Scientific Research Publishing

Open Journal of Pediatrics, 2023, 13, 663-668
https://www.scirp.org/journal/ojped
ISSN Online: 2160-8776
ISSN Print: 2160-8741

Pneumothorax in Children: Epidemiological Diagnostic and Evolutionary Aspects at the Albert Royer National Children's Hospital in Dakar

Guillaye Diagne*, Khadim Bop, Papa Souleye Sow, Mohamed Mbodj, Serigne Tawa Ndiaye, Idrissa Demba Ba

Department of Pediatric Pulmonology, Albert Royer National Children's Hospital of Dakar, Dakar, Senegal
Email: *drgdiagne88@gmail.com

How to cite this paper: Diagne, G., Bop, K., Sow, P.S., Mbodj, M., Ndiaye, S.T. and Ba, I.D. (2023) Pneumothorax in Children: Epidemiological Diagnostic and Evolutionary Aspects at the Albert Royer National Children's Hospital in Dakar. *Open Journal of Pediatrics*, **13**, 663-668.
https://doi.org/10.4236/ojped.2023.135074

Received: August 5, 2023
Accepted: September 11, 2023
Published: September 14, 2023

Abstract

Pneumothorax is defined by the presence of air between the parietal pleura and the visceral pleura. Most of the child's pneumothorax is traumatic. The spontaneous pneumothorax (PS) of the child is rare, and often associated with a favoring factor. When it is large, it can affect the life expectancy. The objective of our study was to determine the epidemiological, diagnostic and evolutionary aspects of pneumothorax in children aged 0 to 15 years, hospitalized at the Albert Royer National Children's Hospital in Dakar. This is a retrospective descriptive study of patient records followed at the Albert Royer National Children's Hospital (CHNEAR) for the management of a pneumothorax during the period from 2020 to 2022. During our study, 15 patients were hospitalized for pneumothorax, with an average annual incidence of 7.5 cases per year. The sex ratio (H/F) was 2.03. The average age was 3.7 years. Chest pain was present in 27% of patients, dyspnea was found in 93%, and cough in 87% of patients. All patients underwent chest radiography and the location of the pneumothorax was predominant on the right in 60% of cases. Thoracic drainage was performed in 93.3% of patients associated with etiological treatment. The average length of hospitalization was 27.8 days with a cure rate of 86.7% and a recurrence rate of 13.3%.

Keywords

Pneumothorax, Drainage, Children, Dakar

1. Introduction

Pneumothorax is the presence of air in the pleural space. There are three types of

pneumothorax: spontaneous, traumatic and iatrogenic [1]. Spontaneous pneumothorax is said to be primary when no underlying pathology is associated with it however secondary spontaneous pneumothorax occurs in people with pulmonary pathology (Chronic obstructive bronchitis, Tuberculosis, Asthma, cystic fibrosis, emphysema). In England, the overall incidence of emergency hospitalizations for pneumothorax of 16.7 per 100,000 each year [2] all ages combined. In Mali, the frequency of pneumothorax was 1.28% [3] in 1991 and 1.93% in 2001 [4]. In Senegal, a study reported a prevalence of 6.93% of pneumothorax in a population of 1053 hospitalized patients in 2011 [5]. The diagnosis of pneumothorax is usually made by performing a chest X-ray that may show avascular hyperclarity between the two pleural leaflets [6]. In some cases, the chest scanner remains the key element to confirm the diagnosis. The different therapeutic methods of pneumothorax are mainly represented by conventional chest drainage, manual needle exsufflation, the installation of low-caliber drains and more invasive methods: thoracoscopy video and pleural surgery. In sub-Saharan Africa, data from the literature on pneumothorax are scarce and there are few studies on pneumothorax in children in Senegal. The general objective of our study was to determine the diagnostic and evolutionary epidemiological aspects of pneumothorax in children aged 0 to 15 from 2020 to 2022. The specific objectives were to determine the frequency of pneumothorax in children but also to determine the etiologies in our contexts.

