ISSN NO. 2320-5407

Journal homepage: http://www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH

RESEARCH ARTICLE

The benefits of Surfactant and Continuous Positive Airway Pressure in Premature newborns.

Dr.Shatha Hussain Ali, Dr. Abdulkareem Mohammed Ali, Dr. Sinan Abdulrazzaq Ibrahim

1. Prof. in dept. of pediatrics College of Medicine Al-Nahrain university M.B.Ch.B. C.A.B.P
2. Assistant prof. in dept. of pediatrics College of Medicine Al-Nahrain University M.B.Ch.B. C.A.B.P
3. Lecturer in dept. of pediatrics College of Medicine Al-Nahrain university M.B.Ch.B. F.I.C.M.S

Manuscript Info

Manuscript History:

Received: 11 February 2014
Final Accepted: 22 March 2014
Published Online: April 2014

Key words:
RDS, surfactant, CPAP

Abstract

- **Background:** Neonatal respiratory distress is a serious clinical problem associated with high morbidity and mortality, and different strategies applied for treatment of respiratory distress syndrome composed of surfactant, CPAP, both of them or nill treatment.
- **Objective:** To investigate the benefits and outcome Application of surfactant and Continuous Positive Airway Pressure (CPAP) in the neonate with respiratory distress admitted to nursery care unit.
- **Patients and Methods :** This retrospective clinical study was performed on 294 preterm neonates who were admitted to the neonatal nursery care unit of Madinat Al-Imamin Al-Kademain Teaching Hospital because of respiratory distress from the 1st January 2012 to thirty 1st of December 2012. The information taken regarding gender , gestational age , birth weight , which treatment given,and its outcome according to the treatment given .
- **Result:** During the study period of 294 premature with RDS the surfactant ,CPAP , Both of them or Nill treatment have demographic characteristics , 12 (4%) patients received the Surfactant therapy proved to be effective in the 9 cases (75%) cases received it , CPAP given to 101 (34%) of cases and was effective in 64(63%)of patients , while the 53(18%) received Both surfactant and CPAP it was effective in 29(55%) and in the rest 128(44%) of cases that didn't receive any kind of treatment it was effective in 79(61%) of patients. Estimated survival rates at 24 hours in surfactant , Continuous Positive Airway Pressure, Both of surfactant , Continuous Positive Airway Pressure and Nill treatment groups were 100% ,77%,100% and 35% respectively.
- **Conclusion:** According to the results, surfactant and Both of surfactant , Continuous Positive Airway Pressure were effective in the treatment of neonates who were suffering from respiratory distress syndrome.

Introduction

Pulmonary disorders represent one of the most common diagnoses in infants admitted to neonatal units. The overall incidence of any form of acute lung disease in the newborn is approximately 3% [1–4] . Respiratory distress syndrome (RDS) and transient tachypnea of the newborn are the most common specific diagnoses, followed by infection /pneumonia.As expected,the incidence of respiratory disorders increases

with decreasing gestational age and birth weight [5] . In infants with birth weight between 501 and 1,500g more than 50% have signs of RDS, increasing to almost 90% in infants below 750g [6, 7]. Over the last three decades neonatal care has changed dramatically. Improvement in ventilatory support, antenatal corticosteroid treatment and the introduction of exogenous surfactant replacement are major contributors to the greatly reduced morbidity and mortality from neonatal lung disease [8] .

Aim of study:

- To study the benefits and outcome Application of surfactant and Continuous Positive Airway Pressure (CPAP) in the premature neonates with respiratory distress admitted to nursery care unit in Madinat Al-Emamin Al-KademainTeaching Hospital.

Patients and Methods:

This is retrospective clinical study was performed on 294 preterm neonates who were admitted to the neonatal nursery care unit of Madinat AL-Emamin Al-Kademain Teaching Hospital with signs and symptoms of respiratory distress syndrome including (shortness of breath and grunting sounds while breathing,brief stop in breathing(apnea),cyanosis,nasal flaring,rapid breathig,and decrease urine output) with chest x-ray shows ground glass appearance that is typical of the disease and blood gas analysis that show low oxygen and excess acid in body fluids and lab tests to rule out infection as a cause of breathing problems .so all of the cases that had the above defined criteria for RDS were enrolled in our study[9] , which was done over 12 months period from the 1st January 2012 to thirty 1st of December 2012 . All of the patients were preterm of gestational age below 37 weeks, and birth weight of neonates (≤1000gm, >1000-1500 gm , > 1500-2500 gm) but not more than 2500gm , which treatment was given to the neonates (SURFACTANT – CPAP - RECEIVED BOTH SURFACTANT AND CPAP - OR NILL) ,so the study group was divided into 4 subgroups according to the treatment given:

Group A :received surfactant only (no.=12 patients)
Group B :received CPAP only (no.=101patients)
Group C : received both surfactant and CPAP (no.=53 patients)
Group D : received nill treatment (no.=128 patients)

Surfactant in a dose of 4 ml/kg within 2 hours of delivery is instilled endotracheally as four aliquots with manual IPPV in between for 15to 30 seconds to facilitate sufactant distribution ,type of surfactant given is Survanta manifactured by Abbot of 25 mg phospholipids and 9mg sodium chloride per ml, CPAP was applied with pressure of 6-8 cm H2O nasaly for 24-72hours according to the patients clinical response, also response to the treatment was considered after 72 hours of therapy in all the treatment groups as survival or death of the patients, duration of treatment in hours, and complications associated with each line of therapy given(pneumothorax , intra ventricular hemorrhage and patent ductus arteriosus) .

