Original Research Article

Incidence, clinical profile and outcome of transient tachypnea of newborn

Chiluka S.[1], Srinivas M.[2], Anitha K.[3], Basha S.[3], Reddy P.[3]

[1]Dr. Sudhakar Chiluka, Assistant Professor, [2]Dr. Srinivas Madoori, Professor, [3]Dr. Anitha K, Postgraduate Resident, Dr Subhan Basha, Postgraduate Resident, Dr Praneet Reddy, Postgraduate Resident, All authors are affiliated with Department of Pediatrics, C Anand Rao Institute of Medical Sciences, Karimnagar, Telangana, India.

Address for Correspondence: Dr Sudhakar Chiluka, Department of Pediatrics, C. Anand Rao Institute of Medical Sciences, Karimnagar, Telangana, India. E-mail: chilukasudhakar@gmail.com

……...

Abstract

Introduction: Respiratory distress is a common problem in neonates necessitating admission. Transient tachypnea of newborn (TTNB) is most common after term cesarean delivery. It is characterized by the early onset of tachypnea with retractions, or expiratory grunting and, occasionally, cyanosis. Distinguishing the disease from respiratory distress syndrome (RDS) andother respiratory disorders may be difficult, and TTNB is frequently a diagnosis of exclusion; the distinctive features of TTNB are rapid recovery of the infant and the absence of radiographic findings for RDS (hypoaeration, diffusereticulogranular pattern, air bronchograms) and other lung disorders. **Objective:** To study incidence, clinical profile of TTNB and to identify clinical clues that may help inprediction of severity of disease and need for early intervention for better outcome in patients with TTNB. **Study design:** This is a prospective study conducted at a tertiary care institute in late preterm and term babies admitted in neonatal intensive care unit (NICU) with respiratory distress during the study period. **Results:** Total admissions during study period were 510 of which 22 Newborns had TTNB. The average gestational age of 36+ 1.2 weeks and birth weight of 2924 + 404 gm. Neonates were included in the study following inclusion criteria. Risk factors identified for TTNB includes caesarean section (most common), male sex, infant of diabetic mother. Outcome can be predicted based, on Downe's score at presentation and time of development of respiratory distress after birth. **Conclusion:** According to this study all late preterm and term newborn delivered through LSCS are at greater risk for developing TTNB and early development of respiratory distress and higher Downe's score at presentation are associated with longer hospital stay.

Keywords: TTNB, Newborn, Outcome, Risk factors

……...

Introduction

Respiratory distress is one of the most common indications for admission of newborn in NICU. TTNB is a common condition in full-term or late preterm infant with an estimated incidence between 0.5% and 2.8% of all deliveries as a result of inadequate or delayed clearance of fetal lung fluid [1]. Clinical symptoms include tachypnea,expiratory grunting,nasal flaring and retraction immediately after birth or later. Symptoms usually resolve within 48-72hrs after birth but can last up to 5 days [2]. Disorder is more prevalent among infants who are male, premature, orn via cesarean section without labour or born to a mother with diabetes or asthma and among infants who have perinatal asphyxia [3].

Initial symptoms of TTNB are not easily differentiated from those of respiratory distress syndrome, pneumonia and persistent pulmonary hypertension of newborn leading to unnecessary imaging, blood testing and empiric antibiotic therapy as a result of misdiagnosis.

Treatment comprises supportivecare including supplemental oxygen, with holding of enteral feeds and administration of intravenous fluids [4]. Despite

Manuscript received: 5th October 2017
Reviewed: 15th October 2017
Author Corrected: 24th October 2017
Accepted for Publication: 30th October 2017

its transient nature TTNB is a nontrivial cause of neonatal respiratory distress associated with a substantial use of health care resources [5]. Many studies were conducted on the risk factors and outcome of TTNB and in our study we are looking for risk factors, clinical features and their association for predicting outcome at the time of presentation [6].

Materials and Methods

Place and type of study: This is a prospective study carried out in pediatric department of C Anand Rao Institute of Medical Sciences, a tertiary care hospital at Karimnagar, Telangana. After taking clearance from hospital ethical committee and consent from parents,

Sample collection& duration of study: All newborns admitted in NICU between May 2016 to April 2017 were included in the study.

Inclusion criteria

1. Completed 34wks gestational age
2. Onset of respiratory distress within 6hrs.
3. Respiratory distress at the time of admission (Respiratory rate >60/min, grunting, nasal, flaring and retractions).
4. Typical chest radiography findings (fluid in minor fissures, Hyperinflation or increased anteroposterior diameter, prominent vascular/perihilar markings (sunburst pattern).

Exclusion criteria

1. Preterm <34 weeks GA
2. Patients having polycythemia, hypoglycemia, hypocalcaemia, meconiumaspiration, pneumonia, aspiration, congenital heart disease, perinatal asphyxia, congenital malformations, tachycardia and early onset sepsis.

