ORIGINAL RESEARCH PAPER

Paediatrics

INCIDENCE OF HYALINE MEMBRANE DISEASE IN PREMATURE BABIES AND IT'S OUTCOME AT NICU GGH KURNOOL.

KEY WORDS:

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INTRODUCTION:

Infant respiratory distress syndrome (**IRDS**), also called **neonatal respiratory distress syndrome**, **respiratory distress syndrome of newborn**, or increasingly **surfactant deficiency disorder** (**SDD**), and previously called **hyaline membrane disease**(**HMD**), is a syndrome in premature infants caused by developmental insufficiency of pulmonary surfactant production and structural immaturity in the lungs. It can also be a consequence of neonatal infection. It can also result from a genetic problem with the production of surfactant associated proteins. IRDS affects about 1% of newborn infants and is the leading cause of death in preterm infants. The incidence decreases with advancing gestational age, from about 50% in babies born at 26–28 weeks, to about 25% at 30–31 weeks. The syndrome is more frequent in infants of diabetic mothers and in the second born of premature twins.

IRDS is distinct from pulmonary hyperplasia, another leading cause of neonatal death that involves respiratory distress.

INCIDENCE:

Respiratory distress syndrome occurs primarily in premature infants; its incidence is inversely related to gestational age and birthweight. It occurs in 60-80% of infants 37 wk of gestational age. The risk for development of RDS increases with maternal diabetes, multiple births, cesarean delivery, precipitous delivery, asphyxia, cold stress, and a maternal history of previously affected infants. The incidence is highest in preterm male or white infants. The risk of RDS is reduced in pregnancies with chronic or pregnancy-associated hypertension, maternal heroin use, prolonged rupture of membranes, and antenatal corticosteroid prophylaxis.

AIM AND OBJECTIVES OF THE STUDY:

1. To determine Study of incidence of hyaline membrane disease in preterm babies with respiratory distress
2. All premature babies admitted in nicu with hyaline membrane disease

MATERIALS AND METHODS:

SOURCE OF THE DATA:

Preterm babies admitted to NICU at GGH Kurnool with respiratory distress syndrome

METHODS OF COLLECTION OF DATA:

(INCLUDING SAMPLING PROCEDURE)

METHOD: Preterm babies admitted in NICU with respiratory disease <37 weeks collaborated with X- rays findings. Evaluated by X-RAY and lung by shake test.

DURATION OF STUDY: 2016 march to 2017 march

Sample size : 4 PQ/L L

Inclusion Criteria : Who are admitted in NICU with features of respiratory disease <37 weeks

Exclusion Criteria:

1. Neonates with APGAR Score <-2at 5 minutes
2. Congenital malformations
3. Pneumonia and incomplete treated pneumothorax
4. Born through MSAF.

Differential diagnosis

Although characteristic of HMD, hyaline membranes are a nonspecific finding with a number of causes, which should be considered especially in the term and post-term infant with RDS. Hyaline membranes can be seen associated with meconium aspiration, neonatal pneumonia, pulmonary edema and hemorrhage and with various irritants to the terminal airways and alveoli.

DISCUSSION

As per the study x-ray findings re mild in 8 cases moderate In 22 cases and severe in 65 cases.

The Silverman score 8 in 3 cases and 10 in 65 cases.

Shake test negative in 25 cases, in the study the female babies are 65 and male babies are 75, the in born cases are 36 and out born cases are 104 the full-term inference 45 and pre-term inference are 95 Spectrum of respiratory distress syndrome in the newborn in North India :

A prospective study S. Thomas, M.D., Ishwar C. Verma, M.R.C.P., D.C.H., Meharban Singh, M.D., and P.S.N. Menon, M.D. A prospective study over a 13 month period was carried out to determine the spectrum of respiratory distress syndrome (RDS) In the newborn. Of 1400 neonates, 116 developed RDS of which 67 were term and 49 preterm.

The cases were catogorised on the basis of clinical data and course, biochemical, radiologic and autopsy findings. Maximum number of cases (51.4%) were due to pneumonia and bronchopneumonia. Hyaline membrane disease was responsible for respiratory distress in 10 cases (86%). All infants were preterm with a negative shake test and all expired. Transient tachypnea was observed in 22 cases (19%), all of term gestation. Meconium aspiration was responsible in 14cases (12.1%) and was commoner in term infants than preterm. Pneumothorax was seen in 2 cases.
The finding of hyaline membranes at the histological examination of lungs is a frequent event in preterm newborns died in the clinical setting of RDS. Even though hyaline membranes should not be considered specific, on the other hand they are characteristic of HMD and, in the majority of cases, allow to confirm the clinical diagnosis.

