



## The Radiological Spectrum Underlying Neonatal Respiratory Distress in a Large Tertiary Care Hospital- Role of the Chest And Abdomen Radiograph in the Emergency Room

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**ABSTRACT**

One of the few clinical manifestations of respiratory or non-respiratory illness in the newborn is respiratory distress. In such situations the simple, quickest and most of the time the only radiological investigation required is the plain x-ray of the chest and abdomen. The chest and abdomen x-rays of all newborn admissions with respiratory distress in one year in a large tertiary care hospital were analysed. The spectrum of radiological features were studied. 24% of x-rays had a positive diagnosis. The commonest etiological factor was respiratory infection.

**KEYWORDS**

newborns, respiratory distress, chest and abdomen x-ray.

The neonatal period is a crucial time when the child adjusts to earthly environment to lead an independent existence. Breathing is established and respiration takes over oxygenation. One of the few clinical manifestations of respiratory or non-respiratory illness in the newborn, is respiratory distress. Given the paucity of clinical features that could help in clinical assessment of a newborn, the immediate simple and quickest investigation is a plain x-ray of the chest and abdomen. It is here in the emergency room where the time factor is vital that the simple x-ray of the chest and abdomen would provide all necessary information for making a firm diagnosis. Though there are many studies of respiratory distress of the newborn there are very few recent studies and fewer studies looking into all the entities presenting with respiratory distress. There is no study of the diagnostic yield of plain x-ray in the newborn with respiratory distress. Ultrasound and computerized tomography may give supplemental information in a few instances, but can be reserved for a later date.

### Aim

The study aims at examining the radiological spectrum underlying the clinical symptom of respiratory distress in the newborn intensive care unit in a large tertiary care hospital in a metropolitan city, to know the common etiological factors of radiologically evident disease and to underline the role of the chest and abdomen radiograph in the emergency room.

### Materials and Methods:

All newborns admitted during the year 2015 (January to December) with respiratory distress had an x-ray taken.

The chest radiograph of a neonate consists of the chest and abdomen and the projection is antero-posterior. This has to be kept in mind while interpreting abnormalities. The child is placed supine on the table. Both the arms are elevated above the head and the humeral ends are always included. Immobilization of the child is by holding the hands above the head while the other hand of the attendant holds down the knees. The tube is at a distance of 3 feet. As a result of its antero-posterior position the heart appears more magnified on the AP radiograph. This coupled with the reduced film-tube distance calls for allowances when assessing cardiac size.

There are no air fluid levels and distribution of air and fluid in the pleural space is different from that in the erect film taken in adults. Fluid is seen as a density paralleling the lateral chest wall. New born films not taken in adequate inspiration may

be very misleading, the lung fields tend to look hazy and the heart appears enlarged. Assessing the degree of inspiration by counting the number of ribs visible above the diaphragm is of little practical worth. Inspection of a number of x rays can gradually evolve a mental prototype of the well aerated chest. Pitfalls to beware are skin folds and the pseudo hyperlucent lung due to rotation of the chest.

### Result

The present study is descriptive in nature where the radiological spectrum of respiratory distress was studied. The total number of admissions in the year were 3624. 3004 had respiratory distress.

### Discussion.

Respiratory distress was the largest symptom among our newborns requiring admission. 24% of patients had a specific diagnosis in the x-ray chest and abdomen (Table 1). 5% had a surgical cause (Fig 1). Respiratory infections were a leading cause of respiratory distress. The World Health Organization estimates that almost 750,000 neonatal deaths occur each year from pneumonias<sup>1</sup>. 55% of medical cases had bronchopneumonia and pneumonias in our study. 68.7% is the reported value 12 years ago in a similar setting<sup>2</sup> clearly reflecting changed and safer health practices. The radiological features consisted of fluffy air space opacities to segmental or lobar consolidation. The next most frequent condition was transient tachypnea of the newborn which formed a large proportion of patients (53%). According to a study by Santosh et al<sup>3</sup> TTN accounted for 46%, and RDS 31.5% but in their study respiratory infections are low at 26%. Hyaline membrane disease formed only a small share in our study like in the study by Kumar et al<sup>4</sup>. Heart disease constituted 32% of our cases. This large number may be due to our centre being a referral centre for heart surgery. Only 2% of children developed pneumothorax- both spontaneous and after assisted ventilation. Only 2 children required chest tube. In a study of air leaks with mechanical ventilation over a span of four years, 26% developed pneumothorax<sup>5</sup>.

Surgical diagnoses speeded up referral to the pediatric surgeon. All the surgical cases were taken up for surgery except the child with rhabdomyosarcoma. Loculated empyema was drained with the help of ultrasound.

### Conclusion

In this study 82% of newborn admissions had respiratory distress. 24% of them had a positive X ray. In others it helped

the clinician to rule out serious respiratory illness and concentrate on a search for other causes. While radiographs identified new findings they also were useful for follow up when changes in treatment were required. eg. Pneumonias unresponsive to simpler antibiotics or endotracheal tubes down into one bronchus .

It is concluded that chest radiographic studies are an important adjunct of care in critically ill newborns with respiratory distress and may identify potential problems before they are reflected in a change in clinical status. Ancillary studies such as ultrasound or computerized tomography may only be occasionally necessary. Further when every minute is precious, time consuming investigations delay treatment and increase mortality and morbidity. As Caffey<sup>6</sup> wrote "an x ray of the chest and abdomen is part of inspection – internal inspection." This is exceptionally true of the crying, gasping neonate. For the new born in the emergency room whose clinical condition is most labile, where time is crucial, the plain x- ray chest and abdomen provides the diagnosis quickly enabling appropriate therapy- be it medical or surgical.

**Results**

**Table 1**

ANALYSIS OF STATISTICS OF NEW BORNNS PRESENTING WITH RESPIRATORY DISTRESS DURING 2015 IN THE INSTITUE OF CHILD HEALTH AND HOSPITAL FOR CHILDREN CHENNAI

**Total number of newborn admissions:**

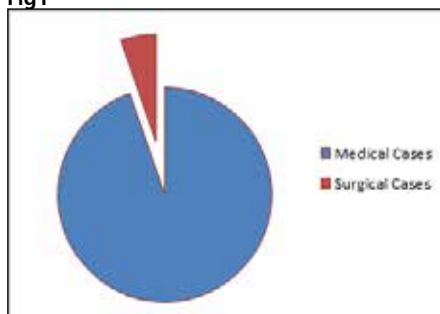
Medical 3098  
Surgical 529  
Respiratory cases 3007

1. Medical Cases		678
2. Respiratory distress syndrome	4	
3. TTN	53	
4. Pneumothorax and pneumomediastynem	20	
Respiratory Infections		
a. Bronchopneumonia	340	
b. Pneumonia	36	
c. Pyopneumothorax	6	
5. Congenital heart disease	219	
Surgical Cases		41
1. Diaphragmatic hernia	15	
2. Eventration	6	
3. Congenital lobar emphysema	2	
4. CCAM	1	
5. Mass (RMS Diaphragm and duplication cyst)	2	
6. Tracheo-esophageal fistula	15	
Total number of cases with a specific diagnosis (positive x ray chest and abdomen)		719
Percentage of cases with a specific diagnosis on xray chest and abdomen		24%

**Note:**

- 2 cases required ultrasonogram – RMS and loculated pleural fluid
- In others x ray chest and abdomen helped to exclude lower respiratory tract infection and search for non respiratory conditions causing respiratory distress

**Fig1**



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