Respiratory Distress in Full Term Newborns

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ABSTRACT:

BACKGROUND:

Respiratory distress (RD) is among the most common symptom complexes seen in the newborn infant. It may result from both non-cardiopulmonary and cardiopulmonary causes.

OBJECTIVES:

This study Aimed to assess some possible risk factors, types, and short term out come of RD in full term newborns.

PATIENTS AND METHODS:

A case control study extending along a 6 months period from 1st of October 2006 to 31st of march 2007, during which a 50 full term newborns with RD, who were admitted to the NICU of Baghdad Teaching Hospital in Medical City-Baghdad, and enrolled with another 50 full term newborns without RD delivered in the same period, in the same place.

For studied groups (cases and controls), a full prenatal and natal history, and complete physical examination were done, including Down's score evaluation of RD. For each patient in the studied group, CXR, CBP, CRP, Bl.C/S were under taken, close observation and out come were recorded.

RESULTS:

The risk factors that emerged as being significant includes: history of maternal smoking, caesarian section delivery and male sex .The elective caesarian delivery was highly significant risk factor for RD in full term newborns. The percentage of RD in full term newborns to the total live births at that period was (2.16%), TTN was the commonest cause (1.68%), followed by HMD (0.25%), MAS (0.086%), CHD (0.086%) and then C. P (0.001%).

CONCLUSION:

That RD in full term newborns is still an important problem in this NICU, especially due to TTN and following elective CS. These prompt us to recommend the reduction of these risk factors especially elective CS to decrease the percentage of RD in full term newborn babies.

KEYWORDS: Respiratory distress, full term, newborns, transient tachypnea of newborns, Hyaline membrane disease.

INTRODUCTION:

Respiratory distress (RD) is among the most common symptom complexes seen in the newborn infant. It may result from cardiopulmonary and non pulmonary causes.[1]

Transient tachypnea if newborns (TTN) is the most common cause of neonatal RD (>40%), followed by respiratory distress syndrome (RDS), and meconium aspiration syndrome (MAS). [2]TTN is also known as wet lung, RDS type II. It is relatively mild, self limited disorder, usually affect infant who are born at or near term. [3,4,5] Typically , the infant becomes tachypneic immediately after birth and has mild RD. Resolution usually occur within 12-24 hours .[1,5] The chest radiographs reveal hyperinflation with clear lung parenchyma except for perihilar linear densities and fluid in the fissures . The treatment is generally close observation and symptomatic care.[2,3,4.5]

Hyaline membrane disease (HMD) or (RDS) is common problem in preterm babies .Iatrogenic RDS (after elective C/S) persist as a cause of neonatal morbidity and mortality [2,3,4,5,6,7,8,9]. RDS is the second most common cause of neonatal RD [2,10]. Infants born at 37 and 38 weeks gestation remain at significantly increased risk for severe RDS. Elective delivery is responsible for 50% of the potentially avoidable cases [11]. Antenatal betamethasone and delaying delivery until 39 weeks both reduce

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admission to special care baby units with RD after elective C/S at term [12]. Both porcine and bovine surfactants has statistically significant advantage in the positive outcome of treatment of patients with RDS in intensive care units [13,14]. Deaths occurring secondary to RDS are greater for males [15].

Meconium aspiration syndrome (MAS) is considered to be relatively common event in term and post term infants. The symptoms are similar to TTN, but more severe, more tachypnea, retraction, and may need more oxygen [2,3,10]. The recommendation provided by the NRP program are to suction the oropharynx of all infants after the delivery of the head and to intubate and suction the trachea of any infant with meconium in the amniotic fluid, if the infant is depressed [16,17].Current recommendations no longer advice routine intrapartum oropharynyeal and nasopharyngeal suctioning for infants born to mothers with meconium staining of amniotic fluid . Endotracheal suctioning for infants who are not vigorous should be performed immediately after birth [18].

Bacterial infection is another possible cause of neonatal RD. Pneumonia and sepsis has various manifestations. Screening and treating group B streptococcal infection in mothers decrease pneumonia and sepsis. Chest radiograph and blood culture help in the diagnosis [2,10,19].

