SHORT REPORT

The impact of human immunodeficency virus 1 on largyngeal airway obstruction in children

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Children with laryngeal airway obstruction (LAO) require admission to the intensive care unit (ICU). The unresolved ethical dilemma of ICU access for HIV infected children in resource poor settings requires further scientific data to help guide triaging. Of 38 children with LAO, 19 had HIV infection. The mortality, need for supportive management, duration of intubation, intermittent positive pressure ventilation, and ICU and hospitalisation stay were similar in the HIV infected group compared to the HIV uninfected group. Episodes of laryngotracheobronchitis were equally distributed between both groups (31.6% *v* 31.3%), while oropharyngeal/laryngeal candidiasis (26.3%), tuberculosis (15.8%), and benign lymphoid hyperplasia (15.8%) were commonly seen in the HIV infected group.

Very little has been described about the causes and outcome of HIV infected children with laryngeal airway obstruction (LAO). Case reports have implicated Epstein–Barr virus, tuberculous lymphadenitis, and candidiasis as aetiological agents.[1 2]

PATIENTS AND METHODS

Records of all children aged 0–12 years of age, who were diagnosed with LAO in the paediatric wards and paediatric intensive care unit (ICU) at a tertiary hospital, King Edward VIII Hospital, Durban, South Africa, during 1999 were analysed retrospectively. The standard international definition of LAO was utilised.[3] All children had the following tests performed for aetiology: blood cultures, endotracheal aspirate bacterial and viral cultures, and laryngoscopy. Relevant biopsy specimens were taken and sent for histology in selected cases. HIV infection was confirmed according to standardised international criteria.[4]

RESULTS

All 38 children with LAO during 1999 were evaluated. Nineteen had associated HIV-1 infection, 16 were HIV-1 uninfected, while the remaining three cases had an indeterminate HIV result and were excluded. The mean age of the HIV-1 infected group was 11 months (range 1–34 months) and that of the HIV uninfected group was 26.9 months (range 2–96 months).

Laryngotracheobronchitis (LTB) was the most common diagnosis among HIV infected and uninfected children (31.6% and 31.3% respectively). In the remaining cases, oropharyngeal/laryngeal candidiasis, tuberculosis, and benign lymphoid hyperplasia were commonly diagnosed in the HIV infected group, while laryngeal papilloma was seen in the HIV uninfected group of patients. Bacterial infections caused by *Haemophilus influenzae* (n = 3) and *Moraxella catarrhalis* (n = 2) were more frequently identified in HIV uninfected children (43.7%; table 1).

Table 1 Aetiological diagnoses of children presenting with laryngeal airway obstruction

Diagnoses	HIV infected (n=19)	HIV uninfected (n=16) (%)
LTB	6† (31.6)	5‡ (31.3)
Squamous papilloma	0	5* (31.3)
Subglotttic stenosis	2 (10.5)	1 (6.3)
Benign lymphoid hyperplasia	3 (15.8)	0
Oesophageal/laryngeal candiadiasis	5 (26.3)	0
Tuberculosis	3 (15.8)	1 (6.3)
Cytomegalovirus associated abscess	0	1 (6.3)
Tonsillar adenoidal hypertrophy	0	2 (12.5)
Cystic hygroma	0	1 (6.3)

Associated infections:
**Haemophilus influenzae* (n=2); *Moraxella catarrhalis*; *Streptococcus pneumoniae*; *Acinetobacter acintratus*.
†Herpes simplex; influenza virus.
‡Herpes simplex; *Haemophilus influenzae*; *Moraxella catarrhalis*.

The signs of LAO were similar in both groups. Associated clinical findings were different. The HIV infected group presented with CDC clinical categories B (n = 11) or C (n = 8) with reticular endothelial hyperplasia (94.7%), failure to thrive (47.4%), and candidial infection (42.2%) frequently observed. The chest radiographs were abnormal in 73.7% of these children, with mediastinal lymphadenopathy and left lower lobe collapse (26.3%) commonly seen.

Management for symptomatic relief of LAO was identical in both groups. Additional treatment was given according to the aetiological diagnosis. The mortality in the HIV infected and uninfected groups was 21.1% and 12.5% respectively; all deaths occurred in those requiring additional support with mechanical ventilation. Readmission rates (26.3% *v* 31.3%), mean length of intermittent positive pressure ventilation (6.6 days *v* 5.0 days), and duration of ICU stay (7.6 days *v* 6.1 days) and hospital stay (9.6 days *v* 9.0 days) were similar in the HIV infected and uninfected groups.

