signs and symptoms have been found to be useful for clinical diagnosis of HIV in children: recurrent bacterial infections, oral thrush, persistent fever, persistent diarrhoea, generalized lymphadenopathy, developmental delay, weight loss or failure to thrive, severe or repeated pneumonia, severe pruritic dermatitis, chronic parotitis, and persistent hepatosplenomegaly. There are two main definitions, the WHO and the Centres for Disease Control (which require the diagnosis of opportunistic infections to be included).1

Ocular manifestations of HIV infection do not feature in the diagnosis. However, from studies in adults it has been shown that this may indeed be the presenting manifestation of HIV infection, since the HIV virus has a propensity for neural tissues. The literature on ocular manifestations of HIV infection in children is still very limited and now as we embark on the treatment of these children, it is even more important to know about this. In a recent study which discussed extensively the care of HIV infected children, there was no clear mention of ocular manifestations, although these may be part of generalized malnutrition.2 There have been no studies from Tanzania about ocular manifestations of HIV and hence this study was carried out.

Methods
A case-control study of ocular manifestations in HIV positive and HIV negative children was conducted from July to December 1996. Sixty-two HIV positive and 47 HIV negative children were enrolled in the study. Verbal consent was obtained from all the patients’ caretakers.

Children who had at least two of the WHO clinical case definition criteria were selected. All subjects were tested for HIV by ELISA test. Those who tested positive for ELISA were recruited as cases and those who tested negative were recruited as controls.

Ocular examination
This included a detailed inspection of the ocular adnexa and anterior segment for the presence of eye discharge, conjunctival infection or growth, corneal disorders, size and reaction of the pupils and abnormalities of the lens. The posterior segment was also examined in detail. Slit lamp examination was performed for a more detailed examination of the cornea, anterior segment, uvea, the lens and the vitreous.
Corneal ulcers were examined under blue light after staining with fluorescein. Direct and indirect ophthalmoscopy was carried out after full pupillary dilatation using phenylepinephrine hydrochloride 5 per cent and tropicamide 0.5 per cent. The retina was examined for retinopathy, infective retinochoroiditis, papilloedema and optic atrophy. Evaluation of ocular motility was done to search for neuro-ophthalmic manifestations of HIV infection such as cranial nerve palsies.

Visual acuity was difficult to elucidate in very young children. It was, however, considered normal if:

1. under 24 months the child can follow an object at 3 m.
   Each eye is tested separately (in a calm child, on the mother’s lap);
2. a child between 24 and 60 months can follow objects at 4 m.

For an older child, over 60 months, Snellens chart and E-charts were used.

Results

The study population comprised 109 children, 56 males and 53 females. The age range was 18 months to 14 years with a mean of 44.5 months. They were divided into three groups: below 24 months, 25–60 months and those over 60 months. Sixty-two children were HIV positive and 47 were HIV negative. These age groups were arbitrary to see the effect of age, if any.

The prevalence of ocular lesions in both HIV positive and HIV negative children is shown in Table 1. Ocular lesions were more common in HIV positive children. Also of note is that the majority of children were below 60 months.

The clinical and anatomical distribution of the lesions are described in Table 2. There were 24 HIV positive children with a total of 35 observed lesions, some children had two or more lesions and this was common among the older group, however the number was not statistically significant. There were no abnormalities seen in the anterior chamber, the iris, the pupil and the lens for both groups of children.

There were six children among the HIV positive and three among the HIV negative who had abnormal visual acuity. All the children with visual acuity abnormalities also had associated ocular lesions. The age, ocular findings and visual acuity abnormalities are described in Table 3.

There were no cases of corneal ulcers, conjunctival and eyelid tumours or obvious conjunctival discharge in the children studied.

Discussion

Children constitute 20 per cent of the population in Tanzania. The incidence of HIV is estimated to be 3.7 per cent among children, the majority of them acquiring the infection vertically. Thus there are many infected children and hence understanding the details of presenting problems will help in their subsequent management.

Ocular manifestations of HIV positive children are not so markedly high and significant since most children are not of the age where these manifestations can be addressed, whereas between 40 and 94 per cent of adults with AIDS have ocular involvement. However, with better management and progress in limiting disabilities by means of various therapeutic measures, these may come to the surface. Indeed, some of these could be the presenting features of AIDS.

In this study the incidence of ocular manifestations was 38 per cent among the HIV positive children; this was nearly twice as high as for those who were HIV negative. This incidence is comparable to the 33 per cent incidence among the 110 HIV seropositive children studied by Kestelyn et al. in Rwanda in 1985. The incidence of ocular manifestations among paediatric
patients infected with HIV was found to be 20 per cent (eight out of 40) in the USA. This difference will be discussed in detail later.

Conjunctival and corneal lesions
Conjunctival lesions were the most common in our series. Those who were HIV infected were 22 times more prone to develop conjunctival xerosis. All the patients recruited were from hospital and although we have not described in detail their nutritional status, almost all were moderately to severely malnourished. HIV infection and malnutrition, which may be secondary to persistent diarrhoea or other opportunistic infections, are always associated in children. This predisposes these children to vitamin A deficiency which clinically manifests as conjunctival xerosis. This was the only manifestation of vitamin A deficiency seen in this study. Semba et al. found that vitamin A deficiency was very common among the children and adults with HIV infection in Rwanda.11 Similarly, corneal lesions were relatively more frequent in our children with HIV infection, and although the same explanation of vitamin A deficiency applies here, it is also possible that decreased lacrimation and opportunistic infection may be the contributing cause as seen by Kestenyl et al. in their study of children in Rwanda.

