

Original Research Article

Radiographic aspects of acute community-acquired bacterial pneumonia and pulmonary tuberculosis in children

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ABSTRACT

Background: The etiological diagnosis of pneumonia is often difficult because of the impossibility of microbiological confirmation most of the time. Therefore, chest X-ray is still essential for a positive diagnosis and etiological orientation. The main objective of our study was to describe the radiographic aspects of acute community-acquired pneumonia and tubercular pneumonia in children.

Methods: This was a descriptive retrospective study conducted at the university hospital mother and child of Tsaralalana from January 1st to July 31st, 2017.

Results: Sixty-nine cases of pneumonia were included, including 13 cases of TB pneumonia and 46 cases of acute community-acquired pneumonia. The average age was 36.68 months with a male predominance. Clinically, respiratory functional signs predominated in both cases. Alteration in general condition was mainly observed in tubercular pneumonia (26.08%). Alveolar syndromes were present in 43.47% of TB pneumonias and 36.94% of acute community-acquired pneumonia. With regard to the radiographic images, alveolar involvement was common to both types of pneumonia; the nodular image was present in 8.69% of the tubercular pneumonias and 2.17% of the acute community-acquired pneumonia; the cavity image was present only in the tubercular pneumonia ($p=0.04$); the right-sided location predominated in both cases.

Conclusions: X-ray images were common to both TB pneumonia and acute community-acquired pneumonia; some images were specific to TB pneumonia. However, the etiologic orientation of pneumonia is based on a combination of epidemiologic, clinical, and radiographic evidence.

Keywords: Child, Bacterial pneumonia, Radiography, Pulmonary tuberculosis

INTRODUCTION

Pneumonia is an infectious disease of the lung parenchyma, of bacterial, viral or tubercular origin. It is a common pathology in pediatrics, particularly in sub-Saharan Africa, where it is a frequent reason for hospitalization.¹⁻³ The positive diagnosis of pneumonia is often easy in its typical form.

However, its etiological diagnosis remains difficult in the absence of biological and microbiological guidance, which is not always available or accessible. As a result, chest radiography remains essential in the positive diagnosis and etiological orientation of pneumonia; the radio-clinical elements play an important role as they constitute the essential basis of management.

Thus, the main objective of this study was to describe the radiographic aspects of acute community acquired pneumonia and tubercular pneumonia in children and secondarily to describe the clinical aspects in order to improve their management.

METHODS

This was a descriptive retrospective study carried out at the university hospital mother and child of Tsaralalana from January 1st to July 31, 2017.

We recruited children aged 0 to 15 years admitted to the department with a diagnosis of acute community bacterial pneumonia and pulmonary tuberculosis (positive and negative microscopy).

We excluded patients with incomplete medical records or with nosocomial pneumonia.

Data was collected from registers and medical records.

The following variables were considered in this study: age, gender, clinical signs and radiographic signs.

The interpretation of the radiographic images of the thorax was performed by a radiologist.

Statistical analysis

The Epi info 6 software was the data analysis method and the Chi-square test was used for the study of radiographic signs with a significant test for a value of p<0.05.

RESULTS

Frequency

Sixty-nine cases of pneumonia were identified during the study period, including 23 cases of TB pneumonia and 46 cases of acute community-acquired pneumonia, representing 4.5% of admissions during the study period.

Demographic aspects

The average age was 36.68 months; the minimum age was 1.5 months and the maximum age was 168 months. A male dominance (57.17%) was noted with a sex ratio equal to 1.37.

Table 1: Breakdown per respiratory functional signs.

Signs	Acute community-acquired pneumonia, n=46 (%)	Pulmonary tuberculosis, n=23 (%)
Cough	37 (80.43)	16 (69.56)
Dyspnoea	2 (4.34)	2 (8.69)
Chest or abdominal pain	1 (2.17)	1 (4.34)

Table 2: Breakdown per physical signs.

