

# RADIOGRAPHIC APPEARANCE OF ROUND PNEUMONIA IN CHILDREN

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## ABSTRACT

Round pneumonia is a disease of childhood. Chest x-ray is the first and inexpensive modality of its diagnosis however there are few articles in describing the radiographic appearance of this entity. So we evaluated chest x-ray of 24 cases with radiologically proved round pneumonia in our hospital in a period of 12 years. Age, sex, clinical and radiological findings of location, number of lesion are evaluated. According to this study mean age of patients was 4 years old (1 month - 11 years). 10 cases (42%) were female and 14 cases (58%) were male with male / female ratio of 1.4/1. Clinical symptoms were fever, chill, cough and shortness of breath in 23 cases and presenting as acute abdomen in one case. 22 cases (92%) revealed only one lesion and 2 cases (8%) had 2 and 3 lesions. Location of lesions were as follow, right upper lobe 37.5%, right lower lobe 37.5%, left lower lobe 12.5%, left upper lobe 8.3% and right upper and right lower lobe simultaneously 4.2%. conclusion: like other study most of round pneumonia occur under 8 years of age and all of them was under 12 years old. This pneumonia presented as solitary lesion which more common involvement of lower lobes.

**Keywords:** Round pneumonia, Children, Radiography.

## Introduction

Round pneumonia is a known pediatric disease which rarely involve adult cases.<sup>1,2,3,4,5,6,7,8</sup> Adult cases was rare and 31 cases were reported which only 2 of them were asymptomatic<sup>4</sup> prevalence of this disease is reported 1% by study.<sup>9</sup> However due to empiric antibiotic therapy in many situation without taking radiography and increased antibiotic therapy for lower respiratory tract infection, it seems to be more common and estimated to be 10%.<sup>9</sup> Most of children involved with this disease have mild symptoms however fever, chill and cough<sup>1,3,9</sup> may detected in some of them at presentation or with exact history taking may found one week before admission<sup>9</sup> and the first imaging modality in diagnosis of this entity is chest x-ray (CXR) however CT scan is used in suspicious cases to rule out other diagnosis or complications.<sup>1,3</sup> Radiographic

appearance of this disease may mimic other benign and malignant pulmonary diseases so accurate diagnosis is critical to prevent unnecessary thoracotomy or biopsy.

Round pneumonia is a well describing clinical entity but there are few documented study respective to radiological findings are available. So we try to retrospectively evaluating CXR findings of it in our hospital to find more common radiological aspects of this disease.

## Material and Methods

We retrospectively evaluated 24 clinico-radiologically proved cases of round pneumonia. According to our criteria patient with respiratory symptoms with fever who referred to our hospital which had round shape or oval shape appearance in their chest x-ray (CXR) were included in the study. Variables as age, sex, clinical findings, number and location of the lesions in chest x-ray were recorded. All data then analyzed by SPSS version 11.5 software.

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## Results

Our case had mean age of involvement of 4years (1month-11years) which is shown in Chart-1.

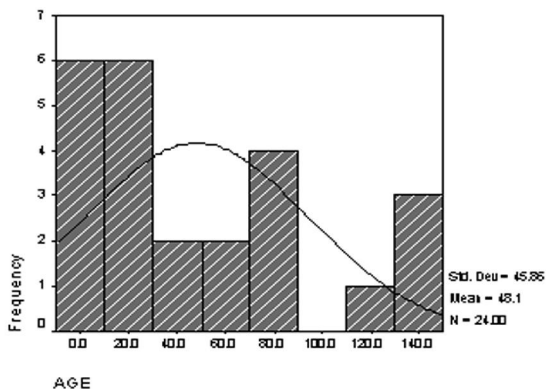


Chart-1: Frequency of patient age

Male/ female was 14/11(58% male and 42% female). 23 cases (95.8%) had symptoms of fever, chill and respiratory distress and one case (4.2%) revealed acute abdomen at presentation.

22 cases (91.7%) had one lesions and 2 cases (8.3%) had 2 and 3 lesions which both of them was under 5 years which was significant ( $p < 0.05$ ).

In 9 cases(37.5%) right upper lobe ,9 cases (37.5%) right lower lobe, 3 cases (12.5%) left lower lobe and 2 cases (8.3%) left upper lobe and in one case (4.2%) both right upper and lower lobe were involved. Right lung was more commonly involved and lower lobes were the more common site of involvement because 14 lesions(58.3%) lower lobes respective to (41.7%) upper lobe involvement was detected. On the other hand there was tendency in lower lobe involvement in children below 5 years respective to upper lobe involvement in children older than 5 years which was significant( $p < 0.045$ ) (Charts-2 & 3).

