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ORIGINAL ARTICLE

Use of Bubble Continuous Positive Airway Pressure (BCPAP) in Management of Neonatal Respiratory Distress Syndrome in Resource Limited Settings

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ABSTRACT

Aim: To determine the efficacy of use of bubble continuous positive airway pressure in management of neonatal respiratory distress syndrome.
Study design: Prospective study.
Place and duration of study: Paediatric Medicine, Abbas Institute of Medical Sciences (AIMS) Muzafarabad, AJ Kashmir from 01-02-2022 to 31-07-2022.
Methodology: Fifty new born who were admitted with respiratory distress syndrome was enrolled. On clinical examination their shake test was found positive for respiratory distress syndrome or in other cases the chest x-ray imaging was suggestive towards respiratory distress syndrome symptoms. Oxygen flow-meter was prepared and nasal-pong were closed for bubble prior attachment with neonate. Appearance, pulse, grimace, activity and respiration scoring at five min, primigravida, child temperature, vital signs, oxygen saturation rate, complications, post and pre-bubble continuous positive airway pressure were recorded.
Results: The mean age of the neonates was 2.7±1.1 days. There were more male children than female new born who were suffering from respiratory distress syndrome. The mean maternal age was 32.3±3.5 years with 70% of the births to be in singleton Antenatal steroids were received by 66.7% of new born and the 5 minutes appearance, pulse, grimace, activity and respiration score presented 64% new born within a range of 8-10 points. There were 76.2% respiratory distress syndromes new born who were successfully weaned off from bubble continuous positive airway pressure.
Conclusion: Bubble continuous positive airway pressure is a cost-effective technique in resource limited regions for reducing and treating respiratory distress syndrome cases and decreasing mortality.
Keywords: Management, Respiratory distress syndrome, Management

INTRODUCTION

Respiratory distress syndrome (RDS) is a health condition presented in many new born children. In most of the cases it is associated with very low or extremely low birth weight neonates or in preterm deliveries[1-3] Prematurity has been documented to account for a substantial number of mortalities with RDS been identified as a major reason of mortalities. Hyaline membrane disease which is surfactant deficiency has been observed in RDS cases. Surfactants production is initiated at 22 weeks of gestation and is completed by 34 weeks of gestation. In conditions where complete surfactant development is not achieved respiratory complication can be observed as without the surfactant formation the air space of the lungs collapses during expiration process.

Respiratory distress syndrome has been treated through various interventional techniques in context to reduction of mortality. Ventilator support of continuous positive airway pressure (cPAP) are the two major techniques assisting mechanical ventilation and are commonly in use in developed world in addition to administration of surfactant.

It is important to mention that as other interventional techniques the risk of complications is present and merits as well as demerits need to consider. Mechanical ventilators are costlier than CPAP machines which is further assisted by cost in form of bubble CPAP (bCPAP). The bCPAP provides a continuous alveolar air pressure preventing their collapse.[4-6] CPAP carried by underwater closure sources chest vibrations owing to flow of gas underwater (bubbles). These vibrations makes high frequency ventilation waves[3-7] which can assist in normalizing RDS and improving health outcomes of such new born.

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The objective of the study was to determine the efficacy of use of bubble continuous positive airway pressure in management of neonatal respiratory distress syndrome.

MATERIALS AND METHODS

This prospective study was conducted at Paediatric Medicine, Abbas Institute of Medical Sciences (AIMS) Muzafarabad, AJ Kashmir after permission from Institutional Ethical Committee.. Fifty new born who were admitted with respiratory distress syndrome either just after their birth or within a short time after birth. On clinical examination their shake test was found positive for RDS or in other cases the chest x-ray imaging was suggestive towards RDS symptoms. New-born with congenital anomalies were excluded from enrolment. bCPAP was administered in RDS new-borns or those preterm births which were less than 33 weeks gestation. bCPAP tubing is cut and free end is used as expiration limb. The other end is stick to prevent air escape. Inspirational limb is generated from second tubing. Oxygen flow-meter was prepared at 5-8L per min and nasal-pong were closed for bubble prior attachment with neonate. Complete data including mother and child history, clinical assessment, symptoms, APGAR scoring at five min, primigravida, child temperature, vital signs, oxygen saturation rate, complications, post and pre bCPAP were entered on a well-designed proforma. The success of the bCPAP was considered in case of RDS and oxygen saturation improvement. Statistical analysis was conducted using SPSS volume 26.0.

RESULTS

The mean age of the neonates was 2.7±1.1 days. There were more male children than female new born who were suffering from RDS. The mean maternal age was 32.3±3.5 years with 70% of the

births to be in singleton while 1 case of triplets was also presented (Table 1). Antenatal steroids were received by 66.7% of new born while 33.3% of neonates did not receive any antenatal steroid. The condition of RDS was associated with the deliverance of antenatal steroid. Higher number of new born enrolled were given antenatal steroid presenting their crucial RDS condition (Figure 1). Majority of the neonates suffering from respiratory distress syndrome were delivered through caesarean than normal vaginal delivery. There were 80% of the cases which were delivered through caesarean mode of birth (Figure 2). The birth weight of 34% of new born was below 1000 grams and the 5 minutes APGAR score presented 64% new born within a range of 8-10 points (Table 3). There were 76.2% those RDS new born who were successfully weaned off from bCPAP while 38.1% of total enrolled RDS new-born could not survive (Figure 3).