At the time of admission respiratoryrate (breaths/min), Heart rate (beats/min), O_2 saturation, fraction of inspired O_2, bloodglucose, complete blood count, arterial blood gas analysis, chest x-rayand clinical scoring for TTNB (Table 1) was done.

Table-1: Downe's clinical scoring [7]

score	0	1	2
Cyanosis	None	In room air	In 40% FiO_2
Retractions	None	Mild	Severe
Grunting	None	Audible with stethoscope	Audible without stethoscope
Air entry	Normal	Decreased	Barely audible
Respiratory rate	<60/min	60-80/min	80/min or apnea

Interpretation: Score > 4 = Clinical respiratory distress- monitor arterial blood gases, Score >7 = Impending respiratory failure

All newborns during the study period admitted to NICU with complains of respiratory distress, tachypnea, grunt within 6hrs of birth were evaluated clinically using Downe'sscore and laboratory work up as needed to rule out other causes of respiratory distress and child was monitored for requirement of oxygen, continuous positive airway pressure (CPAP), and ventilator support and outcome noted as discharge or death.

The support given to the newborn was categorized as shown in table 2.

Table-2: Level of Support.

Level	Respiratory support	Oxygen concentration
1	No oxygen	-
2	Face mask	30
3	Hood	40
4	Nasal cannula	50(5L/min)
5	NCPAP*(PEEP#: 5cm H_2O)	50-60

*Nasal continuous positive airway pressure # Positive end expiratory pressure

Data Analysis: Comparison of continuous variation was done by one way ANOVA and proportions by Chi-square test *or student T test.* Analysis was done using windows based SPSS statistical package 19.0.

Results

Total live births during study period were 1670 of which 510 (30.53%) neonates were admitted in NICU for various conditions. Of these case, 22 (4.31%) were identified as TTNB with an incidence of 13.17 cases per 1000 live births. All of the22 infants were included in the study. The average gestational age of newborn was36+1.2wks and birth weight was 2924+404gm. Of newborns, males were 20 and females were 2. out of 22 cases, 20 cases were born out of cesarean section and 2 cases born by normal vaginal delivery (NVD). One newborn was born to mother with overt Diabetes mellitus (Table 3).

Table-3: Demographic characteristics of maternal and newborn.

Gestational age in weeks (mean±SD)	**36+1.6**
Birth weight (mean±SD)	2924+404
Gender(male/female)	20/2
Elective cesarean section/NVD	90.09%/ 9.91%
APGAR score at 5 min	10(7-10)
Initial respiratory rate	82+9
TTNB score	5+2
WBC(mean±SD)	15.8+4.7
Peak respiratory rate	81+8
Respiratory support	
Oxygen	21
CPAP	1
Mechanical ventilation	0
Oxygen saturation%(mean±SD)	92+5
Duration of hospital stay	4+2
Heart rate	130±8
Blood glucose	60±7
CRP	Negative

APGAR at 5minwas 7±3, on average neonatal tachypnea was first detected 3+1.5hrs of life and initial respiratory rate was 82+9 breaths/min.

Of 22 cases 21cases managed on supplemental oxygen one case was managed on CPAP and duration of CPAP was for 48 hours and no cases required mechanical ventilation and all case discharged at 4+2 days.

Discussion

Transient tachypnea of the newborn (TTNB), first described by Avery and coworkers in 1966 as a result from delayed clearance of fetal lung fluid [3]. TTNBis also known as wet lung syndrome, type 2 respiratory syndromes, prolonged transition/ transient RDS and retained fetal lung fluid. Itis a clinical syndrome associated with respiratory distress usually seen shortly after delivery in infants. Affected term or late preterm infants usually present within the first 6 hours of life with tachypnea; respiratory rates are typically 60 to 120 breaths per minute. The tachypnea may be associated with mild tomoderate respiratory distress with retractions, grunting, nasal flaring, and/or mildcyanosis that usually responds to supplemental oxygen at <0.40 $Fi0_2$.

Mechanism of clearing alveolar fluid in fetus mainly occurs duringlabour and after birth. During late pregnancy as a result of increased secretion of epinephrine and other hormones, neonatal mature lung switches from secreting fluid into air spaces to starting reabsorbing it. Resorption of neonatal lung fluid also occurs after birth because of changes of oncotic pressure between alveoli, interstitial tissue and small blood vessels [3, 8].

Delayed resorption of lung fluid in fetus is considered main cause of TTNB where fluid fills air spaces and moves into interstitial perivascular tissue and interlobar fissure until drained by lymphatics or capillaries. Excess lung fluid in TTNB results in decreased lung functions. Tachypnea will occur to compensate for decrease gas exchange associated with increased lung fluid. Risk factors for TTNB include birth by cesarean section withor without labor, precipitous birth, and preterm birth [9, 10]. These have been attributed todelayed or abnormal fetal lung fluid clearance due to the absence of the hormonal changes that accompany spontaneous labor. Other risk factors include male gender and family history of asthma (especially the mother). The mechanism underlying the gender and asthma associated risks is unclear but may be related to altered sensitivity to catecholamine's that play a role in lung fluid clearance [11].