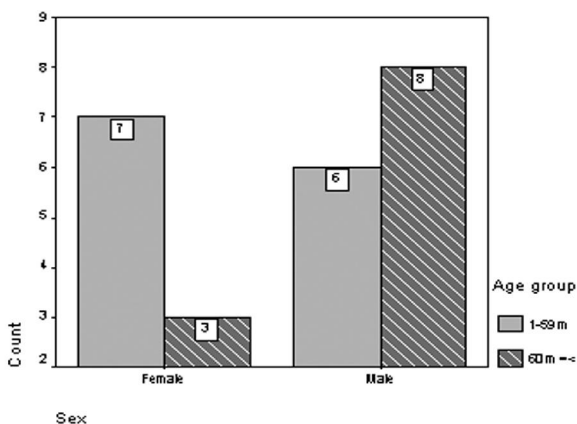


Chart-2: patient age and sex in the study group.

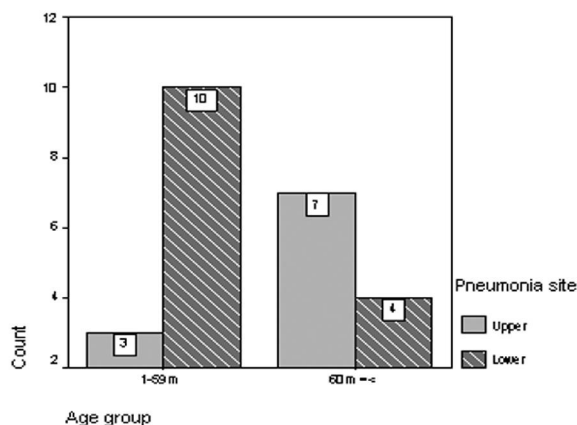


Chart-3: Location of pulmonary involvement according to age.

20 cases( 83.3%) had well defined- lobulated margins and 4 cases(16.7%) had irregular borders however no significant difference between age and lesion margin was noticed.

8 cases (33.3%) had complication of which cavitation (central necrosis) was noticed in 5 (21%) and pleural effusion in 3 cases (12.5%).

Duration of treatment was averagely 39 days and ranged between 16-120 days after admission. The duration of disease was longer with increased of age which was significant statistically ( $p < 0.05$ ).

## Discussion

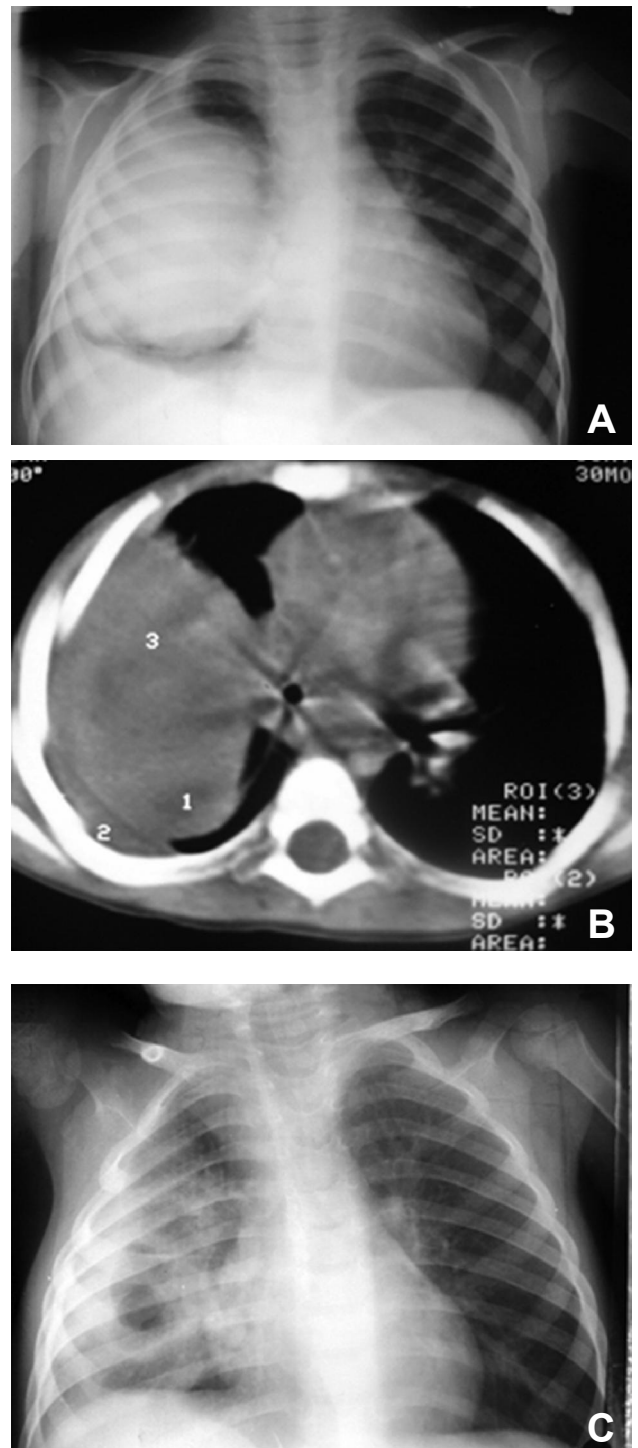
Chest x-ray finding of round pneumonia didn't need to be round opacity. Oval shape, well defined, lobulated and some times spiculated lesions may be detected in literatures<sup>9</sup> however in a case report by Katsumura<sup>8</sup> round pneumonia multiply distributed in one lung, the most appearance is a single pulmonary density. What is important is 2-3 cm mass appearing in 2-6 weeks with satellite lesion and if periphery, accompanying pleural involvement is diagnostic.<sup>9</sup> Most common pathogens of this entity is Streptococcus Pneumonia<sup>2,10</sup> however Klebsiella pneumonia<sup>2,10,11</sup> Haemophilus Influenza,<sup>12</sup> Mycobacterium Tuberculosis,<sup>5,10,11</sup> fungal and atypical agents such as Chlamydia Psitacci and Coxiella Burnettii (Rickettsiae), and viral agents such as Corona virus are also reported.<sup>10</sup> Also 8 cases with SARS were found having round pneumonic infiltration by Wan et al.<sup>13</sup> However we had no blood culture of our cases so had no proved pathologic organism.

