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Original Research

Assessment of Outcome of Preterm Infants with Respiratory Distress on CPAP

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ABSTRACT

Background: Preterm birth is defined as birth before 37 completed weeks gestation, and it is estimated that each day, across the world over 41,000 infants are born before this gestational age. The simplest and least invasive type of ventilator provides nasal continuous positive airway pressure (CPAP). Hence; the present study was undertaken for assessing the outcome of preterm infants with Respiratory Distress on CPAP. **Materials & methods:** A total of 50 subjects were enrolled. Routine Investigations and Chest Xray was done. Vitals were monitored every 30 mins from starting of CPAP. CPAP failure is defined as: SpO2 <88% on FiO2 >60% for >30 minutes (with requirement of CPAP >8 cms of H2O), Pathologic apnea and Increasing Retractions. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. Chi-square test, student t test and Mann-Whitney U test were used for assessment of level of significance. **Results:** CPAP success occurred in 80 percent of the subjects while CPAP failure occurred in remaining 10 percent of the subjects. CPAP failure referred to recovering after shifting to mechanical ventilation. **Conclusion:** CPAP is an effective way of improving oxygenation of preterm babies with respiratory distress due to various causes.

Key words: CPAP, Respiratory

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INTRODUCTION

Preterm birth is defined as birth before 37 completed weeks gestation, and it is estimated that each day, across the world over 41,000 infants are born before this gestational age. The risk of adverse consequences of premature birth declines with increasing gestational age.[1]

If untreated, infants may become fatigued, apnoeic, and hypoxic. They may progress to respiratory failure and will need assisted ventilation. High airway pressures may be required to ventilate the stiff, non-compliant lungs, thereby increasing the risk of acute respiratory complications, such as pneumothorax, pneumomediastinum, and pulmonary interstitial emphysema.[2]

Respiratory disease may result from developmental abnormalities that occur before or after birth. Early developmental malformations include tracheoesophageal fistula, bronchopulmonary sequestration (abnormal mass of pulmonary tissue not connected to the tracheobronchial tree), and bronchogenic cysts (abnormal branching of the tracheobronchial tree).[3] The simplest and least invasive type of ventilator provides nasal continuous positive airway pressure (CPAP). These ventilators provide a constant end distending pressure to maintain alveolar recruitment, prevent atelectasis, and improve gas exchange.[4] CPAP is effective in preventing failure of extubation in preterm infants. Cohort studies have also showed that early use of CPAP in preterm infants with respiratory distress syndrome may reduce the need for endotracheal intubation for positive pressure ventilation.[4-7] Hence; the present study was undertaken for assessing the outcome of preterm infants with Respiratory Distress on CPAP.

MATERIALS & METHODS

The present study was undertaken for assessing the outcome of preterm infants with Respiratory Distress on CPAP. A total of 50 subjects were enrolled.

Inclusion criteria

- Babies born at ≥28 weeks and <37 weeks of gestational age having respiratory distress

Exclusion criteria

1. Babies born <28 weeks of gestation
2. Babies born ≥37 weeks of gestation
3. Babies with congenital anomalies

Routine Investigations and Chest Xray was done. Vitals were monitored every 30 mins from starting of CPAP.

CPAP failure is defined as[8]

- SpO2 <88% on FiO2 >60% for >30 minutes (with requirement of CPAP >8 cms of H2O)
- Pathologic apnea
- Increasing Retractions

All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. Chi- square test, student t test and Mann-Whitney U test were used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

RESULTS

In the present study, a total of 50 subjects were analyzed. Mean gestational age was found to be 32.85 weeks. Cesarean delivery was done in 70 percent of the subjects. CPAP success occurred in 80 percent of the subjects while CPAP failure occurred in remaining 10 percent of the subjects. CPAP failure referred to recovering after shifting to mechanical ventilation.

Table 1: Distribution of patients according to gestational age

Gestational age (weeks)	Number of patients	Percentage of patients
28 weeks	4	8
29 weeks	5	10
30 weeks	7	14
31 weeks	7	14
32 weeks	6	12
33 weeks	5	10
34 weeks	5	10
35 weeks	6	12
36 weeks	5	10
Total	50	100
Mean (weeks)	32.85	

Table 2: Distribution of patients according to mode of delivery

Mode of delivery	Number of patients	Percentage of patients
Cesarean	35	70
Vaginal	15	30
Total	50	100

Table 3: Distribution of patients according to Outcome

Outcome		Number of patients	Percentage of patients	p-value
CPAP success	Recovery (weaning off from CPAP)	40	80	0.002*
CPAP failure	Recovered after shifting to mechanical ventilation	10	10	
	Mortality	0	0	
	Total	50	100	

*: Significant

DISCUSSION

Continuous positive airway pressure (CPAP), which refers to the application of continuous distending pressure in a spontaneously breathing neonate, increases the functional residual capacity of the lung resulting in better gas exchange. CPAP has been shown to reduce the risk of mortality by 48% and the need for surfactant and mechanical ventilation by about 50%.[7-9] Hence; the present study was undertaken for assessing the outcome of preterm infants with Respiratory Distress on CPAP.

In the present study, a total of 50 subjects were analyzed. Mean gestational age was found to be 32.85 weeks. Cesarean delivery was done in 70 percent of the subjects.

