

## Respiratory Distress in Full Term Outborn Neonates: A Hospital Based Study

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### Summary:

**Background:** Respiratory distress remains a major problem post adaptation and one of the most common reasons for admission of neonates to Intensive Care.

**Objectives:** To study the causes and short term outcomes of respiratory distress in full term neonates and its correlation to mode of delivery.

**Patients and Methods:** A cross sectional study was carried out on 100 full term outborn neonates with respiratory distress admitted to Neonatal care unit of Children Welfare Teaching Hospital, Medical City, Baghdad from 1st of April to 31st of August 2011.

**Results:** Hundred full term neonates were studied, 66% were boys and 81% born by cesarean section (elective cesarean section in 62%). In both sexes, Transient Tachypnea of Newborn and pneumothorax ranked the 1st and 2nd among other causes. Among boys, early onset sepsis/pneumonia ranked 3rd, whereas late pneumonia and hyaline membrane disease among girls. The proportion of Transient Tachypnea of Newborn was higher in those who were delivered by cesarean section (86.66%). There was no significant correlation between the mode of delivery and respiratory distress in congenital heart disease, birth asphyxia, meconium aspiration and tracheoesophageal fistula. The case fatality was 100% in birth asphyxia, 16.66% in sepsis/pneumonia, 9.09% in hyaline membrane disease and 5.88% in pneumothorax.

**Conclusions:** Transient tachypnea was the commonest cause of hospitalizations among term neonates with respiratory distress. Elective cesarean section was correlated with neonatal respiratory distress.

**Key Words:** Respiratory Distress, Full Term Outborn neonates.

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### Introduction:

Respiratory distress remains a major problem post adaptation and considered as one of most common reasons for admission of term and preterm neonates to Neonatal Intensive Care Unit<sup>(1)</sup>. The causes may be pulmonary or non-pulmonary in origin. The non-pulmonary causes include cardiac (congenital heart disease, myocardial dysfunction), metabolic (hypoglycemia and acidosis), neurological (asphyxia and intracranial bleeding) and miscellaneous conditions. Potential pulmonary causes for respiratory distress in neonates include; parenchymal conditions (transient tachypnea of newborn, meconium aspiration syndrome, respiratory distress syndrome, pneumonia, pulmonary bleeding and edema), developmental anomalies (lobar emphysema, congenital diaphragmatic hernia, tracheoesophageal fistula and pulmonary hypoplasia), airway abnormalities (choanal atresia/stenosis, laryngeal problems and subglottic stenosis) and mechanical abnormalities (air leak syndrome, pleural effusion and chylothorax).<sup>(2)</sup> This study aimed to study the causes of respiratory distress in full term outborn neonates, assess correlation between caesarean section and respiratory distress and to study short term outcome.

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### Patients and Methods:

A cross sectional study was carried out on 100 full term outborn neonates with respiratory distress who were referred from other hospitals, including private hospitals with poor facilities for neonatal care and some are brought late in critically sick conditions to Neonatal Care Unit at Children Welfare Teaching Hospital / Medical City, Baghdad from 1<sup>st</sup> of April 2011 to 31<sup>st</sup> of August 2011. Information regarding gender, parity, body weight, indications of hospitalization, duration of hospitalization, clinical features, risk factors as leaking liquor, duration of rupture of membrane before delivery and mode of delivery were obtained either from medical records or baby care giver. Information about resuscitation at birth was deficient as they were out born. All term neonates were examined for signs of respiratory distress including tachypnea (Respiratory Rate > 60), grunting, cyanosis, retraction and flaring of alar nasi. All neonates were sent for Chest X-Ray, Complete Blood Count, and C-reactive protein; 46 neonates were sent for Blood Culture and sensitivity for suspected sepsis; Echocardiography was done to 9 neonates who were suspected to have congenital heart disease with persistent tachypnea, cyanosis or the presence of murmur. The final diagnosis of the exact cause of distress was reached depending on history, physical examination and investigations.

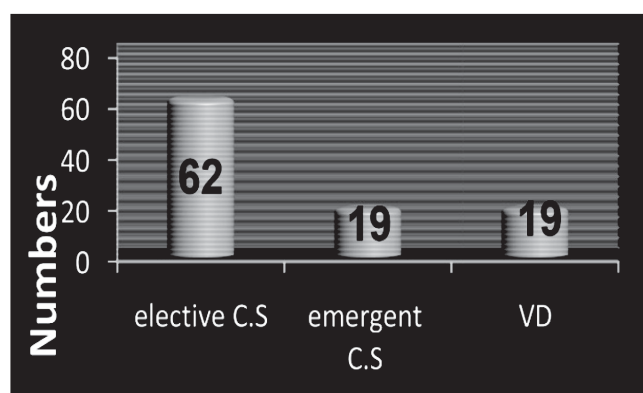
Those having deterioration of respiratory function were referred to Neonatal Intensive Care Unit in nursing home hospital/ medical city for ventilator support.