The chest radiograph of an infant with TTNB is consistentwith retained fetal lung fluid, with characteristic prominent perihilarstreaking (sunburst pattern) due to engorgement of periarterial lymphatics that participate in the clearance of alveolar fluid. Coarse, fluffy densities may reflect alveolar edema. Hyper aeration with widening of intercostal spaces, mild cardiomegaly, widened and fluid-filled interlobar fissure, and mild pleural effusions may also be observed [4].

Treatment is mainly supportive with provision of supplemental oxygen, as needed. More severe cases may respond to CPAP to improve lung recruitment. Infants often undergo an evaluationfor infection and are treated with antibiotics for 24 to 48 hours until blood cultures are negative [12]. If tachypnea persists and is associated with increased work of breathing, gavage feed or intravenous fluids may be needed. Strategies aimed to facilitate lung fluid absorption have not shown clinical efficacy. Oral furosemide has not been shown to improve the duration of tachypnea or length of hospitalization [13].

In our study one case of infant of Diabetic mother developed TTNB which is a well-known risk factor [14]. In a study done by Basseyetalover a period of 5yrs i.e.,, 2008 to 2012 showed that the commonest intrapartum complications was fetal distress in 42.86%[15]. We observed high incidence of TTNB in neonates delivered by caesarean section which is one of the most important risk factor for TTNB.

Kasap et al have also observed similar male preponderance in their study [16]. There are several risk factors that aggravate TTNB symptoms such as male sex, caesarean section, low APGAR score [4].

Higher Downe'sscores were predictive for further respiratory support in our study newborns with higher Downe's score required CPAP for 48hrs similar to the study done by Kahveciogluetalthat higher Silverman scores were predictivefor further respiratory support [17]. Study by Shashidhar et al stated that the inter rater reliability was higher in Downes score (alpha=0.69- acceptable) as compared to Silverman scores (alpha=0.33- questionable)[18].

Hence we used Downes score for TTNB assessment in our study. Study by Weintraub et al in 745 neonates with the initial diagnosis of TTNB, 336 (45%) infants required CPAP or high flow nasal

cannula treatment [11]. In one case respiratory peak during 20hrs >90/min caused prolonged tachypnea similar to study by Kasapetal [16]. Percentage of inspired oxygen on admission is predictors of significant respiratory support.

Summary and Conclusions

To conclude our study confirms that simple scores can help predict likelihood of deterioration and may be helpful for clinical intervention of neonate with diagnosis of TTNB and better outcome.

The estimated incidence of TTNB of all deliveries were higher (4.3%) than normal (0.3-2.8%) as ours is a tertiary care institute with higher cases of high risk pregnancy deliveries. As the study group consists of small number larger studies may require endorsingthe results.

What the study added?

- The study reinforces that TTNB is a benign condition.
- Recognition of the symptoms and signs is important
- Avoid unnecessary investigations and treatment
- Our study works as a reference to all practitioners of this area as it is first of its kind from this area.

Author's contributions: SM: Conceived the study, made intellectual contribution to the study protocol, wrote the first draft of the manuscript. SC/AK/SB/PR: Made intellectual contribution to the study protocol, read and edited the manuscript. All authors read and approved the final manuscript.

Acknowledgement: We would like to thank Chalmeda Anand Rao Institute of Medical Sciences for granting permission to conduct our study

List of abbreviations

TTNB: Transient tachypnea of newborn, **RDS:** Respiratory distress syndrome, **GA:** Gestational age, **NICU:** Neonatal intensive care unit, **CPAP:** Continuous positive airway pressure, **NCPAP:** Nasal continuous positive airway pressure, **PEEP:** Positive end expiratory pressure, **ANOVA:** Analysis of variation, **SPSS:** Statistical Package for the Social Sciences, **LSCS:** Lower section cesarean section, **SD:** Standard deviation, **NVD:** Normal vaginal delivery, **CRP:** C reactive protein, **WBC:** White blood cells.

Funding: Nil, **Conflict of interest:** None initiated, **Perission from IRB:** Yes

References

1. Agarwal V, David, Harris, classification of acute respiratory disorder of all newborns in a tertiary care centre. J Nat med Assoc.2003, 95;585-895.

2. Avery MAE, Gatewood, Brumley, TNB, possible delayed respiration of fluid at birth Am j dis child 1996; 111(4);380385.

3. Gowen CW Jr, Lawson EE, Gingras J, Boucher RC, Gatzy JT, Knowles MR. Electrical potential difference and ion transport across nasal epithelium of term neonates: correlation with mode of delivery, transient tachypnea of the newborn, and respiratory rate. J Pediatr. 1988 Jul;113(1 Pt 1):121-7.