In this study did an exclusion of associated congenital anomalies including congenital heart disease (CHD), exomphalos, diaphragmatic hernia and others.

The result calculated by using SSPS program of statistics version 13 and P value is significant if was less than 0.05 .

Results:

Study group consist of 294 premature noenates with RDS,males were 192 (65.3%),females were 102(34.7%),majority of neonates 189 were in the gestational age group of >32-36 weeks(64.3%), also the majority of the neonates were in the birth weight group of >1500-2500 gm were 201(68.4%), duration of treatment range from birth to 72 hours with the mean of 43.5 ± 35.71 hours, total number of surviving neonates in all treatment groups was 181(61.6%),while death was reported in 113 neonates (38.4%), from table (1) we can see that higher survival rate of 75% was recorded among group A who received surfactant only and the result was statistically significantwith P value < 0.04.

During the study period of 294 premature with RDS the surfactant ,CPAP , Both of them or Nill treatment have demographic characteristics , 12 (4%) patients received the Surfactant therapy (group A) proved to be effective in

the 9 cases (75%) received it ,in group B CPAP was given to 101 (34%) of cases and was effective in 64(63%)of patients ,while in group C 53 cases(18%) received Both surfactant and CPAP it was effective in 29(55%) and in the rest(group D) 128(44%) of cases that didn't receive any kind of treatment it was effective in 79(61%) of patients as in table 2.

Also comparison in the survival rates between the treatments every 12 hours . In the first 3 days, the estimated survival rate in the Surfactant group(groupA) was 100%. However, in the CPAP group(group B) In the first 24 hours was 77% and at the 3rd day was 69%.in Both group(group C) it was 90% In the first 24 hours and at the 3rd day was 90% , and in Nill group(group D) was 35% In the first 24 hours and at the 3rd day was 55%, as in (Table 3).

Table 1 : demographic characteristics of the study group.

Variables	No.	%
Gender		
Male	192	65.3
female	102	34.7
Gestational age		
≤28 weeks	27	9.2%
≥29-32 weeks	78	26.5%
>32-36 weeks	189	64.3%
Birth weight		
≤ 1000gm	41	13.9%
>1000-1500gm	52	17.7%
> 1500-2500gm	201	68.4%
Response to therapy		
Survival	181	61.6%
death	113	38.4%

Table 2 : patient characteristics in relation with treatment groups (treatment by surfactant , CPAP, both of surfactant and CPAP and nill):

Variables	Group A no.12 (4%)	Group B no. 101 (34%)	Group C no. 53 (18%)	Group D No. 128(44%)	P value
Gender					
Male	6- 50%	86 – 85%	22 – 41%	78 – 60%	
Female	6- 50%	15 – 15%	31 – 59%	50 – 40%	
Gestation(wk)					
≤28	3- 25%	11 – 10%	11 – 21%	2 – 2%	
≥ 29-32	6- 50%	12 – 11%	30 – 57%	30 – 23%	
>32-36	3- 25%	78 – 79%	12 – 22%	96 – 75%	
Birth Weight (gm)					
≤1ooo	0	7 – 6%	23 - 44%	11 – 9%	
>1000-1500	9- 75%	17 – 16%	18 – 34 %	8 – 6%	
> 1500-2500	3- 50%	77 – 78%	12 – 22%	109 – 85%	
Response to treatment					
Survive	9 – 75%	64 – 63%	29 – 55%	79 – 61%	0.04
failure	3 – 25%	37 – 37%	24 – 45%	49 – 39%	
Duration of treatment (hr)[Mean ± SD]	39.8±38.04	49.4±33.7	41.4±35.4		

Complications **pneumothorax** **IVH** **PDA**	 1 1 0	 5 3 1	 4 1 0	 7 5 4	

- IVH : intraventricular heamorage.
- PDA : patent ductus arteriosus.

Table 3: Comparison of estimated success rate in survival:

Group	12h	24h	36h	48h	60h	72h
Group A	100%	100%	100%	100%	100%	100%
Group B	88%	77%	77%	71%	71%	69%
Group C	90%	90%	90%	90%	90%	90%
Group D	30%	35%	35%	50%	50%	55%

Discussion:

The main goal of this study was to compare the effectiveness of Different modalities in treating the neonatal respiratory distress syndrome.

Findings showed that the failure rate associated with Surfactant was lower than that associated with CPAP and other modalities which was consistent with the results of the study carried out by Tagare et al [10]. Likewise, Lee [11].

In this study clearly shows that the male cases was 192 of overall cases (294) equal to 65%, while the female cases was 102 equal to 35% of the cases agreed by the studies by Morley[12] and Pillow[13] .