Both children with corneal phlyctenules had also been diagnosed to have tuberculosis and both belonged to the older age group. One had pulmonary tuberculosis while the second had tuberculous arthritis. These phlyctenules were therefore a hypersensitive reaction. Both of these children were also HIV positive. The number of patients observed was not significant, but clinically, it is worthwhile to note.

The difference in the incidence of ocular manifestations in the study in the USA could be due to two major reasons. First, most of our children have concurrent malnutrition and therefore ocular manifestations. Second, most of our children succumb to opportunistic infections, while their counterparts in the USA have a better outcome in terms of being treated appropriately, with longer and better survival.

Fundus abnormalities
These were significantly more common in the HIV positive children. Several studies in different countries have described these and are considered to be a non-infectious HIV retinopathy.

There were eight children who had macular oedema out of the 24 with ocular lesions among the HIV positive children. Two of these were also associated with perivascular sheathing and two were associated with haemorrhages in the retina. One child had neovascularization below the discs. The conjunctival lesions could have been due to underlying malnutrition as it also occurred in the HIV negative children. However, fundus abnormalities are relatively more specific and difficult to recognize, unless specifically looked for. Therefore the presence of these lesions is highly significant.

In the study by Kestelyn et al.12 on 32 HIV positive patients with tuberculosis, five had ocular lesions due to tuberculosis, including disseminated choroiditis, phlyctenulosis, and solitary choroidal granuloma. There are reports of cases presenting with oedema of the disc and retina that have been found to have underlying choroiditis. It follows, therefore, that oedema of the retina warns of the presence of underlying choroidal disease. In this situation, infectious causes such as tuberculosis, would usually be the primary suspect. In our series, macular oedema may be a preceding event for choroiditis, as six out of eight with macular oedema also had a diagnosis of pulmonary tuberculosis and two had tuberculosis meningitis. Other studies in the past have

### Table 3

<table>
<thead>
<tr>
<th>Age in months (sex)</th>
<th>HIV status</th>
<th>Ocular lesions</th>
<th>Visual acuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>19 (male)</td>
<td>Positive</td>
<td>RE: perforated</td>
<td>RE: NLP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LE: normal</td>
<td>LE: follows objects at 3 m</td>
</tr>
<tr>
<td>24 (male)</td>
<td>Positive</td>
<td>Bilateral macular oedema</td>
<td>BE: follows objects at 2 m</td>
</tr>
<tr>
<td>36 (female)</td>
<td>Positive</td>
<td>Bilateral conjunctival xerosis and macular oedema</td>
<td>BE: follows objects at 2 m</td>
</tr>
<tr>
<td>36 (female)</td>
<td>Positive</td>
<td>Bilateral conjunctival xerosis, macular oedema and sheathing of vessels near the inferior poles of discs</td>
<td>BE: follows objects at 2 m</td>
</tr>
<tr>
<td>84 (male)</td>
<td>Positive</td>
<td>RE: macular oedema</td>
<td>RE: 6/18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LE: normal</td>
<td>LE: 6/6</td>
</tr>
<tr>
<td>66 (male)</td>
<td>Positive</td>
<td>Bilateral macular oedema with sheathing of vessels near the inferior poles of the discs</td>
<td>RE: 6/60</td>
</tr>
<tr>
<td>19 (female)</td>
<td>Negative</td>
<td>LE: esotropia</td>
<td>LE: 6/60</td>
</tr>
<tr>
<td>27 (male)</td>
<td>Negative</td>
<td>Bilateral congenital cataracts</td>
<td>BE: follows light only</td>
</tr>
<tr>
<td>60 (male)</td>
<td>Negative</td>
<td>Bilateral optic atrophy with macular oedema</td>
<td>BE: NLP</td>
</tr>
</tbody>
</table>

RE: right eye; LE: left eye; BF: both eyes.
indicated the usefulness of fundoscopy in the early diagnosis of disseminated tuberculosis.\textsuperscript{13,14}

Among the HIV negative children, only two had macular pathology. One had bilateral macular oedema and was later diagnosed to have pulmonary tuberculosis. The other had optic atrophy and this was secondary to bacterial meningitis.

It is of note that in our series we did not see any child with cytomegalovirus retinitis, cotton wool spots, conjunctival Kaposi’s sarcoma, or cranial nerve palsies, although other studies have found these frequently.\textsuperscript{3,7,8}
The possible reason could be the fact that children in our series do not live long enough for these manifestations to appear.

**Visual acuity**
There were proportionately more children with decreased visual acuity among those with macular oedema. The child with keratomalacia had no light perception in the affected eye. The visual acuity was very difficult to assess and thus only those with gross impairment were noticed.

**Conclusions**
1. Clinical signs of avitaminosis A is very common among the hospitalized children at the Muhimbili Medical Centre.
2. The prevalence of ocular manifestations was 38 per cent of HIV positive children.
3. In nearly 70 per cent of the children, a suspected or confirmed concurrent diagnosis of tuberculosis was present.
4. The screening for ocular lesions will assist in the detection of systemic tuberculosis.
5. Ocular examination should be carried out for all children, especially those known or suspected to have HIV infection.

**References**