Less common causes of RD include pneumothorax. It occurs spontaneously or as a result of infection, meconium aspiration, lung deformity or ventilation barotraumas. The incidence of spontaneous one is only 1 % [2,20]. Others include persistent pulmonary hypertension of newborns, congenital heart diseases (CHD), bilateral choanal atresia, and diaphragmatic hernia [2,21].Extra pulmonary congenital anomalies are not uncommon causes of neonatal RD[22].

Treatment of neonatal RD can be supportive and disease specific, and includes oxygen, surfactant, nutrition, mechanical ventilation, and antibiotics [2].

The prognosis for TTN is that it is self limited and usually last 2-5 days with no risk of further pulmonary dysfunction, while that of RDS, depend on birth weight and gestational age, and that of MAS was greatly reduced by new modalities of therapy [23].

This study Aimed to assess the incidence, some possible risk factors, types, and short term out come of RD in full term newborns.

PATIENTS AND METHODS:

Fifty full term newborns with RD delivered in delivery room of Baghdad Teaching Hospital/Medical City complex/Baghdad, and admitted to the NICU during the period from the 1st of October 2006 to the 31st of March 2007, were enrolled in a case control study. The control group consists of another 50 full term newborns without RD delivered in the same period at same place.

Data recorded from both groups were studied regarding antenatal history of possible risk factors for RD in full term newborns as: The mother had antenatal care or not ,Chronic illnesses of mother (hypertension, diabetes mellitus),History of maternal smoking, Parity and gravidity, History of premature rupture of membrane and it's duration, and whether antibiotics were used or not, Mode of delivery (normal vaginal delivery, caesarian delivery), and whether caesarian delivery was elective CS or emergency. Some of possible neonatal risk factors were recorded including: sex, birth weight and gestational age, the later was estimated by physical examination using the Ballard scoring system [24], the mother's estimated date of her last menstrual period, and fetal ultrasonic evaluation. Preterm and post term newborns were excluded from the study.

Full physical examination was performed. Down's score [25] (table A), was used to differentiate those who had RD and to categorize them according to severity of RD.

Newborns with RD were investigated by (Random blood sugar, complete blood count, C-reactive protein, Blood culture, and Chest x-ray).The lines of treatment, follow up, outcome, and the causes of RD were recorded.

Inclusion criteria for TTN is defined as RD with tachypnea, retraction and grunting, requiring an increased concentration of inspired O_2, usually to <40%, with chest roentgenogram showing good inflation and perihilar streaking and normal Blood culture. HMD or RDS is supported by chest roentgenogram showing a reticular granularity appearance and air bronchograms, which is characteristic but not pathognomonic appearance, and a normal Blood culture. For MAS is defined as meconium stained amniotic fluid with the presence of meconium in the trachea supported by chest roentgenogram appearance of over inflation, coarse opacities and flattening of the diaphragm. For congenital pneumonia (CP) is supported by positive Blood culture, C-reactive protein, absolute neutropenia <2000/ml and sometimes by chest

roentgenogram finding of lobar infiltration. Other non pulmonary causes such as congenital heart disease were supported by clinical features, chest roentgenogram, and echo study of the heart. Analysis was done by using (Graph Pad Instat Biostatic version 3) program including, T.test, Fisher's exact test, Chi-square test were used as indicated. P. value of <0.05 was considered statistically significant.

Table-A: Evaluation of RD using Down's score [25]

Test	Score		
	0	1	2
Respiratory Rate	<60/min	60-80/min	>80/min
Retraction	No retraction	Mild retraction	Severe retraction
Cyanosis	No cyanosis	Cyanosis relieved by O_2	Cyanosis on O_2
Air Entry	Good bilateral air entry	Mild decrease in air entry	no air entry
Grunt	No grunt	Audible by stethoscope	Audible with ear
Evaluation			
Total	Diagnosis		
<4	No respiratory distress		
4-7	Respiratory distress		
>7	Impending respiratory failure. Blood gases are required.		

RESULTS:

There were 2312 live newborns delivered in the delivery room of Baghdad hospital/medical city complex in the 6 months period of the study. Out of these, 50 were full term newborns with RD constituting (2.1%) of total live births admitted to the NICU.

