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Computed Tomography Findings and Clinico-Epidemiological Aspects of COVID-19 Pneumonia at CHME Luxembourg in Bamako (Mali)

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Abstract

Objective: To describe the CT findings and clinico-epidemiological aspects of coronavirus pulmonary lesions at the Radiology Department of Mother-Child Luxembourg's Hospital in Bamako, West Africa. **Materials and Method:** This was a cross-sectional descriptive study over a period of three months (November 2020-January 2021). The study involved all patients with a clinical suspicion of COVID-19 or confirmed cases with suggestive CT scan lesions during this period. No patients without suggestive CT lesions were not included. The variables were age, sex, clinical data, lungs lesions on CT scan and their severity. **Results:** Out of 202 patients enlisted, the age group 52 - 63 years was more frequent (30.2%), *i.e.* an average age of 60.43 years (range 23 and 95 years). Men represented 56.4% or a sex ratio of 1.3. Cough was the most common clinical manifestations (26.7%). Major findings were mixed appearance of the lung lesions (45.5%). The peripheral distribution was 57.4% and the bilateral topography was 98%. These lesions were extensive in the majority of our patients with 28.2%. **Conclusion:** Older people dominated the socio-demographic profile of our series with a predominance of men. Cough was the most observed clinical information. Mixed lesions with peripheral and bilateral distribution dominated the semiological tomodensitometric aspects. By severity, extensive lung lesions were the most commonly observed.

Keywords

COVID-19, CT Scan, Mixed Lesion, Cough

1. Introduction

SARS-CoV-2 is a new coronavirus that broke up in December 2019 in Wuhan, China. This virus quickly spread around the world resulting in a pandemic with attendant global health crisis [1]. The definitive diagnosis of COVID-19 is provided by the Real-Time Polymerase Chain Reaction (RT-PCR) test, which is the gold standard. It is performed on nasopharyngeal secretions taken by swabbing, and can be weakly positive from the start on the first sample [2]. It is therefore often necessary to repeat the samples in the event of a negative result when the clinical suspicion is very strong, which raises the difficulty of false negative cases. In addition, the result of the examination may only be available within 6 to 48 hours at the earliest, with a sensitivity of between 59% and 83% [2].

Chest imaging has demonstrated its valuable role in the development of this lung disease. In particular, it has proven its effectiveness in the event of respiratory symptoms requiring hospital treatment to refer patients to COVID-19 or non-COVID-19 units, in anticipation of the results of the RT-PCR [3]. Both x-ray and CT scan of the thoraco-pharyngeal regions are helpful in arriving at diagnosis of the disease. X-Ray has the advantage of lesser radiation dose but its specificity is low [4]. Computed tomography scan, on the other hand, although with higher dose, has both higher sensitivity and specificity and can provide 3-dimensional reconstructions [5]. The Radiology Department of the Luxembourg Mother-Child Hospital in Bamako was equipped with a CT scanner in addition to other modalities. The computed tomography (CT) results observed in the context of COVID-19 pneumonia show a high sensitivity but are however not specific to this pathology [3].

The objective of this study was to describe the CT findings and clinico-epidemiological aspects of coronavirus pulmonary lesions in our department.

2. Materials and Method

This was a cross-sectional descriptive study over a three-month period from November 2020 to January 2021 at the Radiology Department of the Luxembourg Mother-Child Hospital in Bamako. The study involved all patients with a clinical suspicion of COVID-19 with suggestive CT lesions and patients with a positive Covid test (RT PCR) during the study period. All patients without suggestive CT lesions were not included. For this work, we received the consent of the head of department.

The socio-demographic data and essential information for this study were collected through pre-established forms for this purpose. This data collection was made from the CT scan request form for each patient. The CT results were

entered directly on the forms after the images were analyzed on the console. The variables analyzed were patient age, patient sex, clinical data, CT lung lesions and severity of these lesions.

The CT scan examination was performed using a 16-slice Hitachi scanner and according to the method described by Sidi and Elugwu [6]. Exploration was performed without and with intravenous injection of contrast product depending on the clinical context. The images were analyzed in the parenchymal and bone window.

We took ethical aspects into account during our study. Image anonymity feature was activated to shield patients' data from third parties. This was done on the CT console in line with the method of Adejoh, *et al.* [7]. In addition, the confidentiality of the results of each patient was respected.

Data analysis was done with the aid of SPSS version 20.