2. Methodology

This is a retrospective, descriptive study, including all patients from 0 to 15 years hospitalized at CHNEAR during the period of our study. We included all children aged 0 to 15 years hospitalized for pneumothorax whatever its origin. All unusable medical records were excluded from the study. Data were collected from patients' medical records through a pre-established survey. We studied sociodemographic, clinical, paraclinical and evolutionary data. Data entry and analysis was done using Excel 2016 software. In the descriptive analysis, the qualitative variables were described by frequency tables, bar charts and pie charts. The quantitative variables were described by their parameters of position (mean, median) and dispersion (standard deviation, extremes).

3. Results

During the 2 years of our study, 15 patients were hospitalized for pneumothorax or an average annual incidence of 7.5 cases per year.

The sex ratio was 2.03. **Figure 1** shows the distribution by sex.

The average age was 3.75. **Figure 2** shows the age distribution.

The vaccination status of patients was up to date in 93.3% of patients only one patient had an incomplete vaccination status. Severe acute malnutrition was confirmed in 1 patient ie 6.7% of cases, 93.3% had a good nutritional status. Heart disease was found in 3 patients and asthma in one patient.

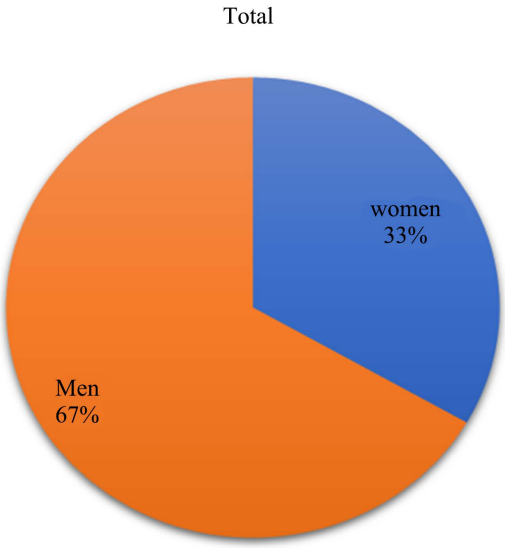

Figure 1. Distribution of patients by sex.

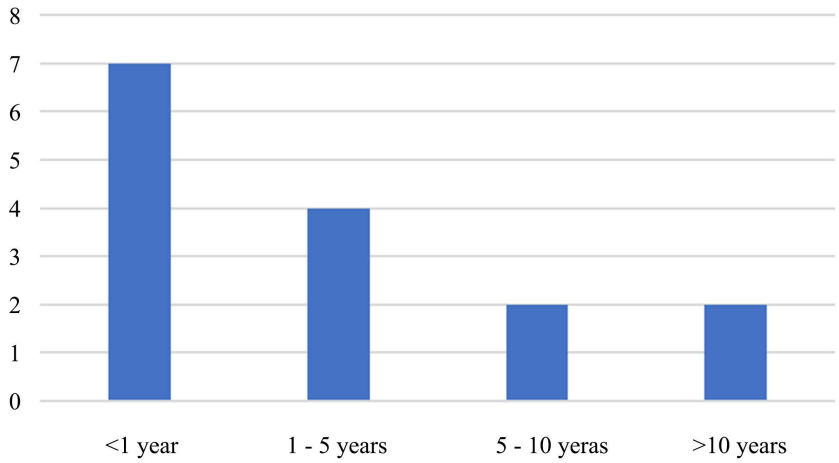

Figure 2. Age distribution of patients.

Fever and dyspnea were present in 93% of patients either (n = 14) and cough was present in 87% of patients. Chest pain was found in 27% of patients.

Figure 3 shows the distribution by functional signs.

On physical examination, polypnea was present in 9 patients or 60% and subcutaneous emphysema was present in 2 patients 13.3%. Table 1 shows the distribution by physical examination results.

Radiography of the chest was performed in all patients and found a pneumothorax in all patients including 9 located in the right lung. Table 2 shows the distribution of children according to the results of chest radiography.

