

Evaluation of Pneumothorax in Neonates in Al Immamian Alkadhomain Medical City

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ABSTRACT

Introduction: Pneumothorax occur most during neonatal age than other age of life in human being, this more related to high morbidity and death rate. It started form damage to alveoli that more distended. The air seepages lengthways of the perivascular sheath of connective tissue inside to the pleural space, The aim of our study is to assessment of prevalence, recognize the danger factors and to define the clinical features, treatment and consequence of neonates that have pneumothorax and determine the fate of neonates after treatments.

Method: Prospectively collected data from newborn infants with pneumothorax observed and treated at the Neonatal Intensive Care Unit (NICU) in al immamian alkadhomain medical city, Sociodemographic data of neonates, clinical features of pneumothorax and treatment of pneumothorax. Finally, assessment the fate of neonate assessed.

Results: A cross section descriptive study on 41 neonates mean age (34.6 ± 3) weeks most age group 31 – 40 weeks 85% and weight (2 ± 0.7) kg most neonates (49%) with 2.1 – 3 kg, 34% females and 66% males, 61% of neonates are single parity, 71% of neonates not need to antenatal steroid, while 56% of neonates delivered by CS, 71% of neonates with Apgar score less than 7 in first 1 min., Significant association between sociodemographic variables and clinical features as show in table 4; 52% of right pneumothorax occur in male, 88% of left pneumothorax occur in male and 100% of bilateral pneumothorax occur in male. 57% of RDS occur females while 43% of RDS in male. 100% of TTN occur in single parity. 67% of pneumonia occur at age group 21- 30 week. Significant association between sociodemographic variables and treatment and fate as show in table 5; 56% of neonate's need C-pap were females and 44% were males. 56% of neonates need O₂ therapy with weight 2.1-3kg, 26% of them that need O₂ therapy with weight 1-2 kg. 55% of alive neonates are males and 45% are females, 72% of single parity neonates still alive.

Conclusion: Pneumothorax is moderately common in the NICU. The fate of neonates are 71% still alive and 29% dead. Pneumothorax itself was not a factor of death, probably due to the sufficient and rapid therapy used in the NICU.

Keywords: Evaluation, Pneumothorax, Neonates, al Immamian alkadhomain medical city.

INTRODUCTION

Pneumothorax occur most during neonatal age than other age of life in human being, this more related to high morbidity and death rate. It started form damage to alveoli that more distended. The air seepages lengthways of the perivascular sheath of connective tissue inside to the pleural space, lead to pneumothorax and low incidence of pneumomediastinum, pneumopericardium and emphysema in addition to pneumoperitoneum (Duong et al., 2014; Miall, 2015).

Pneumothorax is a recurrent serious condition in the Neonatal Intensive Care Unit (NICU). Pneumothorax with symptoms occur with incidence 0.05-0.1% of entirely living deliveries, while in babies with low weight during birth the incidence are 4-9% (Kitsomart et al., 2012; Smith et al., 2011).

Numerous danger factors for pneumothorax defined in immature infants, respiratory distress syndrome (RDS) and chorioamnionitis. In late preterm infants the danger factors are: increase birth weight, male, more than 24 hours break of membranes (Colin et al., 2010). Most usual symptom of pneumothorax are signs or RDS. Hypercapnia and hypoxemia can evaluated by gases analysis of arterial blood. In some neonates, compromise of mediastinal shift on cardiovascular system lead serious danger of reduced the resolving and lead to death.

Tension pneumothorax can lead to increase the pressure inside pleura following collapse of lung and decrease in venous return, hypotension and cardiac shutdown. So it is important to diagnosed the infants under risk to inhibits and manage them correctly (Miall, 2015; Smith et al., 2011). Pneumothorax diagnosis depend on clinical findings and chest X-ray (Arun Ozer et al., 2013).

