Respiratory distress in Full and Post term neonates: Prevalence, Etiologies and Outcomes in a Tertiary Health Center in Yaoundé

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Abstract

Introduction Respiratory distress (RD) is a common condition for admission of newborns in neonatal care unit (NCU), in both preterm and full-term neonates. Our objective was to describe the clinical features, causes and treatment of RD in full term neonates in a tertiary health center in Yaoundé, the Essos Hospital Centre (EHC).

Patients and Method We conducted a cross sectional retrospective study. Full term neonates with RD at EHC from January 2017 to December 2018 were included, assuming clinical signs of RD prior to 48 hours following admission. Factors evaluated: incidence of RD, main etiologies, short term outcomes and risk factors for severity. Data were collected using a chart, then analyzed using software Stata Version 13.

Results 186 full term neonates out of 2312 newborn babies admitted in NCU, met the inclusion criteria giving a prevalence rate of RD of 8%. Sex ratio of 2.15 was favoring males; median age at admission was 7.25 hours and 89.2 % were born at a median gestational age of 38 weeks. Clinical signs of RD were dominated by signs of respiratory control with a Silverman score above 4/10 in 64%. The most common etiologies were neonatal infection / pneumonia (45.9%), followed by transient tachypnea. Clinical management was performed using nasal cannula oxygen and antibiotics. Perinatal asphyxia, cyanosis and caesarian section were found to be associated with severe RD in this setting. Mortality rate was 10.4%.

Conclusion RD in full term neonates is common in this setting, with neonatal infection as preeminent etiology; the mortality rate is high and the management still inappropriate.

Introduction

Respiratory distress is a common condition in neonates requiring admission in a neonatal care unit (NCU) [1]. It can occur in both preterm and full-term neonates affecting both morbidity and mortality rates [2, 3]. The main medical diagnoses that are related to these conditions are transient tachypnea, meconium inhalation syndrome, respiratory distress syndrome also known as hyaline membrane disease and pneumonia [4]. Due to increasing meconium inhalation, respiratory distress syndrome, although seen primarily in preterm babies, is also seen increased in full-term neonates and deserves more attention [5].

Sparse data of surgical causes of RD in sub-Saharan Africa may be due to shortage in antenatal diagnosis, including limited performance of routine third trimester echographies during pregnancy plus low capacity of clinical diagnosis in the labor room. Consequently, many RD cases are medical pulmonary diseases and/or due to congenital cardiovascular conditions [4]. In recent years, the widely used antenatal corticosteroids have resulted in a reduction of hyaline disease especially in preterm babies. However, in parallel the increasing rate of caesarian section has led to more recorded cases of RD in full-term neonates [6]. In Cameroon, the General Hospital-Douala team, JN Tochie et al in 2016, reported that RD represented the main cause of neonatal admission (47.5%) in the NCU [7]. Elsewhere, in Nepal, RD contributed a third of NCU admissions, an incidence of around 4% [8]. Overall, data remain

scarce in low resource settings especially for full term neonates with an incidence rate recorded between 1.2 to 7.2% in term live births. In addition, RD morbidity in low resource settings seems to be greater compared to data of high-income countries [9]. As epidemiological trends show an increasing rate of RD in full-term newborns [10, 11] we designed this study with the primary objective to assess and describe clinical aspects, causes and management of RD in full and post-term neonates in a tertiary facility in Yaoundé.

Method

Type, site, duration and population

We conducted a cross sectional retrospective study over a 24 month-period at Essos Hospital Centre. Neonates ≥ 37 weeks, aged less than 28 days were included, assuming admission in NCU for RD during the first 48 hours of life.