The study done by Thomas et al., [4] showed 58% of term babies and 42% were preterms developed RD. In Khatua SP et al., study [5] among 182 Santosh S et al., A Clinical Study of Respiratory Distress In Newborn and Its Outcome www.ijnmr.net 4 Indian Journal of Neonatal Medicine and Research. 2013 April, Vol-1(1): 2-4 babies with RD 133 (73%) babies were term infants and 49 (29%) were preterms. In our study among 5 cases of PROM, 2 (40%) developed sepsis and pneumonia. In study conducted by Philip et al., [10] 671% of the cases with history of PROM developed pneumonia and sepsis.

According to Tudehope and Smith [6] TTNB is the commenst cause of RD accounting for 41%, he also showed TTNB was more common following caesarean section before labour the reason given that is in absence of labour anticipatory lung fluid clearance will not have occurred. In the study done by Alok kumar and Bhat B V [7], Transient tachypnea of newborn (TTN) was found to be the commonest (42.7%) cause of RD followed by infection (17.0%), meconium aspiration syndrome (10.7%), hyaline membrane disease (9.3%) and birth asphyxia (3.3%). According to Malhotra A K [9] 88% mortality was due to HMD and all cases of TTNB and

MAS were survived and 66% of mortality was accounted due to BA and 50% mortality accounted to sepsis and pneumonia.

Preterm babies were more in no. with male predominance; most of them were delivered vaginally. Antenatal risk factors increase the incidence of RD. Transient tachypnoea was the main cause of respiratory distress followed by RDS. In most of the cases x ray findings correlated with the clinical picture. ABG was found normal in most of the cases. RDS was the main cause for ventilation. The survival rate was 92.2% among RD cases admitted to NICU. The common cause of death was preterm and RDS.

Prophylactic administration of surfactant in preterm newborns of gestational age < 34 weeks is associated with a significant decrease in mean duration of ventilation and an increase in the incidence of retinopathy of prematurity.

Xray findings

Xray					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	mild	8	8.4	8.4	8.4
	moderate	22	23.2	23.2	31.6
	severe	65	68.4	68.4	100.0
	Total	95	100.0	100.0	

The xray findings mild in 8 cases (8.4%) , moderate in 22 cases (23.2%) , and severe in 65 cases (68.4%) .

Silvermanscore					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	6	8	8.4	8.4	8.4
	7	19	20.0	20.0	28.4
	8	3	3.2	3.2	31.6
	10	65	68.4	68.4	100.0
	Total	95	100.0	100.0	

The silverman score 8 in 3 cases (3.2%) , 10 in 65 cases (68.4%).

Radiographic features

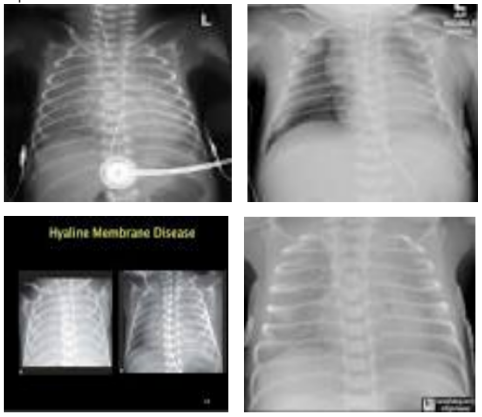
Plain radiograph

- typically gives diffuse ground glass lungs with low volumes and a bell-shaped thorax
- often tends to be bilateral and symmetrical

air bronchograms

- may be evident
- lung whiteout in severe cases
- hyperinflation (in a non-ventilated patient) excludes the diagnosis
- radiographs may show hyperinflation if the patient is intubated

RDS can be safely excluded if the neonate has a normal chest radiograph at six hours after birth.

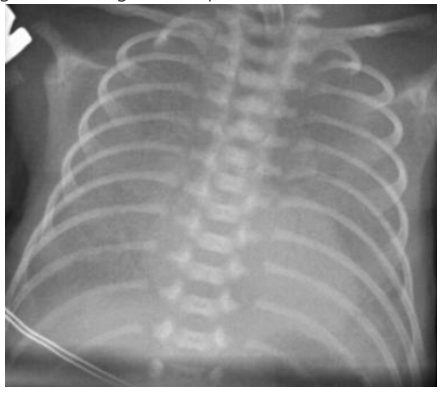


If treated with surfactant therapy there may be a symmetric improvement.

Respiratory distress syndrome (RDS) of the newborn is an acute lung disease caused by surfactant deficiency, which leads to alveolar collapse and noncompliant lungs. Previously known as hyaline membrane disease, this condition is primarily seen in premature infants younger than 32 weeks' gestation.