The managements of pneumothorax in neonates is not well defined. 3 methods are common used in NICUs. Method for asymptomatic and little symptoms pneumothorax and active interference like aspiration by 14-16G needles and drainage of thoracic (MacDuff et al., 2010; Pocivalnik et al., 2013). Aspiration by needle used for pneumothorax of mild to moderate cases and neonates are constant hemodynamically. Hypertensive pneumothoraxes, the most common management methods is putting of chest tube (Miall, 2015). The aim of our study is to assessment of prevalence, recognize the danger factors and to define the clinical features, treatment and consequence of neonates that have pneumothorax and determine the fate of neonates after treatments.

METHODS

Prospectively collected data from newborn infants with pneumothorax observed and treated at the Neonatal Intensive Care Unit (NICU) in al immamian alkadhomain medical city from January to June 2020 were included in this

descriptive study. There were no exclusion criteria for the study. Sociodemographic data of neonates as the following: age of neonate, gender, weight, parity, antenatal steroid, Mode of delivery, Apgar score. About most clinical features of pneumothorax: site of pneumothorax, presence of meconium aspiration, any congenital diaphragmatic hernia, spontaneous pneumothorax, RDS, TTN and sepsis. About treatment of pneumothorax: neonatal need of surfactant, neonate need of O₂ therapy, need of C pap, endotracheal intubation need and drain with chest tube. Finally assessment the fate of neonate. Statistical analysis done by SPSS 22 for categorical variables use frequency and

percentage, Chi-square and Fischer exact tests to show association between categorical variables. The P-value considered significant if less than 0.05.

RESULTS

Across section descriptive study on 41 neonates mean age (34.6±3) weeks most age group 31–40 weeks 85% and weight (2±0.7) kg most neonates (49%) with 2.1–3 kg, 34% females and 66% males, 61% of neonates are single parity, 71% of neonates not need to antenatal steroid, while 56% of neonates delivered by CS, 71% of neonates with Apgar score less than 7 in first 1 min. As show in table 1.

Table 1: sociodemographic variables distribution.

Variables		Frequency	Percentage
Gender	female	14	34.1
	male	27	65.9
parity	multiple	16	39.0
	single	25	61.0
antenatal steroid	no	29	70.7
	yes	12	29.3
Mode of delivery	CS	23	56.1
	NVD	18	43.9
Apgar score	1st min <7	12	29.3
	5th min <7	29	70.7
Age	21-30 w.	5	12.2
	31-40 w.	35	85.4
	more than 40 w.	1	2.4
Weight	1-2 kg	10	24.4
	2.1-3 kg	20	48.8
	3.1- 4 kg	11	26.8

According to table 2: the clinical features distribution as the following: 66% of neonates with pneumothorax side at right side, 80% of neonates with no meconium aspiration, 92% of

neonates with no congenital diaphragmatic hernia, 93% of neonates without spontaneous pneumothorax, 66%, 83% and 78% with no RDS, TTN and sepsis respectively.

Table 2: clinical features distribution.

Variables		Frequency	Percentage
Pneumothorax side	bilateral	6	14.6
	left	8	19.5
	right	27	65.9
Meconium aspiration	no	33	80.5
	yes	8	19.5
C. diaphragmatic hernia	no	38	92.7
	yes	3	7.3
Spontaneous	no	30	73.2
	yes	11	26.8
pneumonia	yes	31	75.6
	no	38	92.7
	yes	3	7.3
RDS	No	27	65.9
	yes	14	34.1
TTN	no	34	82.9
	yes	7	17.1
sepsis	No	32	78.0

yes	9	22.0
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According to table 3; treatment distribution as the following: 59% of neonate no need surfactant, 83% of neonate need O₂ therapy, 56% of neonate need C pap.

Endotracheal intubation not need in 63% of neonates, drain with chest tube need in 76% of neonates. 71% of neonate still alive.

Table 3: Treatment distribution.

Variables		Frequency	Percentage
surfactant	No	24	58.5
	yes	17	41.5
oxygen therapy	No	7	17.1
	yes	34	82.9
C-pap	No	23	56.1
	yes	18	43.9
fate	alive	29	70.7
	Death	12	29.3
Endotracheal intubation	No	26	63.4
	yes	15	36.6
Drain with chest tube	No	10	24.4
	yes	31	75.6

Significant association between sociodemographic variables and clinical features as show in table 4; 52% of right pneumothorax occur in male, 88% of left pneumothorax occur in male and 100% of bilateral pneumothorax occur in male. 57% of RDS occur females while 43% of RDS in male.