3. Results

A total of 202 patients were enlisted. Patients' ages ranged from 23 to 95 years with a mean of 60 years. The 52 - 63 years age range made up 30.2% (n = 61) of the entire group. There were more male patients 56.4% (n = 114), than female. The clinical information was dominated by cough with 26.7% (n = 54). These details are summarized in **Table 1**.

Mixed appearance of lesions was the most common with 45.5% (n = 92). Lung lesions were more frequent in the periphery with 57.4% (n = 116). They were bilateral in the majority of patients with 98% (n = 198).This is shown in **Table 2** and **Figure 1** and **Figure 2**.

As shown in **Table 3**, there were moderate, extended and severe levels of severity of the lesions.

4. Discussion

As a limit, our study is intra-hospital, taking into account only the patients having performed the thoracic CT imaging. However, it contributes to the enrichment of the scientific literature because very few studies have been carried out in our country on the radiological aspects of COVID-19.

4.1. Sociodemographic Profile

The most common age group was 52 - 63 years with 30.2% (n = 61). The average age was 60.43 years with extremes at 23 years and 95 years. Men were more affected with 56.4% (n = 114) or a sex ratio of 1.3. According to Caruso *et al.* reported 83 men against 75 women with an average age of 57 years in a series of 158 cases [8]. In their series of 121 patients, Bernheim and al found 61 men and 60 women with a mean age of 45 years [9].

Shi *et al.* reported 51% of patients ≤ 50 years old in their study of 81 cases with a predominance of men, *i.e.* 52% against 48% of women [10]. Most of the authors observed a male predominance in their studies as observed in our series.

Table 1. Sociodemographic and clinical data.

Sociodemographic and clinical data	n	%
Gender		
Male	114	56.4
Female	88	43.6
Total	202	100
Age groups		
≤32 years	3	1.5
33 - 42 years	11	5.4
43 - 52 years	37	18.3
53 - 62 years	61	30.2
63 - 72 years	57	28.2
73 - 82 years	29	14.4
≥83 years	4	2.0
Total	202	100
Clinical information		
Cough	54	26.7
Several symptoms	47	23.3
Dyspnea	43	21.3
Chest pain	26	12.9
Embolism suspicion	12	5.9
Others	11	5.4
Fever	9	4.5
Total	202	100

Table 2. Semiological analysis on CT scan.

Semiological analysis on CT	n	%
Aspects of lesions		
Mixed	92	45.5
Frosted glass	79	39.1
Crazy paving	21	10.4
Condensation	7	3.5
Nodular aspect	2	1.0
Inverted halo	1	0.5
Total	202	100
Distribution of lesions		
Peripheral	116	57.4

Continued

Mixed	86	42.6
Total	202	100
Localisation of lesions		
Bilateral	198	98.0
Unilateral	4	2.0
Total	202	100

Table 3. CT scan classification of lesions according to severity.

CT Scan Severity	n	%
Minimal (<10%)	16	7.9
Moderate (10% - 25%)	55	27.2
Extended (25% - 50%)	57	28.2
Severe (50% - 75%)	52	25.7
Critical (>75%)	22	10.9
Total	202	100

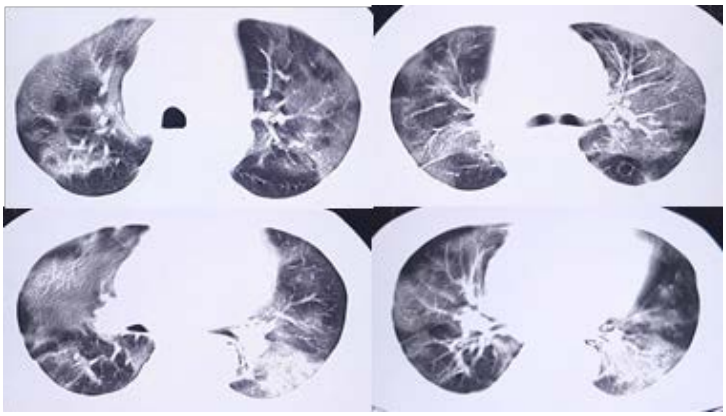

Figure 1. Axial CT scan images with parenchymal window showing areas of frosted glass and condensation.