Procedure

Data collection

Files of neonates eligible were extracted from the neonatal inpatient registry. Data collection lasted for 6 months from January to June 2019. For each newborn, the following variables were recorded: maternal sociodemographic characteristics, clinical features, treatment and early outcomes. Clinical assessment of severity was based on Silverman score quotation. In this study RD was defined as the presence of abnormalities of F (frequency of breathing), T (V(ventilation), O (oxygenation). RD with Silverman score above 4 was considered severe. The criteria listed below were retained for the main diagnosis. To investigate the RD in this NCU, file analysis included: clinical assessment = rate of breathing, cyanosis, and Silverman score and pulse oximetry. Other investigations recorded were full blood count, C-reactive protein, and chest radiography as soon as the baby was transportable. The key conditions retained for diagnosis in our study based on clinical and chest x-ray were : transient tachypnea (rapid onset of RD after birth with superficial tachypnea with favorable outcomes within 24 to 48 hours), meconium aspiration syndrome (established in case of RD in full or post-term newborns with a story of perinatal asphyxia and meconium stained amniotic fluid), congenital pneumonia (in the presence of isolated RD or associated with any feature of neonatal sepsis), respiratory distress syndrome (defined as onset of RD before 24 hours of life without honey moon period with lung (thorax) retraction, pulmonary hypertension in case of RD with critical cyanosis with no criteria for infection, congenital heart disease(in case of RD plus heart murmur or abnormalities at echocardiography); surgical conditions were suspected in presence of asymmetry at clinical auscultation and/or clinical improvement at crying plus results of medical imaging. Each diagnosis suspected was confirmed by a senior pediatrician in the medical file of the patient after viewing of the chest x-ray and/or cardiac echography done following admission.

Data analysis

After collection, data were transferred in software Cs pro version 7.1 then analyzed using software Stata version 13.

Results

From January 2017 to December 2018, 2312 newborn babies were admitted in NCU of Essos hospital Centre of which 186 presented with RD giving a prevalence rate of 8 %.

Sociodemographic characteristics

Median maternal age was 29 years with interquartile range [24-32]. The majority were multiparous, with parity ranging from 1 to 8. The median gestational age of the babies was 38 weeks, with 11.8% of them postmature. At birth, 30.6% of them were resuscitated and their admission in NCU occurred at a median age 7.25 hours of life. Admissions were predominantly male were representing 68.3% of the sample with sex-ratio of 2.15 favoring males. (see table 1)

Clinical characteristics and main etiologies

Amongst the neonates included, almost 9 of 10 had an Apgar score below 7 at 5mn of life and 2 of 3 (64%) had a Silverman score quoted above 4 on admission. Clinical cyanosis was present in 54%, with normal pulse oximetry above 94% for 8.1% (table 2). The main etiologies of RD in this setting were pneumonia (44%), followed by transient tachypnea (35.4%) and meconium aspiration syndrome (16.6%). Surgical causes were few, representing 1.6% of cases. (See table 3)

Management, outcomes and associated factors

Nasal oxygen was widely provided to the neonates with antibiotics as adjunct using 2 drugs given by intravenous infusion. Supportive treatment included parenteral perfusion on the first day of treatment while the baby was put on an oral diet. In this setting, the mortality rate was 10.2%. Not surprisingly, being cyanotic increased the risk of severe RD (OR=6.509; P=0.000); having an Apgar score below 7/10 at 5 mn increased the risk of severe RD 9 fold (OR=9.412, P=0.005). Lastly, neonates born by C-section had a lower risk of severe RD than those born vaginally (OR=0.412; P=0.050), as shown in table 4.

Discussion

This study could be a pioneering one in analyzing the profile of RD in neonates born after 37 weeks of gestation in Cameroon. As first finding, our rate of RD admissions in NCU of 8% was slightly higher than the global record, around 5 to 7% of term live births including data observed in Saudi Arabia and Baghdad in a tertiary level NCU of 1.64% -2.78% [12, 13]; these discrepancies can be explained by exclusion of post term neonates and/or inclusion in neonatal units versus maternities. On the other

hand, our prevalence rate was lower than those recorded in Egypt and Karachi [3, 14], where neonates were included irrespective of gestational age. Of note, we found a preeminence of RD in males in our setting. This finding was consistent with two studies showing susceptibility of the male gender for RD without any clear explanation[14,15]. With regards to the causes, pneumonia stood as the first cause of RD of in this setting thus confirming previous data; this is easily understandable as neonatal infection is a leading cause of morbidities and mortality in our environment[16]. In second position, transient tachypnea was posting a rate concordant with the level of practice of caesarian sections (31.7%) in this population, though the specific rate of elective caesarian sections was not known. Of note, this preeminent TT among this population also fit with the 10% of mothers having a history of maternal diabetes and/or foetal macrosomia [17-19]. Following TT, meconium aspiration syndrome(MAS), was the third cause of RD; unfortunately this diagnosis of MAS can lead to respiratory distress syndrome in full-term neonates and be challenging to manage in absence of exogen surfactant and bubble CPAP[20,21]. We can attest than other causes of RD (diaphragmatic hernia, oesophageal atresia,choanal atresia) were relatively scarce. This scarcity can be attributed to the delay in diagnosis and/or limited access to diagnosis. Regardless of the very limited means available for optimal management of infants in RD (oxygen and antibiotics), notably the lack of positive expiratory pressure known to be helpful in many cases of RD, the mortality rate observed around 10% was quite laudable in our context [22,23].