The incidence of RD in the studied group was TTN 39 cases (1.68%), HMD 6 cases (0.25%), MAS 2 cases (0.086%), CHD 2 cases (0.086%) and CP(congenital pneumonia) one case (0.001%).**(Table-1).**

Regarding prenatal history, it was found that maternal smoking was recognized in 6 cases (12%) and none in the control group, with a significant statistical difference (P.value 0.026). **(Table-2)**

Multipara mothers had delivered babies with RD in (84%) of cases which is more frequent than primiparus mothers (16%), but the difference is not statistically significant, **(Table-2).**

History of maternal DM had shown no significant increase in the risk of RD in full term newborns (P. value 1.000).**(Table-2).**

The newborns were the result of normal vaginal delivery (NVD) in 15(30%), and caesarian section delivery (C/S) in 35(70%) of cases and 30(60%), 20(40%) respectively in the control group, showing a significant statistical difference regarding C/S as a risk factor for RD with (P. value 0.0049). **(Table-4).** Elective C/S show significant risk factor with (P. value 0.0059). **(Table-3).**

The mean birth weight of cases was 3.14 ±0.43 kg, while that of control group was 3.08 ±0.33 kg, showing no significant difference between both cases and controls groups (P. value 0.443). **(Table-2).**There was significant difference (P. value 0.06) between cases and control regarding sex distribution, where males with RD were 34 (68%) of cases, and males without RD were 22 (44%). **(table-2).**

Male predominance was noted in all groups of RD, with male to female ratio of (1.9:1). **(Table-2).**

Down's score screening newborn with RD was highest in CP (8), then (7.5) ± 0.7 in MAS, followed by HMD (7.16) ±1.4, CHD (6.5) ±2.12. TTN group recorded the lowest score of (5) ± 1**. (Table-3).**

The burden of RD especially TTN by prolongation of the mean duration of hospital stay (86 hrs) in relation to the mean duration of RD(44.4 hrs) and initiation of feeding was shown in **(figure 1)** .

The case fatality rate of RD was 2 cases (4%), representing (0.2%) from total live births. The cause of death in one case was HMD with Down's score of 10 and in another case was complex CHD with Down's score of 8.

Table -1: Characteristics of study group

Causes of RD	Number	Male	Female	% of respiratory distress	% from total live birth
TTN	39	24	15	78	1.68
RDS	6	4	2	12	0.25
MAS	2	2	0	4	0.086
CHD	2	2	0	4	0.086
Congenital pneumonia	1	1	0	2	0.001

Table-2: Possible risk factors for RD in full term newborns

Possible risk factors		RD NO.	%	Control NO.	%	P. Value
Mean B.WT +SD		3.14±0.43	-	3.08±0.33	-	0.443
Sex	Male	34	68%	22	44%	0.0267
	Female	16	32%	28	56%	
Parity	Primi	8	16%	9	18%	0.79
	Multi	42	84%	41	82%	
Maternal Smoking	Smoker	6	12%	0		0.026
	Not	44	82%	50	100%	
Maternal D.M	DM	3	6%	2	4%	1.000
	Not	47	94%	48	48%	
Mode of delivery	NVD	15	30%	30	60%	0.0049
	CS	35	70%	20	40%	
Low birth weight	Low	2	4%	0		0.494
	Normal	48	96%	50	100%	

Table-3: Elective CS delivery and RD in full term newborns

Title	RD	control	P value
Elective CS	29	9	0.0059
Non elective CS	6	11	

Table-4: RD and Down's score

Disease	Mean of Down's score	SD
TTN	5.0	±1.0
RDS	7.16	±1.4
MAS	+7.50	±0.70
CHD	6.5	±2.12
CP	8	0