RDS is usually diagnosed with a combination of clinical signs and/or symptoms, chest radiographic findings, and arterial blood gas results. The radiographic features of RDS are seen in the images below. A normal film at 6 hours of life excludes the diagnosis of RDS.

Classic respiratory distress syndrome (RDS). Bell-shaped thorax is due to generalized underaeration. Lung volume is reduced, the lung parenchyma has a fine granular pattern, and peripherally extending air bronchograms are present.



Moderately severe respiratory distress syndrome (RDS). The reticulogranular pattern is more prominent and uniformly distributed than usual. The lungs are hypoaerated. Increased air bronchograms are observed.

The incidence and severity of RDS are inversely related to gestational age. RDS is the most common cause of respiratory failure during the first days after birth. In addition to prematurity, other factors contributing to the development of RDS are maternal diabetes, cesarean delivery without preceding labor, [1] being the second born of twins, perinatal asphyxia, perinatal infection, and patent ductus arteriosus. [2, 3, 4]

Complications of RDS are numerous, both acute and chronic. [5] Infants with RDS are at risk of developing alveolar rupture and pulmonary interstitial emphysema, infection, intracranial hemorrhage, chronic lung disease (bronchopulmonary dysplasia), retinopathy of prematurity, neurologic impairment, and sudden death.

The outcome of patients with RDS has improved with the increased use of antenatal steroids to improve pulmonary maturity, early postnatal surfactant therapy to replace surfactant deficiency, and gentle techniques of ventilation to reduce barotrauma to the immature lungs.

A Cochrane meta-analysis showed that antenatal corticosteroid therapy to women at risk of preterm delivery reduces the incidence of RDS, neonatal death, and intraventricular hemorrhage. [6]

Recent meta-analyses have confirmed that exogenous surfactant treatment decreases overall morbidity and mortality in preterm newborns with RDS. A study by Soll et al demonstrated that multiple doses of animal-derived surfactant extract provided greater improvement than single-dose therapy with regard to oxygenation and ventilatory requirements, reduced risk of pneumothorax, and improved survival.[5] Efforts are ongoing to identify the optimal delivery method and dosages. [4]

Central positive airway pressure (CPAP) is used as an adjunct therapy given after surfactant therapy and helps to prevent atelectasis and apnea.

Lahra et al found that maternal and fetal intrauterine inflammatory responses (chorioamnionitis and umbilical vasculitis) are protective for RDS. In this study, chorioamnionitis with umbilical vasculitis was found to provide a markedly greater reduction of RDS than the presence of chorioamnionitis alone.

Shake test

Shaketest					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	na	70	73.7	73.7	73.7
	negative	25	26.3	26.3	100.0
	Total	95	100.0	100.0	

The shake test negative in 25 cases (26.3%).

The gastric aspirate shake test (GST) was evaluated in 93 newborns with respiratory distress for predicting hyaline membrane disease (HMD) at GGH, Kurnool, India.

Methods: Over 0.5 ml of gastric fluid was obtained within 30 min of birth and mixed with an equal volume of normal saline for 10 sec; 1 ml of 95% ethanol was then added and the mixture agitated for 10 sec. After standing for 15 min, the air–liquid interface was examined for bubbles.

RESULTS:

Sex					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	F	65	46.4	46.4	46.4
	M	75	53.6	53.6	100.0
	Total	140	100.0	100.0	

In the study, 65 are female infants, 75 are male infants.

Maturity					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	FULLTERM (37-<42 Weeks)	45	32.1	32.1	32.1
	PRETERM (<37 Weeks)	95	67.9	67.9	100.0
	Total	140	100.0	100.0	

RR					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	113	1	1.1	1.1	1.1
	15	1	1.1	1.1	2.1
	23	1	1.1	1.1	3.2
	28	1	1.1	1.1	4.2
	42	1	1.1	1.1	5.3
	44	1	1.1	1.1	6.3
	46	1	1.1	1.1	7.4
	48	1	1.1	1.1	8.4
	50	2	2.1	2.1	10.5
	51	1	1.1	1.1	11.6
	56	1	1.1	1.1	12.6
	60	6	6.3	6.3	18.9
	62	7	7.4	7.4	26.3
	64	6	6.3	6.3	32.6
	65	2	2.1	2.1	34.7
	66	5	5.3	5.3	40.0
	68	10	10.5	10.5	50.5
	69	1	1.1	1.1	51.6
	70	7	7.4	7.4	58.9
	71	1	1.1	1.1	60.0
	72	3	3.2	3.2	63.2
	74	1	1.1	1.1	64.2
	75	1	1.1	1.1	65.3
	76	2	2.1	2.1	67.4
	78	4	4.2	4.2	71.6
	79	1	1.1	1.1	72.6
	80	4	4.2	4.2	76.8
	82	2	2.1	2.1	78.9
	84	1	1.1	1.1	80.0
	86	1	1.1	1.1	81.1
	90	1	1.1	1.1	82.1
	NA	17	17.9	17.9	100.0
	Total	95	100.0	100.0	