Signs	PAC, n=46 (%)	Pulmonary tuberculosis, n=23 (%)
Localized crackles	15 (32.60)	10 (43.47)
Condensation syndrome	2 (4.34)	0
Tubular murmur	1 (2.17)	0
Associated bronchial crackles	13 (28.26)	9 (39.13)
Associated pleural fluid syndrome	3 (6.53)	1 (4.34)
Normal auscultation	31 (67.39)	3 (13.04)



Figure 1: Miliary tuberculosis.

Clinical aspects

Respiratory signs were present in both cases dominated by coughing (acute community-acquired pneumonia: 80.43%; TB pneumonia: 69.56%); dyspnea and chest pain were much less frequent (Table 1).

Altered general condition predominated in TB pneumonia (26.08%).

Associated extra respiratory signs were mainly digestive (vomiting, diarrhea, abdominal pain), neurological (seizure) and ENT (ear infection).

On physical examination, localized crackles were the main signs of pulmonary auscultation in both cases.

The other signs (condensation syndrome, tubal murmur, pleural fluid syndrome, associated bronchial crackles) were less frequent.

Nevertheless, pulmonary auscultation was normal in 67.39% of the acute community-acquired pneumonia; and in 13.04% of TB pneumonias (Table 2).

Radiographic aspects

Alveolar patterns were common to both TB pneumonia (82.6%) and acute community-acquired pneumonia (97.82%); nodular patterns were present in 8.69% of TB pneumonia and 2.17% of acute community-acquired pneumonia.

Cavity and miliary images (Figure 1) were present only in TB pneumonia with a significant difference ($p=0.04$) (Table 3).

Table 3: Breakdown by radiographic aspects.

Images	Acute community-acquired pneumonia, n=46 (%)	Pulmonary tuberculosis, n=33 (%)
Alveolar opacities		
Systematized	19 (41.30)	9 (39.13)
Not systematized	26 (56.52)	10 (43.47)
Associated bronchial opacities	36 (78.26)	9 (39.13)
Interstitial opacities	0	0
Nodules	1 (2.17)	2 (8.69)
Cavities	0	1 (4.34)
Miliary	0	2 (8.68)
Associated crying	3 (6.52)	0

Table 4: Distribution by radiographic topography of pneumopathies.

Topography	PAC (%)	Pulmonary tuberculosis (%)
Right lung	37 (80.43)	17 (73.91)
Upper lobe	10	6
Medium lobe	20	8
Lower lobe	2	0
Upper and middle lobes	5	3
Lower lobe	-	-
Left lung	6 (13.04)	4 (17.39)
Upper lobe	4	1
Lower lobe	2	3
Bilateral	3 (6.52)	2 (8.69)

The location of lesions was on the right in the majority of cases (CAP 80.43%, TB pneumonia 73.91%) (Table 4).

DISCUSSION

Childhood pneumonia is common in all countries and is responsible for significant mortality in developing countries.³

Acute community-acquired pneumonia and TB pneumonia accounted for 4.5% of admissions in this study: this frequency is slightly lower than that found by other authors.

Vierin et al found a 10.9% incidence of pneumonia in a study conducted in a pediatric ward in Libreville from July 1st 2012 to June 30th 2013.⁴

In a study conducted in Bamako from September 1998 to May 2000 by Kayantao et al, the incidence of pneumonia was 8.28%.⁵

This difference can be explained by the small sample size and the shorter duration of this study.

The average age of the patients was 36.68 months. This is almost similar to what was found in children with acute infectious lung disease in a study in Libreville where the average age of the children was 33 months.⁴ In contrast, in Côte d'Ivoire in a study of acute infant pneumonia from November 2008 to October 2010 the average age of children was 9 months.⁶

This age difference is due to the fact that the Ivorian study only included infants between 1 and 24 months of age.

Acute childhood pneumonia most often affects boys.^{1,7} In this study, a male predominance was noted with a sex ratio of 1.37.

