

Radiographic Cardiomegalia in Adults at the Kati Hospital-University Center

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Received: 01 Jun 2024; Accepted: 21 Jul 2024; Published: 29 Jul 2024

Citation: Diakité Siaka, Traore Ousmane, Sidibe Drissa Mansa, et al. Radiographic Cardiomegalia in Adults at the Kati Hospital-University Center. Radiol Imaging J. 2024; 3(3): 1-4.

ABSTRACT

Introduction: Cardiomegaly is defined as a pathological increase in cardiac volume. The cardiothoracic index is a simple parameter to assess the size of the heart on the frontal chest radiograph. The aim of our work was to study radiographic cardiomegaly in adults at Kati University Hospital.

Material and Methods: This was a descriptive, prospective study, which took place over a period of 11 months. All chest x-rays with cardiomegaly taken in the medical imaging department of Kati University Hospital during the study period were included in our study. These radiographs were associated with patient clinical files.

Results: The average age of our patients was 57 ± 16.34 years. The frequency of cardiomegaly was 10.40% of chest radiographs. Cardiomegaly was isolated in 49.8% of cases. Dyspnea alone or associated with other signs represented 58.2% of the reasons for consultation. The ICT between [0.56-0.6] was in the majority with 29.1% of cases. Hypertension represented the most common risk factor with 46% of cases.

Conclusion: The cardiothoracic index is a simple parameter to evaluate the size of the heart on chest radiography. The frequency of radiographic cardiomegaly was 10.4% of chest radiographs.

Keywords

Radiographic cardiomegaly, Adult, Kati University Hospital, Mali.

Introduction

Cardiomegaly is defined as a pathological increase in cardiac volume. On the frontal chest radiograph, this shows an increase in the cardiothoracic index > 0.50 in adults [1]. The cardiothoracic index is defined as the ratio between the maximum horizontal cardiac diameter and the maximum horizontal inner thoracic diameter [2]. Chest x-rays are commonly used to explore the lungs and mediastinum. The cardiothoracic index (CTI) or cardiothoracic

ratio is a simple parameter to assess the size of the heart on the anteroposterior chest radiograph. It is only reliable if it is calculated from a full-frontal, postero-anterior (PA) chest radiograph taken while standing [3]. In 2015, cardiovascular diseases (CVD) were responsible for 17.7 million deaths [4]. More than three-quarters of CVD-related deaths occur in low- and middle-income countries [2]. In many tropical regions, cardiovascular diseases rank 2nd or 3rd among the causes of morbidity and hospitalization [5]. In Mali, between January 2000 and December 2002, the frequency of radiological cardiomegaly was 97% among heart failure patients at the G-point hospital [6]. Cardiomegaly is the consequence of many cardiovascular pathologies. It is the observation of a serious lesion

and above all a diagnostic delay. Several imaging techniques allow its diagnostic approach, including chest radiography, which also constitutes a reference tool [7]. The aim of this work was to study radiographic cardiomegaly in adults at Kati University Hospital.

Material and Methods

This was a prospective and descriptive study running from April 31, 2019 to March 31, 2020, a period of 11 months. It was carried out in the radiology and medical imaging department of the Professor Bocar Sidy SALL University Hospital in Kati, Mali. The subjects concerned were adult patients of all sexes referred to the imaging department for a chest x-ray. All chest radiographs in adults with cardiomegaly were included in this work after calculating the cardiothoracic index (ICT > 0.50). The patients' clinical records were also studied. These x-rays were taken in a standing position with a "bone-lung" x-ray machine. An AGFA type digital printer using AGFA type films was used to print the plates.

The parameters studied were: The sociodemographic profile of the patients, the clinical and radiographic aspects of cardiomegaly.

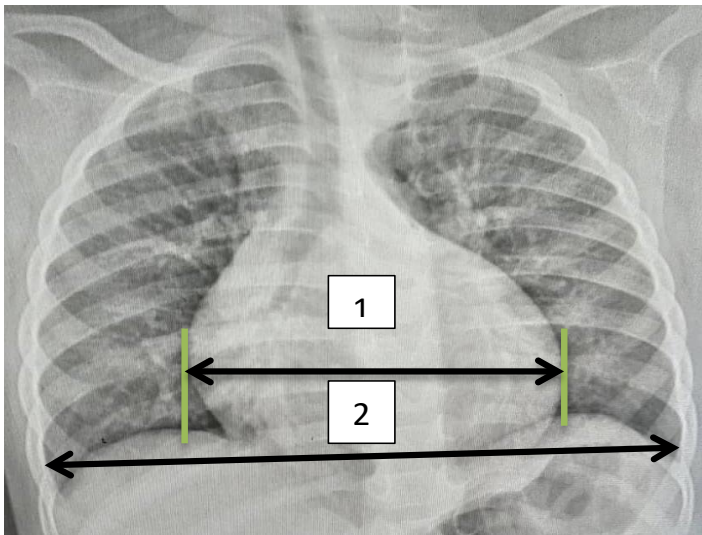


Figure 1: Frontal chest x-ray showing the technique for measuring cardiac and thoracic diameters.