DISCUSSION

In this study, HIV-1 infection was present in half of the patients admitted with laryngeal airway obstruction, creating a substantial demand for scarce ICU resources. In both HIV infected and uninfected patients, short term outcomes were equally reasonable, and patients had similar median duration of ICU and hospital stay. This justifies the continued acceptance of HIV infected with LAO to the paediatric ICU.

Abbreviations: ICU, intensive care unit; HIV, human immunodeficiency virus; LAO, laryngeal airway obstruction; LTB, laryngotracheobronchitis

Deaths in this group were caused by AIDS related diseasesrather than the severity of LAO. The mortality rate of 12.5% in the HIV uninfected group with LAO was similar to reports from other HIV-1 non-endemic regions in developing countries and was related to overall poor socioeconomic condition and the overwhelming burden of infectious diseases.[5]

LAO can frequently be treated, and therefore the need for further aetiological investigation is imperative. Candidiasis should be treated with both topical and systemic agents (fluconazole or amphotericin B). Ketoconazole, a cheaper alternative, should be avoided if possible, because of the recent reports of hepatotoxicty. Broad spectrum penicillins could be given if bacterial LTB is suspected.

There are limitations to this study, given its small sample size and retrospective design. Interestingly, bacterial tracheitis was not a common cause of LAO among HIV infected children in this study, which is an unusual finding. However, these results provide pilot data, which will be helpful in assessing future paediatric patient populations with LAO. HIV infection should not be a deterrent for ICU care in children with LAO.

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COMMENTARY

The report by Jeena *et al* further substantiates the striking effects of the HIV pandemic in South Africa, where half of the children admitted to a tertiary hospital with laryngeal airway obstruction (LAO) are infected with HIV. The results are of interest given that there were differences in disease presentation, age, and aetiology between HIV infected and uninfected children. Unsurprisingly, HIV infected children had LAO more frequently due to tuberculosis, candidiasis, and lymphoid hyperplasia, all treatable conditions. However, the most striking finding was that short term outcomes, duration of hospital stay, and need for mechanical ventilation were similar for both groups of children. This was a limited study, with descriptive data, and a small sample size. Nevertheless, a convincing case is made that LAO is a reversible condition, even among HIV infected children. This undermines any proposals to prioritise ICU care to children without HIV infection on the basis that they would be more likely to survive an acute disease episode. In resource limited settings, where a paucity of critical care beds prevails, physicians not infrequently are faced with difficult decisions, such as whether to provide labour intensive, high maintenance and expensive care to a child who will die anyway of a fatal illness. In effect, colleagues working under these conditions quite often have to generate a "Schindler's list" of patients.

ICU beds are scarce. If some form of prioritisation is necessary, should HIV ever be a criterion? In Africa such children with HIV who require ICU care generally do not have access to antiretroviral treatment.[1–4] As a result of this, studies of the natural history of HIV disease show a higher rate of disease progression than in developed countries, with a substantial proportion of children achieving AIDS defining conditions by 5 years of age.[5–7] However, overall infant mortality from other causes in resource poor settings is also unacceptably high,[8–15] and this has not generally been an accepted reason for denial or selection for medical care in children with potentially reversible illnesses, when it is available.

Nevertheless, it seems incongruent to deny access to antiretrovirals and then provide expensive ICU care. If antiretrovirals were available, it is possible that fewer children with HIV would require ICU care, and certain that HIV would be less often perceived as a necessarily terminal process.

In South Africa, HIV seroprevalence rates in mothers may be as high as 30%,[16] with a 30% chance of mother to child HIV transmission. Therefore, three of every nine children born will be HIV exposed, and one of the three will be infected. When HIV seroprevalence rates reach such astounding figures, an exclusion policy based on HIV serology would mean denying ICU care to 10% of the paediatric population. Certainly, decisions regarding patient management should be taken regardless of HIV serology results and be based solely on the patient's disease severity and short term prognosis.

Unavailability of specific treatment should not justify denial of critical care for HIV infected children who happen to have a reversible, emergent disease of childhood. Unavailability of treatment for HIV infection which would dramatically improve the natural history of the disease is wrong. Condemning those with HIV to have no access to ICU care for reversible conditions is also wrong. One erroneous policy does not justify another, and two wrong policies will not add up to a right one.

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