This finding is similar to what was reported in the Ivorian study (sex ratio=1.2).⁶ The same is true in Togo where the sex ratio was 1.3 and in Libreville (sex ratio=2).³

In terms of clinical signs, cough was the main sign of respiratory call (CAP 80.43%, TB pneumonia 69.56%).

This result is similar to what was observed in Libreville where cough represented 87.5% of the reasons for consultation.⁴

In a study in Bamako, cough was also one of the main functional signs; in fact, cough and fever are frequent warning signs of pneumonia.

Other respiratory signs (dyspnea and chest pain) were present in this study but much less frequent. This was also the case in other studies.^{4,8}

An altered general condition was noted in both patient groups, with a much higher frequency in children with pulmonary tuberculosis.

In Mali, the same finding was reported: the altered general condition was present in 71.2% of bacterial pneumopathies.⁵

Extra respiratory signs can be observed in children with pneumopathy; in this study, they were dominated by digestive signs, which are signs frequently associated with respiratory signs.

Convulsion was the main neurological sign found and an associated case of otitis media was also noted.

In the Malian study, digestive disorders were the main extra respiratory signs found.⁵

Pulmonary auscultation was normal in 67.39% of acute community-acquired pneumonia and 13.04% of TB pneumonias.

Kayantao et al in their studies also reported 5 cases of pneumopathies where pulmonary auscultation was normal.⁵

This confirms that the absence of auscultatory abnormalities does not exclude presence of pneumopathy.

Localized crackles were the main signs of pulmonary auscultation in this study; they are classic physical signs of pneumopathy.

Some authors have reported that the condensation syndrome was found in almost all patients contrary to what was found in the present study.⁵

With regard to radiographic signs, the abnormalities consisted of alveolar opacities in most patients, both for acute community-acquired pneumonia (97.2%) and pulmonary tuberculosis (82.6%). The same result was reported by Kouamé et al in a study conducted in Ivory Coast on the contribution of chest radiography in the etiological investigation and early management of acute infant pneumonia.⁶ In the study conducted by Kayantao et al, alveolar opacities also constituted the majority (93.9%) of radiological abnormalities during pneumopathies.⁵

Associated bronchial opacities are usually the second most common radiographic abnormality in pneumopathies.⁵ In the present study, these bronchoalveolar opacities accounted for 78.26% of the acute community-acquired pneumonia abnormalities and 39.13% of TB pneumonia. This finding has also been reported by other authors.⁵

In Burundi, Nikoyagze et al highlighted broncho pneumopathies and then lobar pneumopathies in order of frequency.⁹ The same was true in Togo, where broncho pneumopathies were the most frequent radio-clinical forms of acute pneumonia in infants.²

In addition, 3 cases of associated pleurisy were noted only in acute community-acquired pneumonia in this study. In Ivory Coast, pleuro-pneumopathies were found in 13.3% of cases in infants less than two years old.⁵

Cavity and miliary images were respectively observed in 1 and 2 cases of pulmonary tuberculosis with a significant difference ($p=0.046$). Indeed, both types of radiographic abnormalities are more specific for pulmonary tuberculosis.¹⁰⁻¹²

The majority of these radiographic abnormalities were located on the right (acute community-acquired pneumonia: 80.43%, pulmonary tuberculosis: 73.91%); only 13.04% (acute community-acquired pneumonia) and 17.39% (pulmonary tuberculosis) were in the left lung and bilateral involvement was much less frequent. This result is consistent with that described in the literature.^{4,5,13}

Limitations

This is a retrospective study: the data are often incomplete. Furthermore; it is a single-center study with a small sample size: thus, the results are not representative of the entire pediatric population.

CONCLUSION

In practice, no clinical signs are specific to any one type of pneumonia; according to the results of this study, radiographic images were common to acute community-acquired pneumonia and TB pneumonia but cavity and miliary images were more in favor of TB pneumonia.

However, the etiological orientation of pneumonia is based on a combination of epidemiological, clinical, and radiographic arguments.

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