

Unique Way of Peripheral Stimulation for Recurrent Apnea in a Preterm Neonate

Apnea of prematurity (AOP) is a common concern in premature infants. Routine clinical management of the obstructive subtype involves providing continuous positive airway pressure (CPAP) ventilation to prevent alveolar atelectasis and pharyngeal collapse, apart from prone positioning. In central apnea, methylxanthine therapy is mainstay of treatment as it stimulates the central nervous system and respiratory muscle function [1]. Peripheral tactile stimulation is the most common intervention for AOP as it helps in reducing apnea episodes. It works by generating excitatory, nonspecific neuronal activity in the brainstem to stimulate respiration [2]. Tactile stimulation has the potential to substantially reduce the frequency of apnea [3].

Devices for stimulation like oscillating mattress are not available in most of the neonatal intensive care units. We recently managed a case of recurrent apnea in a preterm infant by providing peripheral stimulation in a unique way. The baby was a 27-week-old preterm neonate who developed recurrent apnea and required mechanical ventilation for the same, apart from intravenous caffeine, red blood cell transfusion and intravenous antibiotics for infection. Ultrasonography of the cranium was normal. Baby was finally extubated but

she was still having apneic episodes, improved by tactile stimulation. We connected the end delivery limb of the ventilator tubing to a glove (*Web Video 1*), and the ventilator was started with average settings. Baby's foot had contact with the air filled glove that provided repeated gentle stimulation. After providing tactile stimulation with this technique, the frequency of apnea reduced drastically. In next 48 hour period, baby had only 2 episodes of apnea, which also subsided on their own. We believe that it is an easy bedside method to provide gentle tactile stimulation, and can be tried in cases of intractable apnea. The rate of stimulation can be set as per the respiratory rate of ventilator. The impact can be set by setting Peak Inspiratory Pressure (PIP). We suggest that this method of providing tactile stimulation should be tested in form of research studies.

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Neonatal Resuscitation Guidelines: India-specific Concerns

There has been increasing use of technology in the delivery room as recommended in the past few editions of the newborn resuscitation guidelines [1]. This poses several challenges in implementation in low-resource settings. There is wide economic inequality in India, and putting the technology into practice raises several concerns in actual practice of these guidelines.

Time of birth finds no mention in the guidelines as timing of birth is taken differently (birth of the head,

delivery of shoulders, cutting of cord etc) in practice. When should the timer be started at birth needs to be precisely defined. This has relevance as timely action is precious at birth.

Delayed cord clamping is recommended for at least 30 seconds for term and preterms not requiring resuscitation. There is no upper limit defined. Putting this step into practice needs clear understanding, communication and defining of roles and responsibilities between the obstetric and neonatal health care providers at delivery. This simple intervention which can be practiced in majority of newborns at birth is under-utilized, and its benefits – not widely recognized.

Use of pulse oximetry is recommended for all newborns undergoing resuscitation. The studies were based on pulse oximeter with signal extraction technology (SET). Routine pulse oximeters take atleast several minutes after birth to detect signals; by that time either resuscitation is over or there is need for chest compressions during which time the oximeter becomes invalid. Routine use of pulse oximeters based on SET in delivery room is not practicable, due to the higher costs involved in low-resource settings.

Use of a blender in delivery room is recommended for precise oxygen concentration delivery. Blenders are not part of delivery room setup or even in newborn nurseries in majority of Indian public and private hospitals. There is need to categorize blender into essential equipments for newborn care for both - delivery rooms and nursery care. It is medically, ethically and legally not advisable to care for a preterm without blended oxygen. The titration of oxygen delivery of 21-30% for initiation of preterm ventilation is not feasible without a blender.

Use of T-piece device is recommended for ventilation and delivery of CPAP at birth, especially for preterm. T-piece needs compressed air and oxygen to function. Compressed air is not available in majority of delivery rooms in public and private sector in India. Hence, the T-piece functions either on 100% oxygen or room air which defeats its purpose. There is a need to develop innovative, local, compressed air sources.

Use of ECG monitor is now suggested with positive pressure ventilation and recommended with chest compressions, as heart rate assessment clinically and by pulse oximetry is imprecise in first few minutes of birth. This is based on weak evidence, and there have been no randomized control trials to address this issue. Further, whether use of ECG monitor leads to better resuscitation outcomes is not known. The use of ECG monitor in neonatal nursery is not a routine practice and the modalities of implementing ECG in the delivery room needs elaboration.

There is a need to adapt and put the science into practice, based on available skills and resources with India-specific guidelines. At present, the guidelines are far from implementation in majority of the delivery rooms in India due to lack of technology, lack of resources, and absence of skills. This also poses several ethical and legal issues in the care of the newborn.

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