(1: The maximum diameter of the heart; 2: The maximum thoracic diameter)

$$\text{Cardiothoracic Index (CTI)} = \frac{\text{The maximum diameter of the heart}}{\text{Maximum thoracic diameter}}$$

Results

During the study we collected 2054 chest x-rays out of 17771 examinations carried out in the radiology and medical imaging department. Which represented a frequency of 11.56% of cases.

Sociodemographic Aspects

The 41-60 year old age group was the most represented with 37.6% of cases. The average age of our patients was 57 ± 16.34 years. The extremes were 18 and 100 years. There was a slight female predominance with a M/F sex ratio of 0.85 (Figure 2).

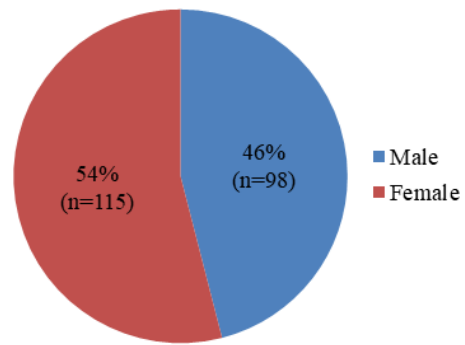


Figure 2: Distribution of patients according to sex.

Clinical aspects

Dyspnea alone or associated with other signs represented 58.2% of reasons for consultation (Figure 3).

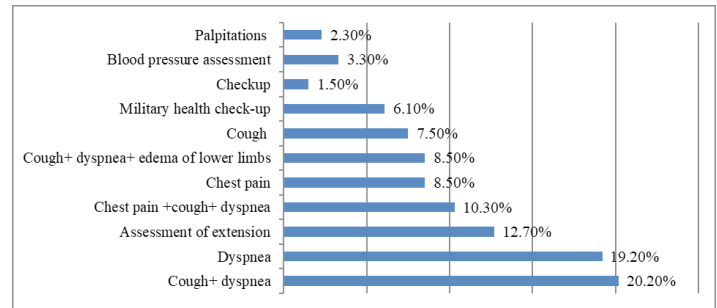


Figure 3: Distribution of reasons for consultation.

The most represented risk factor was hypertension in 60.6% of patients (Table 1).

Table 1: Distribution of patients according to risk factors/history.

Risk factors/ATCD	Numbers	Percentage
High blood pressure	129	60,6
Tobacco	36	16,9
Heart disease	21	9,9
Obesity	6	2,8
Hormonal contraception	6	2,8
Alcohol	6	2,8
Diabetes + arterial hypertension	5	2,3
Sedentary lifestyle	4	1,9
Total	213	100,0

Radiographic aspects

The Cardio-Thoracic Index between [0.56-0.6] was in the majority with 29.11% closely followed by [0.50-0.54] with 28.64% of cases (Table 2).

Table 2: Distribution of patients according to ICT.

ICT	Numbers	Percentage
≤ 0.50	3	1,41
0.51- 0.55	61	28,64
0.56- 0.60	62	29,11
0.61- 0.65	45	21,13
0.66-0.70	30	14,08
≥ 0.71	12	5,63
Total	213	100