Thoracic CT was performed in 40% of children for etiological research.

A post-infectious etiology was found in 10 patients (67%). Staphylococcus was the most frequently found germ.

The following Figure 4 shows the distribution according to the etiologies of the pneumothorax.

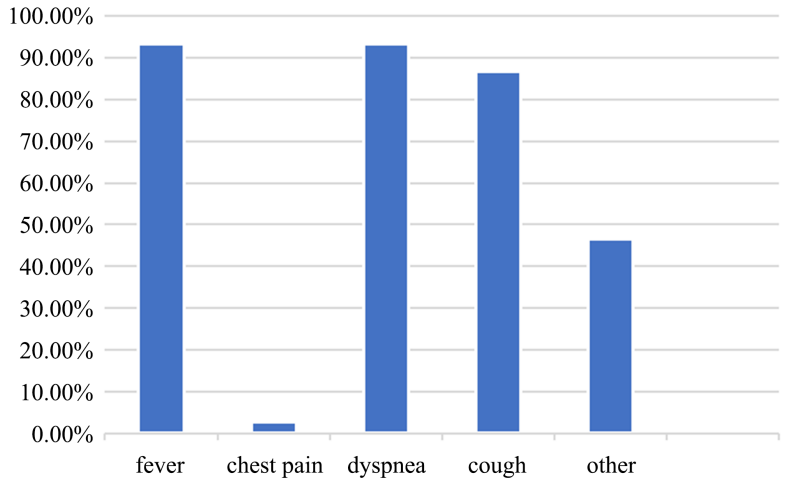

Figure 3. Distribution of children by functional signs.

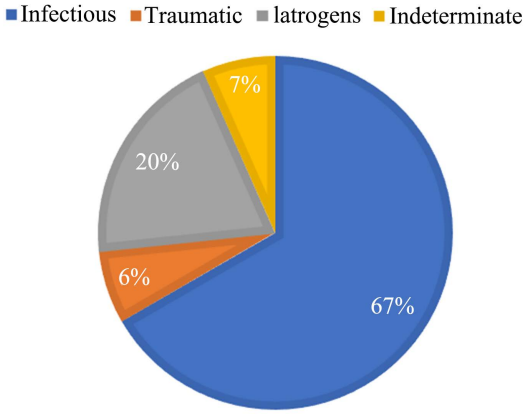

Figure 4. Distribution by causes of pneumothorax.

Table 1. Distribution of children by physical examination results.

Physical signs	Headcount n = 15	Percentage %
Decreased vocal vibrations	4	26.7
Increased vocal vibrations	1	6.7
Tympanisme	3	20
Matite	3	20
Diminished vesicular murmurs	10	66.7
Vesicular murmurs abolished	1	6.7
Crackling rails	7	46.7
Wheezing	4	26.7
Ronchis	3	20.0
Subcutaneous emphysema	2	13.3
Polypnoea	9	60.0

Table 2. Distribution of children according to chest X-ray results.

Result of the X-ray	Headcount n = 15	Percentage 100%
Pyo pneumothorax	9	60
Hydro pneumothorax	4	26.6
Pneumothorax + pneumo-mediastinum	1	6.7
Partial pneumothorax	1	6.7

Drainage was performed in 14 patients or 93.3% and 1 patient had benefited from clinical surveillance without invasive procedure.

The cure rate was 86.7% either (n = 13) with a recurrence rate of 13.3% or (n = 2).

4. Discussion

We found a sex ratio of 2.03. Kuaban C., *et al.* [4] finds a sex-ratio of 4.5 in favor of men that could be explained by the fact that young boys are more active and more exposed to trauma.

The age group under 1 year was the most represented in our study is 47% with an average age of 3.75. This could be explained by the fact that staphylococcus infections can be the cause of the formation of bubbles in the parenchyma that can rupture and give a pneumothorax.

This can also be explained by the vulnerability of this age group as well as the frequency of iatrogenic accidents during pleural punctures without ultrasound guidance in our contexts.

