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Feeding Tube Used as Nasal Cannula to Deliver Continuous Positive Airway Pressure

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ABSTRACT

We describe a simple low cost technique of delivering continuous positive airway pressure in a toddler with heart disease and respiratory distress due to collapse consolidation using feeding tube as a nasal cannula.

Keywords: feeding tube cannula, airway

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INTRODUCTION

Acute respiratory tract infections are a common cause of morbidity and mortality especially in infants and young children [1]. The necessary respiratory support for most of these sick infants can be given in primary health centers, small peripheral and district hospitals by utilizing locally available and indigenous techniques in contrast to use of sophisticated equipments. We describe a simple technique of providing nasal continuous positive air way pressure using a low flow nasal cannula.

A one and half year old female toddler was brought with cough and cold for seven days, fever for three days and severe respiratory distress of two days duration. The infant is a known case of large membranous ventricular septal defect whose compliance to anticongestive therapy was poor. Admission heart rate was 168/min; respiratory rate was 74/min with sub costal and intercostals retraction with alae nasi flaring and an oxygen saturation of 88% in room air. There were coarse crepitations in both lung bases and right inframammary and interscapular regions. Liver was palpable 3 cm below the right costal region and spleen tip was palpable. The infant was managed with oxygen by head box at 8 liters/minute, intravenous ceftriaxone and intravenous fluids at two third maintenance. Anticongestive measures were restarted. However over the next eight hours, the respiratory distress progressively worsened with the development of grunt and requirement of higher FiO2 to maintain saturation. The baby had thick tenacious secretions which were suctioned every two hours after hypertonic saline nebulisations.

Investigations revealed an elevated TLC with neutrophilic leucocytosis and chest radiograph revealed collapse consolidation of right middle and lower lobes with cardiomegaly (CT ratio 60%). In view of thick secretions which kept blocking the nasal passages, a feeding tube of 10F size was passed up to the nasopharynx and was connected to 2litres/min of oxygen. Subsequently, over the next few hours, the distress settled, grunt disappeared and oxygen saturations improved to 100%. Oxygen was stopped after 48 hrs and feeds were gradually increased initially through a nasogastric tube and advanced to full feeds. Antibiotics were given for a total of seven days and discharged with advice to continue three days of oral antibiotics and anti congestive therapy. Her parents were counseled about appropriate diet to improve calorie and protein intake of the infant.

The use of nasal cannula for administering CPAP has been well documented in literature especially in preterm infants [2, 3, 4]. In a study on preterm infants, it was reasoned out that nasal cannula inadvertently delivers continuous positive distending pressure, with a mean distending pressure of 9.8 cm with a 3mm outer diameter nasal cannula [4]. In another study on adults with obstructive sleep apnea, the use of high flow nasal cannula with mouth closed was found to generate a mean nasopharyngeal pressure of 1.54 to 5.34 cm of H_2O [5]. The constant flow of gas through nasal cannula and its presence in the nares itself probably creates an increased resistance to expiration and as a result, increases airway pressure [6]. The desired pressure can be achieved by varying the size of the cannula and the flow through it. In one study, a pressure of 4.5cm of H2O was achieved with a flow of 8 litres/min and cannula of 3 mm diameter using humidifier device and lower pressures were achieved with wide bore cannula [7].

In our case, the infant developed worsening distress while on oxygen flow of 10 litres/min by head box and improved with oxygen by nasal cannula at 2 litres/min. The manner in which the infant responded to the low flow oxygen indicates that, more than oxygen, a continuous positive airway pressure played an important role in improving the respiratory distress with additional respiratory support in the form of chest physiotherapy, saline nebulisations and frequent suctioning. The CPAP was provided by the nasal cannula oxygen delivery which was humidified by bubbling it through water. However we were not able to measure the exact pressures since we did not have a transducer attachment. The nasal cannula in our case was a feeding tube of 10 F size which was introduced into one of the nostril to a distance measured from exterior nares to the tragus of the ipsilateral ear.

To conclude, oxygen through a nasal cannula with flow as low as 2 litres/min is able to produce continuous airway distending pressure and thereby improve respiratory mechanics especially in infants who have collapse consolidation. It appears to be safe when administered for short periods. In resource limited settings, it may avert the need for expensive machines to provide the same level of support. However long term benefits and risk of excess pressure related complications have to be studied in well designed clinical trials.

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