4. ClohertyJP, Eichenwald EC, Hansen AR, Strak AR. Manual of neonatal care 5th ed. Philadelphia, PA; Lippincott Williams & Wilkins 2012; P403-07.

5. Yurdakok M, Ozek E. Transient tachypnea of the newborn: the treatment strategies. Curr Pharm Des. 2012;18(21):3046-9.

6. Liem JJ, Huq SI, Ekuma O, et al: Transient tachypnea of the newborn may be an early clinical manifestation of wheezing symptoms, J Pediatr 151: 29–33, 2007. DOI:10.1016/j.jpeds.2007.02.021.

7. Anita Rusmawati, Ekawati L. Haksari, Roni Naning. Downes score as a clinical assessment for hypoxemia in neonates with respiratory distress. Paediatr Indones. 2008;48:342-5. DOI : dx.doi. org/ 10. 14238/pi48.6.2008.342-5.

8. Tutdibi E, Gries K, Bücheler M, Misselwitz B, Schlosser RL, Gortner L. Impact of labor on outcomes in transient tachypnea of the newborn: population-based study. Pediatrics. 2010 Mar; 125 (3): e577-83. doi: 10.1542/peds.2009-0314. Epub 2010 Feb 15.

9. Hack, M., Fanaroff, A. A., Klaus, M. H., Mendelawitz, B. D., & Merkatz, I. R. (1976). Neonatal respiratory distress following elective delivery. A preventable disease?. American journal of obstetrics and gynecology, 126 (1), 43-47. DOI: http://dx.doi.org/10.1016/0002-9378(76) 90462-2.

10. Kolås T, Saugstad OD, Daltveit AK, Nilsen ST, Øian P. Planned cesarean versus planned vaginal delivery at term: comparison of newborn infant outcomes. Am J Obstet Gynecol. 2006 Dec;195(6): 1538-43. Epub 2006 Jul 17.

11. Guglani L, Lakshminrusimha S, Ryan RM. Transient tachypnea of the newborn. Pediatr Rev. 2008 Nov;29(11):e59-65.doi:10.1542/pir.29-11-e59.

12. Weintraub AS, Cadet CT, Perez R, DeLorenzo E, Holzman IR, Stroustrup A. Antibiotic use in newborns with transient tachypnea of the newborn. Neonatology. 2013; 103 (3): 235-40. doi: 10.1159/ 000346057. Epub 2013 Feb 14.

13. Lewis, V., and Andrew Whitelaw. "Furosemide for transient tachypnea of the newborn." Cochrane Database Syst Rev 1 (2002);(1);CD003064.

14. Takaya, Akane, Miwa Igarashi, Mizue Nakajima, Hidehiko Miyake, Yoshio Shima, and Shunji Suzuki. "Risk factors for transient tachypnea of the newborn in infants delivered vaginally at 37 weeks or later." Journal of Nippon Medical School 75, no. 5 (2008): 269-273. DOI :doi.org/ 10. 1272/jnms.75.269.

15. Bassey G, Inimgba NM. Fetomaternal outcome of twingestation in Port Harcourt, South-South, Nigeria. Niger J Med. 2014 Oct-Dec; 23 (4): 282-7.

16. Kasap B, Duman N, Ozer E, Tatli M, Kumral A, Ozkan H. Transient tachypnea of the newborn: predictivefactor for prolongedtachypnea. Pediatr Int. 2008 Feb; 50 (1):81-4. doi: 10.1111/j.1442-200X. 2007. 02535.x.

17. Dilekkahvecioglu, U Fukcakir, Duran Yildiz, Serdar Alan, Omer Erdeve, Begum Atasay, Saadet Arsan. Transienttachypnea of newborn is there bedside clues for predicting the need of ventilation a support? Turkishjournal of paediatrics 2016:58:400-405. DOI :10.24953/turkjped.2016.04.009.

18. Shashidhar A, Suman Rao PN, Joe Jose. Downes Score vs. Silverman Anderson Score for Assessment of Respiratory Distress in Preterm Newborns. Pediatric Oncall [serial online] 2016[cited 2016 July-September 1]; 13. Art #30. Available from: http://www. pediatriconcall.com/pediatric-journal / View /fulltext-articles/1027/J/0/0/542/0. DOI: 10. 7199 /ped.oncall.2016.30.

……

How to cite this article?

Chiluka S, Srinivas M, Anitha K, Basha S, Reddy P. Incidence, clinical profile and outcome of transient tachypnea of newborn. Int J Pediatr Res. 2017;4(10):623-628. doi:10.17511/ijpr.2017.i10.07.

……...