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Usefulness of nCPAP in infants with bronchiolitis: A clinical study

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Abstract

Background: Bronchiolitis is characterized by edema and mucus secretions. It is common in infants. The present study was conducted to assess usefulness of CPAP in infants with bronchiolitis.

Materials & Methods: The present study was conducted on 68 children of 1 month to 1 years of age of both genders. All patients were divided into 2 groups of 34 each. Group I received bubble CPAP in addition to the standard care and group II received standard care, which included maintenance of adequate hydration and oxygenation. All children were monitored continuously and respiratory rate, SA score and Modified Pediatric Society of New Zealand Severity Score (MPSNZ-SS) was compared.

Results: Group I had 20 boys and 14 girls and group II had 18 boys and 16 girls. Respiratory rate was 72 and 68 respectively in group I and II. SA score was 4.3 and 3.9 respectively in group I and II. MPSNZ-SS was 12.5 and 11.8 respectively in group I and II. The difference was non-significant ($P > 0.05$). Respiratory rate after 1 hour was 9 and 6 respectively in group I and II. SA score was 0.82 and 0.43 respectively in group I and II. MPSNZ-SS was 2.4 and 1.7 respectively in group I and II. The difference was significant ($P < 0.05$).

Conclusion: Authors found that nCPAP is an effective method of reducing respiratory distress in infants suffering from bronchiolitis.

Keywords: Bronchiolitis, nCPAP, Respiratory distress

Introduction

Bronchiolitis is characterized by edema, mucus secretions and damage of airway epithelium with necrosis, causing airflow obstruction and distal air trapping, atelectasis and a ventilation perfusion mismatch that leads to hypoxemia and increased work of breathing^[1].

In a typical case, an infant under two years of age develops wheeze, cough and shortness of breath over one or two days. Crackles or wheeze are typical findings on listening to the chest with a stethoscope. The infant may be breathless for several days. After the acute illness, it is common for the airways to remain sensitive for several weeks, leading to recurrent cough and wheeze^[2].

Children born prematurely (less than 35 weeks), with a low birth weight or who have congenital heart disease may have higher rates of bronchiolitis and are more likely to require hospital admission. There is evidence that breastfeeding provides some protection against bronchiolitis^[3]. Clinical improvement with significant falls in respiratory rate, pulse rate and pressure of carbon dioxide (pCO₂) has been reported with the use of Continuous positive airway pressure (CPAP) in bronchiolitis. Continuous positive airway pressure (CPAP) is a form of positive airway pressure ventilator, which applies mild air pressure on a continuous basis to keep the airways continuously open in people who are not able to breathe spontaneously on their own^[4]. The present study was conducted to assess usefulness of CPAP in infants with bronchiolitis.

Materials & Methods

The present study was conducted in the department of Pediatrics. It comprised of 68 children of 1 month to 1 years of age of both genders. All children were suffering from bronchiolitis based on criteria of presence of respiratory distress. All patients were divided into 2 groups of 34 each. Group I received bubble CPAP in addition to the standard care and group II received standard care, which included maintenance of adequate hydration and oxygenation. All children were monitored continuously and respiratory rate, SA score and Modified Pediatric Society of New Zealand Severity Score (MPSNZ-SS) was compared. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

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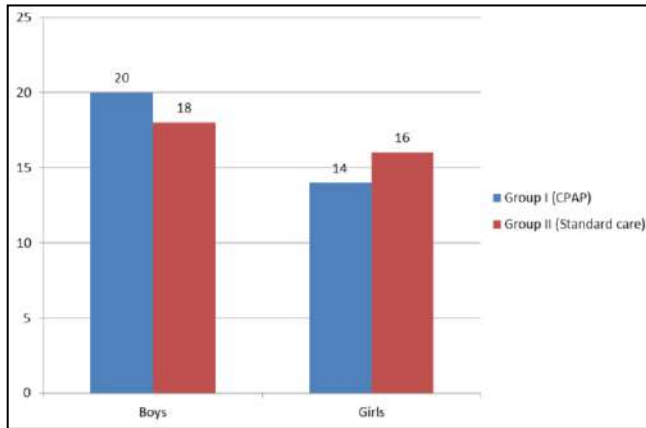
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Results

Table I: Distribution of patients

Groups	Group I (CPAP)	Group II (Standard care)
Boys	20	18
Girls	14	16

Table I shows that group I had 20 boys and 14 girls and group II had 18 boys and 16 girls.