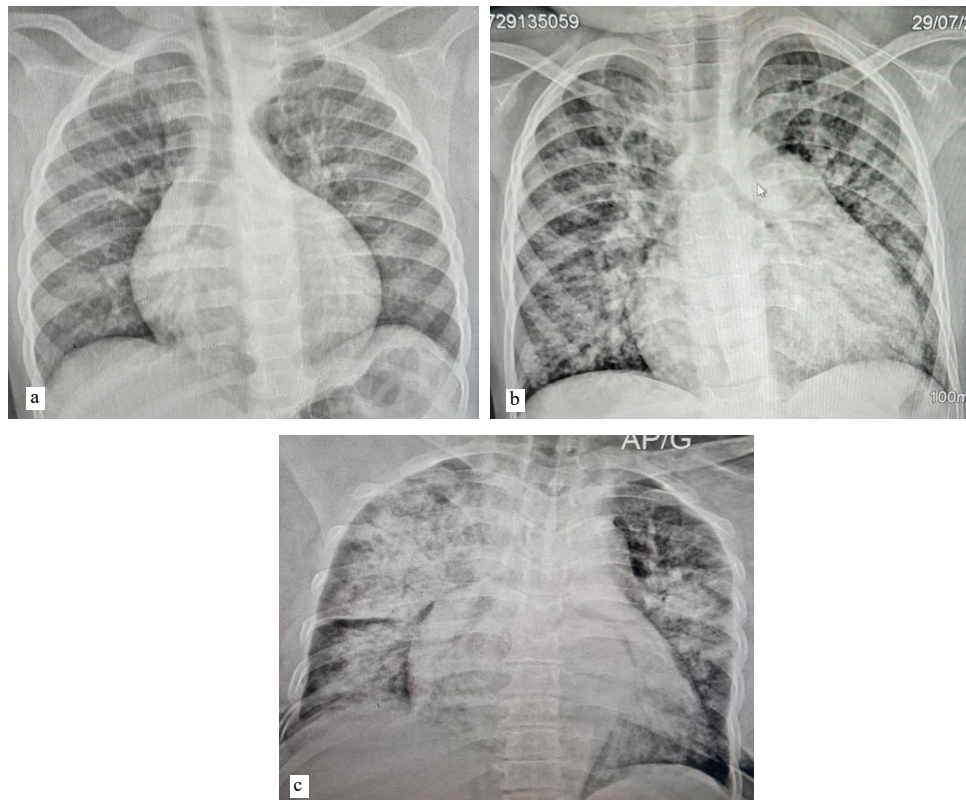


Figure 4: Frontal chest x-ray showing: (a) cardiomegaly (ICT=0.6) associated with vascular redistribution towards the apices: cardiomyopathy; (b) cardiomegaly (ICT=0.7) with interstitial edema: Decompensated heart failure; (C) bilateral perihilar alveolar filling, asymmetrical butterfly wing in favor of PAO associated with cardiomegaly (ICT = 0.7).

The radiographic signs associated with cardiomegaly were dominated by the cardiac lung which occupied 43.8% of cases (figure 4). Arteriopulmonary hypertension represented 7% of cases. And isolated cardiomegaly was in 49.8% of cases. There was no significant correlation between the ICT and the age of the patients ($P=0.573$). There was no longer a significant correlation between the ICT and the sex of the patients ($P=0.069$).

Discussion

Sociodemographic aspects

The average age of our patients was 57 ± 16.34 years, with extremes of 14 and 100 years. The age group of 41-60 years represented 37.55% of cases. This result was close to that of ZOUAN [8] for whom the average age was 56.5 ± 17.4 years; the most represented age group was 50 - 59 years old with extremes of 18 and 100 years old. However, our results were superior to those of SOUMAORO [9] in whom the average age was 48.7 ± 17.07 years with extremes of 18 and 88 years); from KANTA [10] who found an average age of 45 ± 18 years with extremes of 19 and 90 years; and MOLONGA [11] in CONGO in whom the average age was 52.9 ± 11.7 years, with extreme ages of 26 and 79 years). In our study, there was a slight female predominance with a sex ratio (M/F) of 0.85. This result was close to those of SOUMAORO [9] who had 57.2% with a sex ratio of 0.75, KONE [12] who found 55% with a sex ratio of 0.81 and KANTA [10] who had 53% with a sex ratio of 0.89.

Clinical aspects

Dyspnea was the most frequent reason for consultation with 58.22% of cases. This result was consistent with that of NDALA [13] in Congo which found 60% cases of dyspnea. But it was higher than that of SIDIBE N [14] which found 32.63% of dyspneic patients. It was lower than that of ZOUAN [8], SOUMAORO [9] and KONE [12] who had respectively 95.4%, 92%, and 80.8% cases of dyspnea. Dyspnea is a clinical manifestation of any advanced heart disease. In the literature, some authors found cardiogenic dyspnea as a clinical warning sign of heart failure attesting to cardiomegaly [15,16]. Hypertension was our main risk factor with 62.91% of cases. This rate is higher than those of Ryszard [17], SOUMAORO [9] and KHEYI [18] who found respectively 39.4% in Nigeria, 48% in Mali and 46% in Morocco. But it was close to that of MOLONGA [11] in CONGO which had a rate of 70% of cases. This high frequency of hypertension in our series could be explained by the fact that the majority of our patients were urban.

Radiographic aspects

In our study, the cardio-thoracic index between 0.56-0.60 was in the majority with a rate of 29.11% of cases for the age group of 41-60 years. SOUMAORO [9] had 25.2% $ICT \geq 0.60$. Cardiomegaly was associated with cardiac lung in 43.20% of cases. This result was different from that of SOUMAORO [9] who found 71.6% of cases. This difference in rates was the fact that SOUMAORO's study had been carried out in patients suffering from confirmed heart disease, while ours had focused on the search

for cardiomegaly in patients who had come for a chest x-ray. In our service. We did not find a significant correlation between ICT and patient age ($P=0.573$), as well as between ICT and patient sex ($P=0.069$). Unlike SOUMAORO [9] which had a significant statistical relationship.

Conclusion

The cardiothoracic index is a simple parameter to assess the size of the heart on chest radiography. It is only considered reliable if it is calculated from a frontal, postero-anterior (PA) chest radiograph, taken while standing. The frequency of radiographic cardiomegaly was 10.40% of chest x-ray examinations. Dyspnea was the clinical sign most associated with cardiomegaly and hypertension the most frequent risk factor.

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