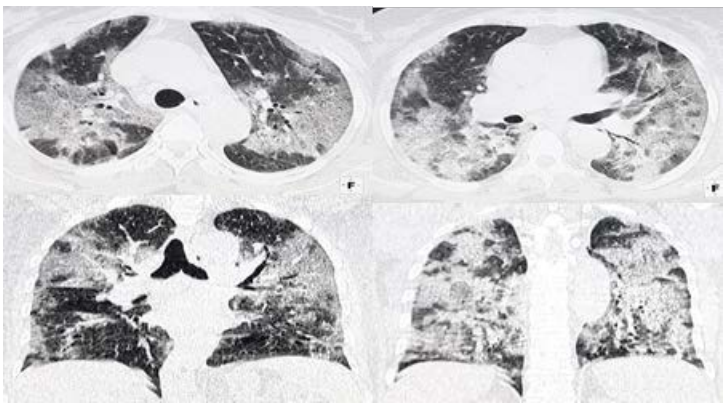

Figure 2. Axial CT scan images and coronal reconstructions withparenchymal window showing areas in frosted glass with "crazy paving".

The mean age of patients varies from author to author in the reviewed literature.

4.2. Clinical Information

The clinical information was dominated by cough with 26.7% (n = 54). For Boly and al, cough was the most frequent, ie 60.8% followed by fever with 47.6% [11]. In their work, Samaké and al observed a predominance of cough and fever with 17.06% each [12]. However Koné and al reported a predominance of dyspnea 11.36% (15/132) and fever 3.03% (4/132) [13]. A wide spectrum of clinical manifestations can be seen with COVID-19. Fever (80.4%), cough (63.1%), tired (46%) and sputum (41.8%) are the most common manifestations of COVID-19 [14].

4.3. CT Semiological Analysis

Mixed appearance of lesions was the most common with 45.5% (n = 92). Lung lesions were more frequent in the periphery with 57.4% (n = 116). They were bilateral in the majority of patients with 98% (n = 198). A wide variety of lung lesions have been described for COVID-19 on chest CT. The most common CT manifestations and their characteristics include frosted glass opacities (87%), bilateral lesion involvement (80%), peripheral distribution (75%), multilobar involvement (89%), posterior topography of the lesions (80%) and parenchymal condensations (33%) [3]. The most characteristic CT abnormalities of COVID-19 pneumonia are areas of ground glass (approximately 80% of cases), multifocal, bilateral, asymmetric. The involvement classically predominates in the peripheral, posterior and basal regions [15]. Yu *et al.* claimed that with regard to the different types of pulmonary opacities, most patients showed mixed lesions (ground glass and union) in both study groups (27 of 50, 54%) and group 2 (11 of 20, 55%) [16]. Bernheim *et al.* report a predominance of round lesions, *i.e.* 54% in a series of 121 [5]. According to these same authors, the peripheral distribution predominated with 52% [9]. Most of the patients had bilateral pulmonary involvement, both central and peripherally distributed. The pure central distribution of lesions and unilateral pulmonary localization was rare [16].

4.4. CT Severity of Lung Lesions

The main CT sign of severity is the extent of parenchymal abnormalities on the initial CT scan. The Thoracic Imaging Society (SIT) therefore recommends grading the parenchymal involvement according to a visual classification in 5 stages, based on the percentage of injured lung: absent or minimal (<10%), moderate (10% - 25%), extensive (25% - 50%), severe (50% - 75%) or critical (> 75%) [15]. In our study, the lesions were classified as extensive in the majority of patients with 28.2% (n = 57). Frederick Tshibasu Tshienda and al stated that assessment of the extent of the lesion revealed a predominance of severe involvement in 34.61%, followed by critical involvement in [17]. According to Madi and al, the extent of the lesions was dominated by severe (37%) and extensive (37%) in-

volvement, followed by critical involvement (14%) [18]. This discrepancy between our result and that of these authors could be related to the immune conditions of the patients, comorbid factors and the type of virus variant according to each geographic region.

5. Conclusion

The socio-demographic profile of our series was dominated by older people with a predominance of men in whom cough was the most observed clinical information. Medical imaging such as, CT scan, is a key pillar in the management of COVID-19. The semiological tomodensitometric aspects were dominated by mixed lesions with peripheral and bilateral distribution. Extensive lung lesions were the most common according to severity.

Author Approval

All authors agree to the submission of this article.

Consent

For this work, we received the consent of the patient as well as that of the head of department.

Conflicts of Interest

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

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