Prevention of Hypoxemia During Feeding in Infants with Bronchopneumonia

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Summary
Administration of oxygen via a tube held close to the nose prevented hypoxemia during breastfeeding in 15 of 20 infants with bronchopneumonia.

Introduction
Hypoxemia is rare during feeding in normal infants and arterial oxygen saturation is generally higher during feeding than during sleep. However, periods of desaturation are common in infants with bronchiolitis or bronchopulmonary dysplasia. Similarly, infants with bronchopneumonia often become cyanotic during feeding.

At Harare Central Hospital routine care of infants with pneumonia includes breastfeeding every 3 h with oxygen administered via a headbox between feeds if the baby is clinically hypoxic. In very ill infants, to avoid removal from oxygen, nasogastric feeds of expressed breastmilk or intravenous fluids are used.

The purpose of this study was to determine whether infants with bronchopneumonia who suck vigorously but become desaturated during breastfeeding, can be adequately oxygenated with oxygen administered via a tube held close to the nose.

Methods
A sample of 30 infants was studied. Ten were well (control) infants and 20 had bronchopneumonia; six severe and 13 very severe by WHO criteria. SaO₂ was measured with a Nellcor pulse oximeter (N10, Hayward, California) with a reusable probe placed on a warm foot. SaO₂, heart rate, color and state were recorded every minute during 3 min breastfeeding in air and 5 min in oxygen, administered via a tube held close to the nose. Respiratory rate was counted for 1 min during feeding in air and oxygen. The 10 control infants did not require oxygen and were studied during 8 min feeding in air.

Results
The mean (±SD) age of the 20 ill infants was 4.4 ± 3.1 months and their mean weight was 4.9 ± 1.3 kg. The mean age of the 10 control infants was 4.2 ± 3.0 months and their mean weight was 5.1 ± 1.2 kg. These differences were not significantly different. Table 1 lists the parameters recorded during feeding in air. With oxygen, mean SaO₂ increased to 89 per cent in ill infants. Five did not tolerate the oxygen via a tube. They all had very severe pneumonia and their SaO₂ values were lower than the 15 who responded well (48 v. 69 per cent in air and 72 v. 95 per cent in oxygen; p < 0.04 and p < 0.0001, respectively). Three required nasogastric feeds and two subsequently died.

Discussion
Prevention of hypoxemia is of major concern in infants with pneumonia and is common during feeding in these ill infants. Furthermore, although failure to suck indicates very severe pneumonia requiring oxygen therapy, there is little information about how these children should be fed. Nasogastric feeds are popular but their safety in distressed infants has been questioned. Shann et al. believe that infants ‘often breast feed satisfactorily’ with nasopharyngeal oxygen but this technique requires an accurate, low flow flowmeter. Gastric distension, nasal obstruction and pneumoencephalus have been reported. Nasal prongs are both safer and better tolerated. However, in our setting the oxygen cylinder has to be shared by two to four babies and it is difficult to maintain a constant low flow of oxygen. We therefore treated all these infants in an oxygen headbox between feeds. Kumar et al. found that the headbox was more effective and acceptable than...
the nasopharyngeal catheter and recommended its use in referral hospitals.

This study was designed to find a simple way of maintaining oxygenation in moderately ill infants who suck vigorously but become desaturated while feeding. We found that asking the mother to hold the oxygen tube close to the baby’s nose was very effective. For the few infants who remain cyanotic and fail to increase their arterial oxygen saturation >90 per cent nasogastric feedings may be required. Further studies on the optimal management of these very ill infants are needed.

References

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<thead>
<tr>
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<th>Ill (n = 20)</th>
<th>Control (n = 10)</th>
<th>p value</th>
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<tbody>
<tr>
<td>SaO₂ (%)</td>
<td>64 ± 19</td>
<td>95 ± 3</td>
<td>&lt;0.00002¹</td>
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<td>Cyanosis (number)</td>
<td>13</td>
<td>0</td>
<td>&lt;0.002²</td>
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<td>Mean heart rate beats/min</td>
<td>166 ± 17</td>
<td>151 ± 15</td>
<td>&lt;0.03</td>
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<tr>
<td>Mean respiratory rate breaths/min</td>
<td>74 ± 19</td>
<td>46 ± 12</td>
<td>&lt;0.003</td>
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¹ Kruskall–Wallis one-way analysis of variance.
² Fisher’s exact test.
Values are mean ± SD.