Looking at the associated factors of severity, a surprising finding in this study was the protection conferred by Caesarian sections, but we can explain this by the fact that many C sections were done emergently, reducing the risk of perinatal asphyxia and therefore protective for the newborn.

In conclusion, RD in neonates born after 37 weeks gestation is mainly due to neonatal infection and pneumonia ; the outcome is still critical with 10.4% mortality rate due to lack of optimal management thus supporting extended access to positive expiratory pressure devices.

Declarations

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Availability of data and materials

Data underlying these findings are provided in the manuscript tables and figures. Complete dataset could be provided upon reasonable request from the corresponding author. This dataset represents a core of the hospital database and may not be deposited in a public repository.

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Contributions

Designed the study and collected the data: DSMK and AENN and ACNM. Analysed the data: ASN .
Interpreted the data: DSMK and AENN . Initiated the manuscript: DSMK. Revised the manuscript: AENN.
All authors read and approved the final version of the manuscript.

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Ethics declarations

Ethics approval and consent to participate

Ethical clearance for this study was obtained from the Institutional review board (IRB) of the Essos Hospital Centre; the Hospital Directorate provided an administrative authorization; and all data were processed under strict confidentiality and privacy by using unique identifiers.

Consent for publication

N/A

Competing interests

The authors declare that they have no competing interests.

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Tables

Table I : Distribution of respiratory distress according to maternal and neonatal sociodemographic characteristics.

	Effectifs (186)	Pourcentage (%)
Age at admission of neonate in hours e		
[1-7]	138	74,2
[8-14]	37	19,9
>14	11	5,9
Gender		
Male	127	68,3
F��male	59	31,7
Gestational Age		
[37-42]	164	88,2
>42	22	11,8
Maternal age		
[15-24]	58	31,2
[25-34]	109	58,6
[35-45]	19	10,2
Parity		
1	83	44,6
[2-4]	94	50
Sup �� 5	10	5,4
Maternal morbidities		
Hypertension	12	6,5
Gestational diabete	12	6 ,5
Maternal infection	37	19,9

Table II : Analysis of respiratory distress according to clinical data.

	Number (186)	Pourcentage (%)
Cyanosis		
Yes	102	54,8
No	84	45,2
Apgar Score (5th minute)		
≤ 7/10	168	90,8
> 7/10	17	9,2
Silverman Score		
[3-4]	67	36
[4-6]	82	44,1
>6	37	19,9
Ressuscitation at birth		
Yes	57	30,6
No	129	69,4
Heart Pulse/mn		
< 110	3	1,6
[110-160]	107	57,5
> 160	76	40,9
Breathing rate/mn		
< 60	16	8,6
[60-80]	139	74,7
> 80	31	16,7
Pulse oxymetry upon admission %		
,80	27	14,5
[80-94]	144	77,4
> 94	15	8,1
Temperature		
Hypothermia	1	5
Normal	102	54,8
Hyperthermia	83	44,6

Tableau III: Distribution of respiratory distress according to medical vs surgical etiologies.

Medical			Surgical		
	Number	Pourcentage (%)		Number	Pourcentage (%)
Maternal infection	82	44	Oesophageal Atresia	1	0.5
Respiratory distress	66	35.4	Congenital diaphragmatic hernia	1	0.5
Pneumonia	31	16.6	Choanal atresia	1	0.5
Respiratory distress	2	1.1			
Respiratory distress	2	1.1			

Tableau IV : Factors associated with severity of respiratory distress : multivariate analysis.

Severity of respiratory distress	Odds Ratio	IC 95%	P-Value
Cyanosis			
yes	6,509	2,693-15,72	0,000*
SaO2			
<80%	4,005	1,178-13,6	0,026*
Respiratory rate			
[60-80]	2,029	0,542-7,581	0,293
> 80	8,914	0,511-122,52	0,129
Apgar Score 5mn			
>7/10	9,412	1,962-45,73	0,005*
Mode of delivery			
Cesarian Section	0,412	0,168-0,929	0,050*
Maternal infection			
No	0,522	0,127-2,213	0,365

Légend

* : significance

OR : odd ratio

P : P value inf à 0,05

CI :Confidence Interval