Our results were in concordance with the results obtained by previous studies. In a study conducted by Bhatti A et al, the mean gestation age of the preterm infants was 29.6 weeks. In another study conducted by Koti J et al, the mean age of preterm infants with respiratory distress was 30.98 weeks. Similar results were obtained in the study conducted by Moya FR et al, who reported that mean age of the preterm neonates was 31.6 weeks.[11- 13]

In the present study, CPAP success occurred in 80 percent of the subjects while CPAP failure occurred in remaining 10 percent of the subjects. CPAP failure referred to recovering after shifting to mechanical ventilation. In the study conducted by Bhatti et al, authors reported that ventilation was required in 12 percent of the patients while mortality in 18 percent of the patients. In another study conducted by Dargaville PA et al, authors reported that CPAP success occurred in 75 percent of the patients. Koti J et al, in their study, reported the success rate of CPAP to be 75 percent. In other uncontrolled studies and in the studies comparing INSURE with ventilation, CPAP failure rate ranged from 14% to 40%.[10- 13]

In a previous study conducted by Myhre J et al, authors reported on the introduction of bubble CPAP (BCPAP), a low-cost method of delivering CPAP appropriate to our setting, by comparing survival-to-discharge before and after the technology were introduced. The inpatient hospital records of all preterm infants (<37 weeks) diagnosed with RDS in the AIC Kijabe Hospital Nursery during two 18-month periods before and after the introduction of BCPAP (46 infants enrolled from 1 November 2007 to 30 April 2009 vs. 72 infants enrolled from 1 November 2009 to 30 April 2011) were reviewed. Differences in survival-to-discharge rates between the two time periods were analyzed. The survival-to-discharge rate was higher in Period 2 (after the introduction of BCPAP) than in Period 1 (pre-BCPAP). Similarly, there were lower referral rates of preterm infants with RDS in Period 2 than Period 1. BCPAP had contributed significantly to favorable outcomes for preterm infants with Respiratory distress.[14] In another study conducted by Sunil B et al, authors assessed whether the introduction of continuous positive airway pressure (CPAP) results in improved respiratory outcomes in preterm neonates ≤36 weeks of gestation in KIMS hospital. All babies born ≤36 weeks of gestational age with respiratory distress were included in this study. Seventy-seven premature newborn babies with ≤36 weeks of gestation were included in the study and were put on nasal CPAP. The incidence of CPAP failure was 22.1% (95% CI 14.27-32.54%). The proportion of neonates who required surfactant was 16.9% (10.14-26.77%) and the proportion of children who met with mortality was 6.5% (10.14-26.77%) in this study. Early institution of CPAP in the management of RDS in premature neonates can significantly reduce the need for mechanical ventilation (MV) and surfactant therapy.[15]

CONCLUSION

From the above results, the authors concluded that CPAP is an effective way of improving oxygenation of preterm babies with respiratory distress due to various causes.

REFERENCES

1. Platt MJ. Outcomes in preterm infants. Public Health. 2014 May;128(5):399-403.
2. Glass HC, Costarino AT, Stayer SA, Brett CM, Cladis F, Davis PJ. Outcomes for extremely premature infants. Anesth Analg. 2015;120(6):1337–1351.
3. Reuter S, Moser C, Baack M. Respiratory distress in the newborn. Pediatr Rev. 2014;35(10):417–429.
4. Davis RP, Mychaliska GB. Neonatal pulmonary physiology. Semin Pediatr Surg. 2013;22(4):179–184
5. Wilmott RW, Boat TF, Bush A, Chernick V, Deterding RR. Kendig and Chernick's Disorders of the Respiratory Tract in Children. Philadelphia, PA: Elsevier Saunders; 2012
6. Magder S. Bench-to-bedside review: ventilatory abnormalities in sepsis. Crit Care. 2009;13(1):202.
7. Weisman LE, Hansen TN. Contemporary Diagnosis and Management of Neonatal Respiratory Diseases. 3rd ed. Newton, PA: Handbooks in Health Care Co.; 2003
8. Kishore M, Dutta S, Kumar P. Early nasal intermittent positive pressure ventilation versus continuous positive airway pressure for respiratory distress syndrome. Acta paediatr. 2009;98(9):1412-5.
9. Upadhyay A, Deorari AK. Continuous positive airway pressure - a gentler approach to ventilation. Indian Pediatr. 2004;41:459–469
10. Aly H, Massaro AN, Patel K, El-Mohandes AA. Is it safer to intubate premature infants in the delivery room? Pediatrics. 2005;115(6):1660–1665
11. Koti J, Murki S, Gaddam P, Reddy A, Reddy MD. Bubble CPAP for respiratory distress syndrome in preterm infants. Indian Pediatr. 2010 Feb;47(2):139-43. Epub 2009 May 20.
12. Bhatti A, Khan J, Murki S, Sundaram V, Saini SS, Kumar P. Nasal Jet-CPAP (variable flow) versus Bubble-CPAP in preterm infants with respiratory distress: an open label, randomized controlled trial. J Perinatol. 2015 Nov;35(11):935-40. doi: 10.1038/jp.2015.98. Epub 2015 Aug 13.
13. Moya FR, Mazela J, Shore PM. Preterm Neonate Early Respiratory Management Prospective Observational Study investigators Prospective observational study of early respiratory management in preterm neonates less than 35 weeks of gestation. BMC Pediatrics. 2019; (19): Article number: 147.
14. Myhre J1, Immaculate M2, Okeyo B2, Anand M2, Omoding A2, Myhre L2, Okeyo L2, Barasa I2, Letchford S2. Effect of Treatment of Premature Infants with Respiratory Distress Using Low-cost Bubble CPAP in a Rural African Hospital. J Trop Pediatr. 2016 Oct;62(5):385-9. doi: 10.1093/tropej/fmw023. Epub 2016 Apr 25.
15. Sunil B, Girish N, Bhuyan M. Outcome of preterm babies with respiratory distress syndrome on nasal CPAP. International Journal of Contemporary Pediatrics. 2017;4:1206-9.