100% of TTN occur in single parity. 67% of pneumonia occur at age group 21- 30 week. As in table 4. All rest clinical features have no significant association with previous sociodemographic variables.

Table 4: significant association between sociodemographic variables and clinical features.

			Pneumothorax side			P-value
			bilateral	left	right	
gender	female	Count	0	1	13	0.028
		%	0.0%	12.5%	48.1%	
	male	Count	6	7	14	
		%	100.0%	87.5%	51.9%	
			RDS			
			No	yes		
gender	female	Count	6	8		0.039
		%	22.2%	57.1%		
	male	Count	21	6		
		%	77.8%	42.9%		
			TTN			
			No	yes		
parity	multiple	Count	16	0		0.031
		%	47.1%	0.0%		
	single	Count	18	7		
		%	52.9%	100.0%		
			Pneumonia			Total
			no	yes		
Age	21-30 w.	Count	3	2		0.011
		%	7.9%	66.7%		
	31-40 w.	Count	34	1		
		%	89.5%	33.3%		
	> 40 w.	Count	1	0		
		%	2.6%	0.0%		

P-value <0.05 (significant).

Significant association between sociodemographic variables and treatment and fate as show in table 5; 56% of neonate's need C-pap were females and 44% were males. 56% of neonates need O₂ therapy with weight 2.1-3kg, 26% of them

that need O₂ therapy with weight 1-2 kg. 55% of alive neonates are males and 45% are females, 72% of single parity neonates still alive. As in table 5.

Table 5: significant association between sociodemographic data and treatment and fate.

			(c-pap)		Total
			No	yes	
gender	female	Count	4	10	0.019
		%	17.4%	55.6%	
	male	Count	19	8	
		%	82.6%	44.4%	
			fate		Total
			alive	Death	
gender	female	Count	13	1	0.033
		%	44.8%	8.3%	
	male	Count	16	11	
		%	55.2%	91.7%	
			Fate		Total
			Alive	Death	
parity	multiple	Count	8	8	0.034
		%	27.6%	66.7%	
	single	Count	21	4	
		%	72.4%	33.3%	
			Oxygen therapy		Total
			No	yes	
Weight	1-2 kg	Count	1	9	0.013
		%	14.3%	26.5%	
	2.1-3 kg	Count	1	19	
		%	14.3%	55.9%	
	3.1- 4 kg	Count	5	6	
		%	71.4%	17.6%	

P-value <0.05 (significant).

DISCUSSION

Neonatal pneumothorax is serious condition that connected with increase death and morbidity (Litmanovitz and Carlo, 2008). When a finding of tension pneumothorax has been complete, rapid management should be assumed to inhibit severe morbidity and mortality. In not well patient, quick management regularly requires needle thoracentesis with a minor gauge needle in the 2nd intercostal space in midclavicular line. A proper chest drain in the 4th or 5th intercostal space in maxillary line then follows this (Mannan et al., 2019).

In current study the neonates mean age (34.6±3) weeks most age group 31–40 weeks 85% and weight (2 ± 0.7) kg most neonates (49%) with 2.1–3 kg, 34% females and 66% males, 61% of neonates are single parity, 71% of neonates not need to antenatal steroid, while 56% of neonates delivered by CS, 71% of neonates with Apgar score less than 7 in first 1 min..

B APILIOGULLARI et al. have similar results stated that male gender 77%, weight more than 2 Kg 77%, more

neonates with CS than normal vaginal delivery (Apiliogullari et al., 2011; Benterud et al., 2009). Also Silva et al. show similar results were males (60.4%). Their median gestational age was 37 (24-40) weeks and the median birthweight was 2,613 grams. Also single parity more than multiple parity, 30% of neonate not need antenatal steroid, 32% of neonate with Apgar score less than 7 in first 1 min. (Ngercham et al., 2005; Silva et al., 2016).