Graph I: Distribution of patients

Table 2: Comparison of parameters at initial

Parameters	Group I (CPAP)	Group II (Standard care)	P value
Respiratory rate	72	68	0.5
SA score	4.3	3.9	0.21
MPSNZ-SS	12.5	11.8	0.18

Table II shows that respiratory rate was 72 and 68 respectively in group I and II. SA score was 4.3 and 3.9 respectively in group I and II. MPSNZ-SS was 12.5 and 11.8 respectively in group I and II. The difference was non-significant ($P > 0.05$).

Table 3: Comparison of parameters after 1 hour

Parameters	Group I (CPAP)	Group II (Standard care)	P value
Respiratory rate	9	6	0.01
SA score	0.82	0.43	0.02
MPSNZ-SS	2.4	1.7	0.05

Table III shows that respiratory rate after 1 hour was 9 and 6 respectively in group I and II. SA score was 0.82 and 0.43 respectively in group I and II. MPSNZ-SS was 2.4 and 1.7 respectively in group I and II. The difference was significant ($P < 0.05$).

Discussion

CPAP is an alternative to positive end-expiratory pressure (PEEP). The diagnosis of bronchiolitis is typically made by clinical examination. Chest X-ray is sometimes useful to exclude bacterial pneumonia, but not indicated in routine cases.⁵ Both modalities stent the lungs' alveoli open and thus recruit more of the lung's surface area for ventilation, but, while PEEP refers to devices that impose positive pressure only at the end of the exhalation, CPAP devices apply continuous positive airway pressure throughout the

breathing cycle. Thus, the ventilator itself does not cycle during CPAP, no additional pressure above the level of CPAP is provided, and patients must initiate all of their breaths^[6].

CPAP typically is used for people who have breathing problems. CPAP also may be used to treat preterm infants whose lungs have not yet fully developed. For example, physicians may use CPAP in infants with RDS. It is associated with a decrease in the incidence of bronchopulmonary dysplasia^[7]. In some preterm infants whose lungs have not fully developed, CPAP improves survival and decreases the need for steroid treatment for their lungs. In resource-limited settings where CPAP improves respiratory rate and survival in children with primary pulmonary disease, researchers have found that nurses can initiate and manage care with once or twice daily physician rounds^[8]. The present study was conducted to assess usefulness of CPAP in infants with bronchiolitis.

In present study, group I had 20 boys and 14 girls and group II had 18 boys and 16 girls. We found that respiratory rate was 72 and 68 respectively in group I and II. SA score was 4.3 and 3.9 respectively in group I and II. MPSNZ-SS was 12.5 and 11.8 respectively in group I and II. We observed that respiratory rate after 1 hour was 9 and 6 respectively in group I and II. SA score was 0.82 and 0.43 respectively in group I and II. MPSNZ-SS was 2.4 and 1.7 respectively in group I and II.

Beasley *et al.*^[9] conducted a study on 72 infants (age <1y) hospitalized with a clinical diagnosis of bronchiolitis were randomized to receive standard care, or nCPAP in addition to standard care, in the first hour after admission. 23 parents refused to give consent for participation. 2 infants did not tolerate nCPAP. The outcome was assessed after 60 minutes. If nCPAP was not tolerated or the distress increased, the infant was switched to standard care. Analysis was done on intention-to-treat basis. 14 out of 32 in nCPAP group and 5 out of 35 in standard care group had change in respiratory rate ≥ 10 ($P=0.008$). The mean (SD) change in respiratory rate [8.0 (5.8) vs 5.1 (4.0), $P=0.02$] in Silverman-Anderson score [0.78 (0.87) vs 0.39 (0.73), $P=0.029$] and in Modified Pediatric Society of New Zealand Severity Score [2.5 (3.01) vs. 1.08 (1.3), $P=0.012$] were significantly different in the nCPAP and standard care groups, respectively.

Conclusion

Authors found that nCPAP is an effective method of reducing respiratory distress in infants suffering from bronchiolitis.

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