Statistical analysis was performed by using the statistical package for the social sciences (SPSS v.16, 3.1.US) software for windows. Data of all cases were entered; descriptive and analytic statistics were conducted using appropriate statistical tests.

Descriptive statistics were expressed as (Mean  $\pm$  SD) or simple frequency tables. Chi square ( $\chi^2$ ) was used to find the associations among the categorical variables, while student (t) test was used for continuous variables. Bivariate correlation and Pearson's coefficient correlation were used to find the correlations among different variables. Epi. calc 2000 software from CDC v3.5 was used to compare percentages and proportions. P value of less than 0.05 was considered significant.

### Results:

During 5 months period, a total of 765 neonates were admitted; of those, 100 term neonates with respiratory distress were included in the study, these represent 13.07% of all newborns who were admitted to the Neonatal Care Unit at that time. Sixty six percent were boys, 34% were girls. Regarding mode of delivery; 81% were born by cesarean section and 19% were born vaginally; among those born by cesarean section; 62% by elective cesarean section and 19% by urgent cesarean section as in figure (1).



**Figure (1): Distribution of neonates according to modes of delivery**

It was found that in both sexes; Transient Tachypnea of Newborn and pneumothorax ranked the 1<sup>st</sup> and 2<sup>nd</sup> among the other diseases, but in boys early onset sepsis/ pneumonia ranked 3<sup>rd</sup> as compared to late pneumonia and hyaline membrane disease among girls, yet the association was statistically not significant (P-value 0.86) Table (1).

**Table (1): The distribution of diseases by sex**

Diagnosis	Male		Female	
	No.	%	No.	%
Transient Tachypnea of Neonate	20	30.3	10	29.4
Pneumothorax	11	16.7	6	17.6
Early sepsis/ Pneumonia	10	15.2	2	5.9
Pneumonia (late)	8	12.1	4	11.8
Hyaline Membrane Disease	7	10.6	4	11.8
Congenital Heart Disease	5	7.6	2	5.9
Meconium Aspiration	2	3.0	3	8.8
Birth asphyxia	2	3.0	2	5.9
Tracheoesophageal Fistula	1	1.5	1	2.9
Total	66	100.0	34	100.0

The correlation between mode of delivery and diagnosis were assessed, the proportion of cesarean section in Transient Tachypnea of Newborn was significantly higher than the proportion of vaginal delivery (p-value < 0.000001), 26 (86.66%) of the Transient Tachypnea of Newborn patients delivered by cesarean section, [22 (73.3%) by elective cesarean section, 4 (13.3%) by emergency cesarean section and 4 (13.3%) were delivered vaginally. Seventeen of neonates (17%) had pneumothorax; of these; 14 (82.35%) were delivered by elective cesarean section and 3 (17.64%) delivered by emergency cesarean section (p-value was significant = 0.00001).

Twelve neonates (12%) had early sepsis/ pneumonia, 8 (66.7%) of them were delivered by elective cesarean section, 3 (25.0%) were delivered by emergency cesarean section and one (8.3%) was delivered vaginally (p-value < 0.0075). Eleven neonates (11%) had hyaline membrane disease; 9 (81.81%) delivered by elective cesarean section, one (9.09%) was delivered by urgent cesarean section and one (9.09%) was delivered vaginally.

There was no significant correlation between the cause of respiratory distress and the mode of delivery regarding congenital heart disease, birth asphyxia, Meconium aspiration syndrome, tracheoesophageal fistula. Table (2). Out of 100 neonates, (9%) died (Table (3)). Three (3%) neonates referred to other hospital and the rest (88%) discharged well.

Table 2: The correlation between diagnosis &amp; mode of delivery

Diagnosis	Mode of Delivery				Pvalue
	NVD No. (%)	Emergency C.S.	Elective C.S.	Total	
Transient Tachypnea of newborn	4(13.3)	4(13.3)	22(73.3)	30 (100)	0.000001
Pneumothorax	0(0)	3(17.7)	14(82.3)	17 (100)	0.000010
Early sepsis /pneumonia	1(8.3)	3(25.0)	8(66.7)	12 (100)	0.00755
Pneumonia	7 (58.3)	1(8.3)	4(33.3)	12 (100)	0.0341
Hyaline membrane disease	1(9.1)	1(9.1)	9(81.8)	11 (100)	0.000163
Congenital heart disease	2(28.6)	3(42.9)	2 (28.6)	7 (100)	0.81
Meconium Aspiration Syndrome	1(20)	3(60)	1(20)	5 (100)	0.3
Birth asphyxia	2(50)	1(25)	1(25)	4 (100)	0.7
Diaphragmatic hernia	0 (0)	0 (0)	1(100)	1 (100)	0.223
Tracheoesophageal fistula	1 (100)	0 (0)	0 (0)	1 (100)	0.223
Total	19 (19)	19(19)	62 (62)	100 (100)	0.00001