In current study, the clinical features distribution as the following: 66% of neonates with pneumothorax side at right side, APILIOGULLARI et al also agreed and stated that 40 % of neonate with right Lung pneumothorax (Apiliogullari et al., 2011), Abdul Mannan et al. stated that 77% of neonate with right pneumothorax (Mannan et al., 2019). In current study 80% of neonates with no meconium aspiration APILIOGULLARI also state that only 3% neonates with meconium aspiration (Apiliogullari et al., 2011), 92% of neonates with no congenital diaphragmatic hernia, 93% of neonates without spontaneous pneumothorax, 34%, 17% and 22% with RDS, TTN and sepsis respectively. This results similar to Silva et al. stated that only 14% of neonates with

RDS, 7% with TTN, 20% sepsis and 45 with diaphragmatic hernia (Silva et al., 2016). While Abdul Mannan et al stated 24 % with RDS and 20% with sepsis (Mannan et al., 2019).

In current, study the treatment distribution as the following: 41% of neonate need surfactant, 83% of neonate need O₂ therapy, 56% of neonate need C pap. Endotracheal intubation need in 37% of neonates, drain with chest tube need in 76% of neonates. These results agreed with Silva et al. that stated 855 of neonates need O₂ therapy, 17 neonates need surfactant (Silva et al., 2016). Md Abdul Mannan et al. have similar results that 77% of neonate need O₂ (Mannan et al., 2019).

Significant association between sociodemographic variables and clinical features; 52% of right pneumothorax occur in male, 88% of left pneumothorax occur in male and 100% of bilateral pneumothorax occur in male. 57% of RDS occur females while 43% of RDS in male. 100% of TTN occur in single parity. 67% of pneumonia occur at age group 21- 30 week. other studies stated that all male gender have more to get pneumothorax than females (Clinic, 2017; Mackenzie and Gray, 2007; Peters et al., 1978). Also many study show that females more get RDS than male similar to current study (Niesłuchowska-Hoxha et al., 2018; Reuter et al., 2014). About TTN studies disagreed with current study and show that TTN more occur in multi para than single parity (Bekdas et al., 2013; Yoder et al., 2008). Also pneumonia occur at age group 21- 30 week (Lim et al., 2001).

In current study significant association between sociodemographic variables and treatment; 56% of neonate's need C-pap were females, other study not agreed with the current study and showed that males is more need C-pap than females (Dewez et al., 2018; Jain et al., 2016). Also in current study there, neonates need O₂ therapy increase with increase the weight, this similar to other study also state that O₂ therapy increase with increase the weight of neonates (Cannula and Therapy, 2018; Sockrider et al., 2019).

In current study we found that 71% of neonates still alive and 29% dead, this similar to other study that showed 30% of neonates dead and 70% of them still alive. Hypotension, mechanical ventilation and thoracentesis correlated with chest tube insert were found to be factors of mortality in newborns with pneumothoraces. These neonates had a bad prognosis as the start. Pneumothorax was not recognized as a prognosticator of death as others have showed it. The suitable treatment used in the NICU was maybe the description for this consequence (Arun Ozer et al., 2013; Duong et al., 2014; Silva et al., 2016). The restrictions of current study are the reflective and single-center project, the minor sample scope.

CONCLUSION

Pneumothorax is relatively frequent in the NICU. The most sociodemographic data are weight with 2.1–3 kg, males, single parity, neonates not need to antenatal steroid, neonates delivered by CS and with Apgar score less than 7 in first 1 min. while the most clinical features are neonates with pneumothorax side at right side, neonates with no meconium aspiration, neonates with no congenital

diaphragmatic hernia, neonates without spontaneous pneumothorax, right pneumothorax most occur in male and most RDS occur females. The fate of neonates are 71% still alive and 29% dead. Pneumothorax itself was not a factor of death, probably due to the sufficient and rapid therapy used in the NICU.

CONFLICT OF INTEREST

None

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