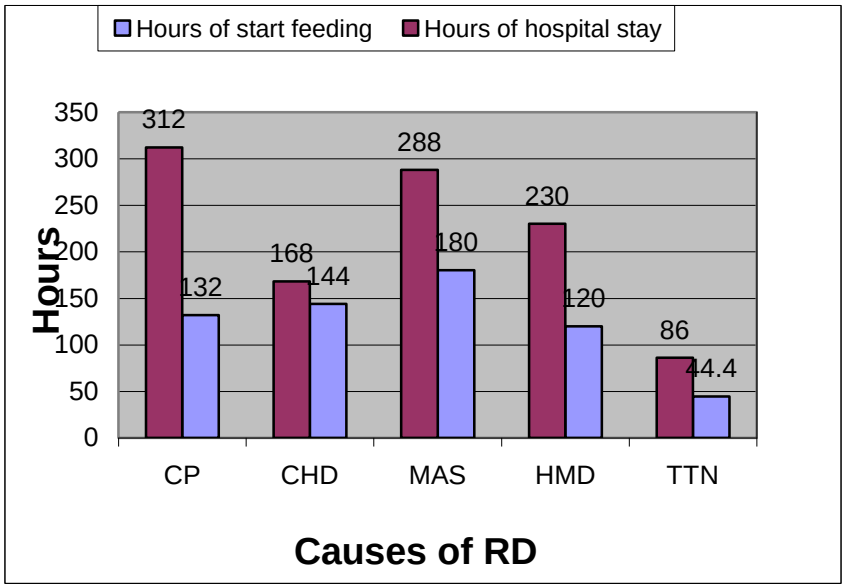

Figure-1: Comparison between mean time of start of feeding and duration of hospital stay in hours for different causes of RD.

DISCUSSION:

Full term newborns with RD represent 2.16% (50/2312) of total live births delivered in the delivery room of Baghdad hospital/ medical city complex at the period of study.Ali Z [26] found that RD incidence in full term was 1.1% (48/4363).

In this study, the frequency of TTN was 39 cases (78%) with incidence of (1.68%) representing the commonest cause for RD. This agrees with Hermansen CL **(2),** and Morrison JJ [27] (0.57%). Kumar A [28] also had found that TTN represented the commonest cause of RD, but at frequency of (42.7%) of total RD including preterm, term and post term.

HMD was recorded in 6 cases (12%) with incidence of (0.25%) of total live births. Morrison JJ [27] showed the same results (0.22%) and (0.5%) by Wax JR [6]. Stoll BJ had recorded that HMD represent (5%) beyond 37 weeks **(10)**.

MAS represent (0.086%), CHD (0.086%) and CP (0.001%) from total live births. Available data for comparison of these frequencies is scarce, only for incidence of MAS as reported by Yong YP [29] (1.4%) including preterm, term and post term.

In this study, maternal smoking was found to be a significant risk factor for the RD in full term newborns (P.value 0.0026). Siva KN [30] also found that maternal smoking is a risk factor for RD in newborns.

Although maternal asthma is regarded as a risk factor for TTN as reported by Demissie K [31], and Schatz M et al [32], but in this study only one woman with asthma in each group of cases and control were recorded, possibly because of small sample size.

Maternal diabetes mellitus and gravidity were not found to be significant risk factors for RD in full term newborns (P.1.0000), (P.0.79) respectively. Stoll BJ**.(10)** reported that maternal DM is a risk factor for HMD and TTN, possibly because of small sample size.

It was found that there was a highly significant association between CS delivery and RD in full term newborns (P.value 0.0049), this was also noted by Zanardo V, et al [33], and others **(**[7,11,12]

In those newborns, a product of the elective CS delivery was a highly significant risk factor for RD (p.0.0059).CS, especially when performed before the onset of labor (elective), incurs additional risk of neonatal respiratory complications.[34,35,36] This risk is attributable to pulmonary immaturity, and the lack of the beneficial effects of normal labor on the newborn. These effects include reduction in lung water, enhanced catecholamine levels, secretion of surfactant stores into the alveolar space, and increased levels of pulmonary vasodilating substances. [37,38,39]

Male sex was regarded as significant risk factor for RD (P.value.0.026), and same finding was reported by Ingemarsson [15], and Rawlings JS. [40]

Low birth weight was not found to be a significant risk factor for RD in full term newborns. As supported by the fact that intrauterine stressful condition enhancing surfactant secretion and maturation of lung. [41]

The case fatality rate of RD was 2 cases (4%), representing (0.2%) from total live births. This agrees with Bonafe L [42] who found that the over all mortality rate was (0.28%).

CONCLUSION:

We **concluded** that RD in full term newborns is still a big problem in this NICU, especially due to TTN and following elective CS. These prompt us to **recommend** the reduction of these risk factors especially elective CS to decrease the incidence of RD in full term newborn babies.

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