Resuscitation					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bag & Mask	5	5.3	5.3	5.3
	NA	21	22.1	22.1	27.4
	No	56	58.9	58.9	86.3
	Only Oxygen	5	5.3	5.3	91.6
	Tactile Stimulation	8	8.4	8.4	100.0
	Total	95	100.0	100.0	

In the study the bag & mask procedure was used in 5 cases, and normal airway in 21 cases. Only oxygen in 5 cases, and tactile stimulation in 8 cases.

Cause of Death					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable	33	34.7	34.7	34.7
	Prematurity (<28 weeks of Gestation)	8	8.4	8.4	43.2
	Respiratory Distress Syndrome	53	55.8	55.8	98.9
	Sepsis	1	1.1	1.1	100.0
	Total	95	100.0	100.0	

In the study, 53 cases suffered with respiratory distress syndrome

Crosstab								
			Resuscitation					Total
			Bag & Mask	NA	No	Only Oxygen	Tactile Stimulation	
Sex	F	Count	2	10	29	1	5	47
		% within Sex	4.3%	21.3%	61.7%	2.1%	10.6%	100.0%
	M	Count	3	11	27	4	3	48
		% within Sex	6.3%	22.9%	56.3%	8.3%	6.3%	100.0%
Total		Count	5	21	56	5	8	95
		% within Sex	5.3%	22.1%	58.9%	5.3%	8.4%	100.0%

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.609a	4	.625
Likelihood Ratio	2.743	4	.602
N of Valid Cases	95		

a. 6 cells (60.0%) have expected count less than 5. The minimum expected count is 2.47.

Crosstab							
			Cause of Death				Total
			Not Applicable	Prematurity (<28 weeks of Gestation)	Respiratory Distress Syndrome	Sepsis	
Sex	F	Count	14	3	29	1	47
		% within Sex	29.8%	6.4%	61.67%	2.1%	100.0%
	M	Count	19	5	24	0	48
		% within Sex	39.6%	10.4%	50.0%	0.0%	100.0%
Total		Count	33	8	53	1	95
		% within Sex	34.7%	8.4%	55.8%	1.1%	100.0%

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.719a	3	.437
Likelihood Ratio	3.114	3	.374
N of Valid Cases	95		
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is .49.			

All 14 infants with a negative GST developed HMD. None of the infants with other respiratory disorders, e.g. transient tachypnoea and pneumonia, had a negative GST. A negative GST had a specificity of 100%, sensitivity of 70% and positive predictive value of 100% for developing HMD.

CONCLUSION:

According to this study gastric shake test (GST) is a reliable test and is a simple procedure to identify those neonates who will develop respiratory distress syndrome (RDS) and therefore to decide prophylactic exogenous surfactant replacement.

In my study the prognosis is good in inborn infants by surfactant therapy.

If the out born infants were referred immediately to tertiary care the prognosis will be better.

SUMMARY:

A total of 1369 neonates were admitted during the study period at NICU of Government General Hospital at Kurnool. Of them 190 were diagnosed with RDS(HMD). 50% of the cases (95) with RDS were selected for the study. The incidence of RDS(HMD) is 13.9% in NICU of Kurnool General Hospital.

Majority of the study subjects was female(49.5%) and 50.5% were male. In the present study majority of thw atudy subjects were admitted because of prematurity(60%) ,followed by Respiratory Distress (rate>60 or GruntReatractions) (30.5%). Majority of the preterm were having a silverman score of 10 (68.4%), followed by 7 (20%) and 6(8.4%).

76% of the preterm were negative for shake test and 24% were positive for shake test. For 70 cases which were admitted from outside shake test was not done. Out of 95 cases , 62 died. The mortality rate of RDS in the present studyis 65.3%. in the present study majority of preterm who expired, 98.4% had Respiratory Distress Syndrome, followed by sepsis (1.6%).

CONCLUSION

The incidence of RDS is 13.9% in NICU of Kurnool General Hospital. 76% of the preterm were negative for shake test and 24% were positive for shale test. For 70 cases, which were admitted from outside, shake test was not done.

Of 90 cases, 62 cases died. The mortality rate of RDS in the present study is 65.3%. In the present study majority of the preterm who expired, 98.4% had Respiratory Distress syndrome,followed by sepsis.

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