We found mean age of our cases 4 years. In study by Kim et al in 2007 the mean age was 5 years<sup>3</sup> and in the study by Rose et al in 1993<sup>2</sup> and Kosut<sup>14</sup> in 2006 the mean age was 3/3 years. In our study 83% was under 8 years and all of them was under 12 years old. In study by Kim<sup>3</sup> 75% cases was under 8 years and 90% was under 12 years. In some study round pneumonia above 8 years old is very rare<sup>1,15</sup> because in small children collateral pathways (channels of Lambert and pores of Kohn) are not developed and alveoli are smaller with firm connective tissues exudates accumulated and cause rounded opacity which is more common in child than adult.<sup>1,4,15,16,17</sup> There is also less common satellite lesion in childhood round pneumonia respective to adult.<sup>9</sup> This is mainly due to under-developed channel of Lambert and pores of Kohn in children.<sup>1</sup>

In our research round pneumonia presented mainly as solitary pulmonary lesion (91.7%) and only 2 cases (8.3%) had multiple lesions which was the same that by Kim<sup>3</sup> revealed single lesion in 98% and multiple lesion in 2% and Miyake<sup>18</sup> and Durning<sup>19</sup> which revealed single lesions in 91% of their cases. Complication in our cases as shown in Fig-1 were pleural effusion (12.5%) and necrosis (16.7%) which is shown in Table-1. No difference between sexes was seen however complication was slightly commoner in children below 5 years old.

Pulmonary location of lesions was most common in lower lobes (58.3%) as shown in Fig-2 and then in upper lobes(41.7%) which was the same as study by Kim<sup>3</sup> which was 69/109 (63/3%) involvement of lower lobes. However, in this study segmental localization of lesions was also evaluated and more common location was in posterior segments. We had no lateral CXR so segmental locations was not evaluated. Most articles like our work revealed the predilection of lower lobe involvement in this disease<sup>3,15</sup> this seem due to gravity effects which accumulate thick fluid containing bacteria and debris in the lower zones and formation of this entity.

Follow up in our cases were done and all of them were resolved with antibiotic therapy. Mean time of treatment was 39 days ranging from 16-120 days. Older child had longer therapy course which was significant (P<0.05).



**Figure 1:** (A-C): CXRs and CT scan of a 2-year-old child with fever, cough and respiratory symptoms; (A) CXR at presentation reveals well defined round lesion in right hemithorax with accompanying pleural effusion. (B) CT scan at the same time reveals soft tissue density with pleural effusion. Round pneumonia is suggested. (C) follow up CXR 24 days after antibiotic therapy reveals partially resolution of the lesion with central necrosis. Complete resolution was achieved 38 cays after treatment (not shown).



**Figure 2:** A 3-year-old boy with cough and mild fever for 11 days which was round pneumonia; (A) CXR on admission reveals a round opacity behind heart in left lower lobe. (B) CXR 24 days after antibiotic therapy reveals complete resolution.