Chest pain was found in 27% of patients in our study; dyspnea (93%). Chest pain remains the most constant sign, in 69% to 90% of cases followed by dyspnea observed in 38% to 80% of cases [7]. These two signs can testify to the importance of pneumothorax. The more severe the dyspnea, the more severe the pneumothorax may be. Looking for signs of compression of the heart chambers is necessary before a large pneumothorax.

For the radiologically, we found a predominance on the right side of the lung (60% of cases). In the literature, 54% to 67% of the child's pneumothorax occurs on the left side [8]. Pneumothorax can interest both lung fields without significant predominance.

Secondary spontaneous pneumothorax (66.6%) predominated over primitive spontaneous forms (6.7%). This result differs from that of Lissac [9], who found respectively 28.4% for primitive forms and 17.6% for secondary forms. Traumatic pneumothorax accounted for 6.7% of pneumothorax.

Of fortuitous discovery, iatrogenic pneumothorax was found in a proportion of 20% of cases. Pleural puncture by poorly trained personnel was the main cause [9]. A scout ultrasound before pleural puncture in the patient's bed can significantly reduce the occurrence of a pneumothorax. This device must be

available in all emergency departments to reduce the risk of iatrogenic pneumothorax.

The retrospective nature of our study is a limitation of our study. Several incomplete files were excluded from the study.

5. Conclusion

The pneumothorax is not a reason for frequent consultation in children at the Albert Royer National Children's Hospital in Dakar but can quickly trigger the vital prognosis. Performing an ultrasound before pleural puncture can risk pneumothorax.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Contou, D., Razazi, K., Katsahian, S., *et al.* (2012) Small-Bore Catheter versus Chest Tube Drainage for Pneumothorax. *The American Journal of Emergency Medicine*, **30**, 1407-1413. https://doi.org/10.1016/j.ajem.2011.10.014

[2] Gupta, D., Hansell, A., Nichols, T., *et al.* (2000) Epidemiology of Pneumothorax in England. *Chest*, **55**, 666-671. https://doi.org/10.1136/thorax.55.8.666

[3] Mukhir, H., Zaghba, N., Benjelloun, H., Bakhatar, A. and Yassine, N. (2016) Treatment of the First Episodes of Spontaneous Pneumothorax. *Respiratory Diseases Review*, **33**, 789-793. https://doi.org/10.1016/j.rmr.2015.11.015

[4] Kuaban, C., Lekama, A.T. and Hagbe, P. (1997) Spontaneous Adult Pneumothorax in Yaoundé (Cameroon): A Retrospective Study of Eighty and One Case. *La Semaine des Hopitaux de Paris*, 73.

[5] Mbatchou, B., Ngahane, H., Dia, K., *et al.* (2010) Etiologies of Spontaneous Pneumothorax in Senegal: Prospective Study at the University Hospital of Fann-Dakar. *Médecine Tropicale*, **70**, 505-508.

[6] Guerin, J.C. (1997) Spontaneous Pneumothorax. *La Revue du Praticien* (*Paris*), **47**, 1320-1325.

[7] Tschopp, J.-M., Bintclefe, O., Astoul, P., *et al.* (2015) ERS Task Force Statement: Diagnosis and Treatment of Primary Spontaneous Pneumothorax. *European Respiratory Journal*, **46**, 321-335. https://doi.org/10.1183/09031936.00219214

[8] Robinson, P.D., Cooper, P. and Ranganathan, S.C. (2009) Evidence-Based Management of Paediatric Primary Spontaneous Pneumothorax. *Paediatric Respiratory Reviews*, **10**, 110-117. https://doi.org/10.1016/j.prrv.2008.12.003

[9] Lissac, J., Larcan, A., Charpin, J., Maurice, P., Euzebyj, G.M. and Chretien, J. (1994) Spontaneous and Iatrogenic Pneumothorax in Adults: About 217 Personal Cases. *Bulletin of the National Academy of Medicine*, **2**, 213-225.