Table 1: Maternal age and number of babies delivered (n=50)

Parameters	No.	%age
Maternal age (years)		
20-25	6	12.0
26-30	16	32.0
31-35	19	39.0
36-40	9	18.0
Gender		
Male	27	54.0
Female	23	46.0
New born delivered		
Singletons	35	70.0
Twins	14	28.0
Triplets	1	2.0

Figure 1: Frequency of Antenatal steroids administered in neonates with RDS

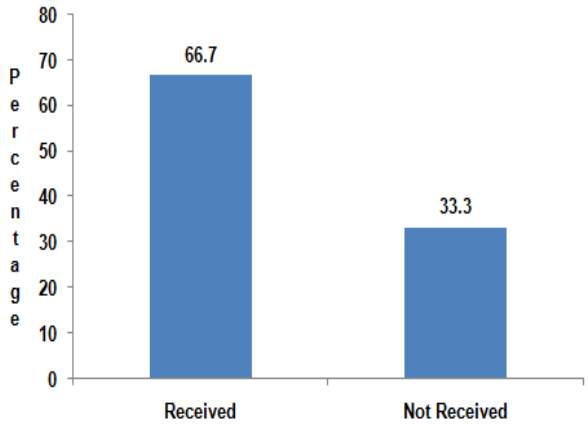


Figure 2: Percentage of mode of delivery of RDS new born

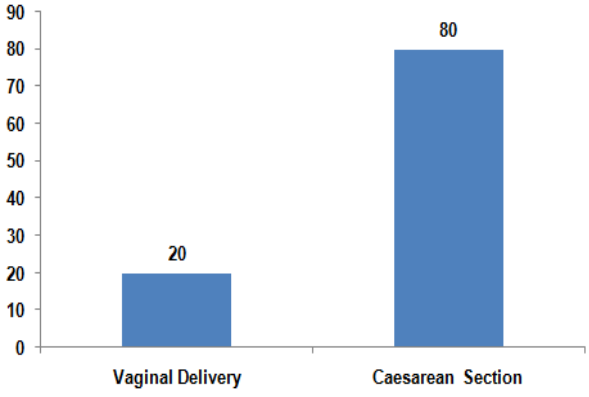
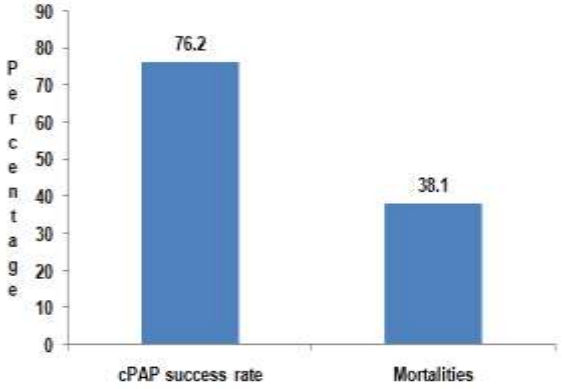


Table 3: Birth weight and APGAR scoring of new born

Parameters	No.	%age
Birth weight		
<1000g	17	34.0
1000 – 1499	17	34.0
1500- 2500	16	32.0
5 minutes APGAR scoring		
0-4	4	8.0
5-7	14	28.0
8-10	32	64.0

Figure 3: bCPAP success rate versus mortalities



DISCUSSION

In region with limited resources the bCPAP has been used frequently for the treatment of respiratory distress syndrome. The most important attraction of this technique is its cost effectiveness as it can be made through locally available materials. There has been a minimal risk of bronchopulmonary dysplasia and pulmonary injury related with bCPAP with an efficient interventional technique for keeping alveolar distended[8-10]. There has been an increase in the usage of CPAP technique on global manner over other methods of ventilation for treating RDS[10]. bCPAP has shown a high success rate in comparison to other techniques as elaborated in the current research and studies elsewhere[11,12].

The present study results showed that majority of the women were administered with antenatal steroids which might have assisted in decreasing the frequency of RDS in new born even those which were still preterm. This further also might have impacted in increasing the success rate of bCPAP as observed in the current research. The similar association has been documented in previous literature where the early lung maturity has been linked with the deliverance of antenatal steroids in neonates[13-14].

Various studies have detailed the fact that rapid raise in oxygen saturation was seen in usage of bCPAP with improvement in lung function and decreases of RDS symptoms in new born.[15-19] as also presented in the current study results where the success rate by using bCPAP was observed up to 76.2%.

CONCLUSION

Bubble continuous positive airway pressure is a cost-effective technique in resource limited regions for reducing and treating RDS cases and decreasing mortality.

Conflict of interest: Nil

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