Age group			Sex			Lesion's count			location			complication		
number	percent		number	percent		number	percent		number	percent		number	percent	
<5Y	13	54.2	F	10	41.7	1	22	91.7	RUL	9	37.5	Pleural effusion	3	12.5
									RUL & LLL	1	4.2			
<5Y	11	45.9	M	14	58.3	2	1	41.5	RLL	9	37.5	Pleural effusion & necrosis	1	4.2
									LLL	3	12.5			
						3	1	4.15	LUL	2	8.3	Non	16	66.6

Abbreviations:: Y=year, F=female, M= male, RUL= right upper lobe, LUL= left upper lobe, LLL=left lower lobe, RLL= right lower lobe.

Table-1: This table represents radiographic location and number of lesions according to age, sex with complications.

## Conclusion

Like other studies round pneumonia mainly involves children and mostly present as single well defined pulmonary lesions on CXR. Other single pulmonary nodule is in differential diagnosis however clinical symptoms and history of respiratory infections, Antibiotic therapy and follow up of the lesion on CXR can help in accurate diagnosis with no need for biopsy or thoracotomy.

## References

1. Kirks DR. Practical pediatric imaging: diagnostic radiology of infants and children, 3rd ed. Lippincott-Raven, Philadelphia, 1998; 639–42.
2. Rose RW, Ward BH. Spherical pneumonias in children simulating pulmonary and mediastinal masses. Radiology1973; **106**:179–82

3. Kim YW, Donnelly LF. Round pneumonia .Imaging finding in a large series of children. *Pediatric Radiology* 2007;**37(12)**:1235-40
4. Camargo JJP, Camargo SM, Machuca TN, Perin FA.Round a pneumonia: rare condition mimicking bronchogenic carcinoma. Case report and review of the literature. *Sao Paulo Med. J.*2008; **126(4)**.
5. Greenfield H, Gyepes MT. Oval-shaped consolidations simulating new growth of the lung. *Am J Roentgenol Radium Ther Nucl Med.* 1964;**91**:125-31.
6. Correa A, Starke J. Infections of the lower respiratory tract in children. In: Niederman MS, Sarosi GA, Glassroth J, editors. *Respiratory infections*. 2nd ed. Baltimore: Lippincott Williams & Wilkins, 2001. p. 155-70.
7. Eggli KD, Newman B. Nodules, masses, and pseudo masses in the pediatric lung. *Radiol Clin North Am* 1993; **31**: 651-66.
8. Y. Katsumura, K. Shirakami, S. Satoh. Pneumococcal spherical pneumonia multiply distributed in one lung *Eur Respir J.* 1997; **10**: 2423-4.
9. Wagner AL, Szabunio M, Hazlett KS, Wagner SG. Radiologic manifestations of round pneumonia in adults. *Am J Roentgenol* 1998; **170**: 723-6.
10. Celebi S, Hacimustafaoglu M. Round Pneumonia in Children. *Indian Journal of Pediatrics*, 2008; **75(5)**: 523-5.
11. Fraser RG, Wortzman G. Acute pneumococcal lobar pneumonia: the significance of non-segmental distribution. *J Can Assoc Radiol* 1959; **10**: 37-46.
12. Sproul JM. Spherical pneumonia due to *Hemophilus influenzae*: a definitive study by transtracheal aspiration. *Am Rev Respir Dis* 1969; **100**: 67-9.
13. Wan YL, Kuo HP, Tsai YH, et al. Eight cases of severe acute respiratory syndrome presenting as round pneumonia. *AJR Am J Roentgenol.* 2004;**182(6)**:1567-70.
14. Kosut JS, Kamani NR, Jantausch BA. one month old infant with multilobar round pneumonias. *Pediatr Infect Dis J* 2006; **25**:95-7
15. McLennan MK. Radiology rounds. Round pneumonia. *Can Fam Physician* 1998; **44**: 751-75.
16. Zinkernagel AS, Schaffner A, Himmelman A. Photo quiz. Round pneumonia due to *Streptococcus pneumoniae*. *Clin Infect Dis.* 2001;**32(8)**:1188, 1233-4.
17. Soubani AO, Epstein SK. Life-threatening round pneumonia. *Am J Emerg Med* 1996; **14**: 189-91.
18. Miyake H, Kaku A, Okino Y et al Clinical manifestations and chest radiographic and CT findings of round pneumonia in adults. *Nippon Igaku Hoshasen Gakkai Zasshi* 1999;**59**:448-51.
19. Durning SJ, Sweet JM,Chambers SL. Pulmonary mass in tachypneic, febrile adult. *Chest.* 2003;**124**: 372-5.