Table 3: The causes of respiratory distress in neonate &amp; fatality

Causes of Respiratory Distress	No.	No. of death	Case fatality rate
Transient tachypnea of newborn	30	0	0
Pneumothorax	17	1	5.88%
Early sepsis/Pneumonia	12	2	16.66%
Pneumonia(late)	12	0	0
Hyaline membrane disease	11	1	9.09%
Congenital heart disease	7	1	14.28%
Meconium Aspiration Syndrome	5	0	0
Birth asphyxia	4	4	100%
Diaphragmatic hernia	1	0	0
Tracheoesophageal fistula	1	0	0
Total	100	9	9%

### Discussion:

Respiratory distress due to medical or surgical reasons is common in the neonatal period and among the most frequent indications of hospitalizations in neonatal care unit (3). In this study, it was found that the most frequent cause of hospitalization in neonatal care unit for respiratory distress was transient tachypnea of newborn 30% followed by pneumothorax 17%, early sepsis 12% and hyaline membrane disease 11%.

Mathur et al (India) (4) evaluated out born term neonates with respiratory symptoms and found that the most frequent cause of respiratory distress was neonatal pneumonia (62.8%), then hyaline membrane disease and transient tachypnea of newborn, where half of them were delivered at home in unhygienic settings by untrained persons; as compared to this study where pneumonia (early and late)

present 24% of infants with respiratory distress.

Fedakar A et al (Turkey)(5) evaluated all neonates with respiratory distress include term and preterm admitted to neonatal intensive care unit and found that transient tachypnea of newborn (76.7%) was the most frequent cause of hospitalization followed by meconium aspiration syndrome and hyaline membrane disease.

Kumar A (India)(6) also found that transient tachypnea of newborn represented the commonest cause of respiratory distress, but in frequency of (42.7%) followed by infection (17.0%) including term and preterm.

Seventeen percent of admissions had pneumothorax & all were delivered by cesarean section; 82.35% of neonates with pneumothorax were born by elective cesarean section; this agreed with Zanardo et al, who found that neonates



delivered by elective cesarean section had an increased incidence of pneumothorax in comparison with neonates delivered by emergency cesarean section or vaginally delivered (7).

Mathur et al (India) (4) found pneumothorax in 14% where available data for comparison is scarce; most of them referred from private sectors with poor information about resuscitation after delivery, all were delivered by cesarean section.

Hyaline membrane disease represents 11% of admissions; while Mathur et al study (4) found hyaline membrane disease in 4%. Diagnostic criteria & study design could be partly responsible for wide variation, and sometime it is difficult to distinguish early onset pneumonia from hyaline membrane disease as the clinical pictures and radiographic appearance can be identical.

In this study, the frequency of elective cesarean section was 73.33% among newborn with transient tachypnea of newborn, it was found that there was a significant association between caesarean section delivery & respiratory distress in term infants; as compared with 42.2% in Tutdibi et al study (8) as rapid clearance of fetal lung fluid during post natal lung adaptation is largely correlated with onset of labor before birth (9). Labor enhances the release of catecholamine in maternal and fetal circulation result in B- adrenergic receptor –mediated regulation of surfactant synthesis and trans-epithelial sodium ion transport, with subsequent fluid reabsorption in the neonatal lung. Infants delivered through elective cesarean section are often deprived of this labor related physiological stress response pattern at birth and consequently experience failure of post natal respiratory transition (10).

Regarding hyaline membrane disease, 81.81% newborns were delivered by elective cesarean section as testing for fetal lung maturity is rarely done in our country; this agreed with Baker AF et al (Egypt) (11) where they found that infants born at 37 and 38 weeks gestation remain at significantly increased risk of severe hyaline membrane disease and 50% of severe hyaline membrane disease cases at these gestational ages follow elective cesarean section without assessment of fetal lung maturity.

The overall death rate in neonates with respiratory distress was 9%; this may be attributed to delayed referral of critically ill neonates and lack of respiratory support in other hospitals.

#### Conclusions:

Transient tachypnea of newborn was the commonest cause of hospitalizations of full term neonates with respiratory distress. High correlation between elective cesarean section and respiratory distress was found.

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