Also in the comparison in the survival rates between the treatments every 12 hours .In the first 3 days, the estimated survival rate in the Surfactant group was 100%. However, in the CPAP group a decrease in survival rate was seen. In the first 24 hours the difference between survival rates was about 25% (100% in Surfactant vs 77% in CPAP) indicating the vital importance of the first hours of management of patients, and the treatment with both Surfactant and CPAP shows results nearly equal to that with surfactant . which was consistent in the study that carried by I ran J Pediatr [14] .

The gestational age largely affect the success of the therapy by BOTH(SURFACTANT AND CPAP) given (the higher gestational age >32-36 week the better outcome).and this is also applied in the birth weight that shows better results of treatment given in the weight > 1500-2500 mg agreed by study Chard T, Soe A [5] .

Regarding the complication an observation of least frequency of complications in the group that received Surfactant therapy which was consistent in the study that carried by Hack M, Fanaroff AA [15].

In the outcome of cases that didn't receive any kind of therapy (no SURFACTANT nor CPAP) the survival rate was high in contrast to the study carried by Crowley P, Chalmers I, Keirse MJ [16] that showed unpromising out come with nill group of patients , this result obtained may be explained by large number of patients taken in this study compared to the number taken in the other groups.

Conclusion:

Based on the results, surfactant (group A) and Both of surfactant and Continuous Positive Airway Pressure (CPAP)(group C) seems to be superior to CPAP only or NiLL treatment in terms of treatment of RDS in preterm infants due to fewer complications and high estimated success rate in survival.

The gestational age largely affect the success of the therapy by BOTH(SURFACTANT AND CPAP) given (the higher gestational age >32-36 week the better outcome), and this is also applied in the birth weight that shows better results of treatment given in the weight > 1500-2500 mg .

References:

1 .Bonafe L, Rubaltelli FF: The incidence of acute neonatal respiratory disorders in Padova county: an epidemiological survey. Acta Paediatr 1996; 85: 1236–1240.

2 .Hjalmarson O: Epidemiology and classification of acute, neonatal respiratory disorders. A prospective study. Acta Paediatr Scand 2000; 70: 773–783.

3 .Field DJ, Milner AD, Hopkin IE, Madeley RJ: Changing patterns in neonatal respiratory diseases. Pediatr Pulmonol 1999; 3: 231–235.
4 .Rubaltelli FF, Dani C, Reali MF, Bertin G, Wiechmann I, Tangucci M, Spagnolo A: Acute neonatal respiratory distress in Italy: a one-year prospective study. Italian Group of Neonatal Pneumology. Acta Paediatr 1998; 87: 1261–1268.
5 .Chard T, Soe A, Costeloe K: The risk of neonatal death and respiratory distress syndrome in relation to birth weight of preterm infants. Am J Perinatol 1997; 14: 523–526.
6 .Hack M, Fanaroff AA: Outcomes of extremely- low-birth-weight infants between 1982 and 1988. N Engl J Med 2001; 321: 1642– 1647.
7 .Hack M, Horbar JD, Malloy MH, Tyson JE, Wright E, Wright L: Very low birth weight outcomes of the National Institute of Child Health and Human Neonatal Network. Pediatrics 1991; 87: 587–597.
8 .Crowley P, Chalmers I, Keirse MJ: The effects of corticosteroid administration before preterm delivery: an overview of the evidence from controlled trials. Br J Obstet Gynaecol 1990; 97: 11–25.
9. Martin RJ, Fanaroff AA. The Preterm Lung and Airway: Past, Present, and Future. Pediatr Neonatol. 2013 Mar 31. pii: S1875-9572(13)00036-3
10.Tagare A, Kadam S, Vaidya U, et al. . J Trop Pediatr Prophylactic nasal continuous positive airways 2010;56(3):191-4.
11 .Lee K, Khoshnood B, Wall SN, Chang Y, Hsieh HL, Singh JK: Trend in mortality from respiratory distress syndrome in the United States, 2002–1995. J Pediatr 1999; 134: 434– 440.
12 .Morley CJ, Lau R, De Paoli A, et al. Nasal continuous positive airway pressure: does bubbling improve gas exchange? Arch Dis Child Fetal Neonatal Ed 2005;90(4):F343–4.
13. Pillow JJ, Hillman N, Moss TJM, et al. Bubble continuous positive airway pressure enhances lung volume and gas exchange in preterm lambs. Am J Respir Crit Care Med 2007;176(1):63–9.
14 .karly ,Iran J Pediatr Preterm Infants with Respiratory Distress from Jun 2011; Vol 21 (No 2),Pp: 151-158

15 .Hack M, Fanaroff AA: Outcomes of extremely- low-birth-weight infants between 1982 and 1988. N Engl J Med 2000; 321: 1642– 1647.
16 .Crowley P, Chalmers I, Keirse MJ: The effects of corticosteroid administration before preterm delivery: an overview of the evidence from controlled trials. Br J Obstet Gynaecol 1990; 97: 11–25.