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Epidemiological, Clinical and Evolutionary Analyses of Cardiovascular Damage During Pulmonary Tuberculosis

Akciğer Tüberkülozu Sırasındaki Kardiyovasküler Hasarın Epidemiyolojik, Klinik ve Evrimsel Analizleri

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ABSTRACT

Background: Tuberculosis (TB) remains a major public health problem with nearly 8 million new cases each year and more than 1 million deaths per year. TB is a risk factor for cardiovascular damage and thromboembolic disease and a state of hypercoagulability by genetic predisposition could be incriminated. Our study aimed to study the epidemiological, clinical and evolutionary aspects of cardiovascular damage during pulmonary TB in Bujumbura hospitals.

Materials and Methods: This was a retrospective study conducted from September 1, 2017 to September 30, 2022 in the Internal Medicine Department of the University Teaching Hospital of Kamenge (CHUK) in Bujumbura. The study population consisted of active or sequellar TB patients with cardiovascular involvement.

Results: During the study period, 374 patients were admitted with TB to the internal medicine department of the CHUK, 49 of whom had at least one cardiovascular disease, representing a prevalence of 13.10%. Cardiovascular disease affected 25 women and 24 men, with a sex ratio of 0.96 in favor of women. The mean age was 50.73 years, with extremes of 22 and 90 years. Cardiovascular disorders were dominated by chronic pulmonary heart disease (53.06%); tuberculous pericarditis (34.70%); and venous thromboembolic disease (12.24%). Comorbidities including human immunodeficiency virus infection, diabetes and chronic respiratory insufficiency were respectively associated with 26.53%, 8.20% and 4.08% of cases. The clinical picture was dominated by dyspnea, cough and chest pain in 75.5%, 59.7% and 38.77% of cases respectively. Progression under treatment was considered favorable in 69.4% of patients, compared with 30.6% who died in respiratory distress.

Conclusion: Cardiovascular damage in TB is a frequent and serious pathology in Bujumbura Hospitals. Diagnosis and management are often delayed or even unavailable, resulting in many deaths. Their prognosis depends on the type of disease and its immediate management, and they are chronic, disabling diseases.

Keywords: Tuberculosis, cardiovascular damage, analyse

ÖZ

Amaç: Tüberküloz (TB), her yıl yaklaşık 8 milyon yeni olgu ve 1 milyondan fazla ölümle birlikte önemli bir halk sağlığı sorunu olmaya devam etmektedir. TB, kardiyovasküler hasar ve tromboembolik hastalık için bir risk faktörüdür ve genetik yatkınlık nedeniyle aşırı pıhtılaşma durumu suçlanabilir. Çalışmamız Bujumbura'daki hastanelerinde akciğer TB'yi sırasında ortaya çıkan kardiyovasküler hasarın epidemiyolojik, klinik ve evrimsel yönlerini incelemeyi amaçladı.

Gereç ve Yöntemler:. Bu çalışma, 1 Eylül 2017 ile 30 Eylül 2022 tarihleri arasında Bujumbura'daki Kamenge Üniversitesi Eğitim Hastanesi'nin (CHUK) iç hastalıkları bölümünde yürütülmüş retrospektif bir çalışmadır. Çalışma popülasyonu, kardiyovasküler tutulumu olan aktif veya sekel TB hastalarından oluşuyordu.

Bulgular: Çalışma döneminde CHUK dahiliye bölümüne 374 TB hastası başvurdu, bunların 49'unda en az bir kardiyovasküler hastalık vardı ve prevalans %13,10 idi. Kardiyovasküler hastalık 25 kadın ve 24 erkeği etkiledi; cinsiyet oranı kadınlar lehine 0,96 oldu. Ortalama yaş 50,73 idi, uç noktalar ise 22 ve 90 idi. Kardiyovasküler bozukluklarda kronik pulmoner kalp hastalığı (%53,06)

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ÖZ

hakimdi; TB perikarditi (%34,70); ve venöz tromboembolik hastalık (%12,24). İnsan bağışıklık eksikliği virüsü enfeksiyonu, diyabet ve kronik solunum yetmezliği gibi komorbiditeler sırasıyla olguların %26,53'ü, %8,20'si ve %4,08'i ile ilişkiliydi. Klinik tabloya olguların sırasıyla %75,5, %59,7 ve %38,77'sinde dispne, öksürük ve göğüs ağrısı hakimdi. Solunum sıkıntısından ölen hastaların %30,6'sına kıyasla tedavi altında ilerlemenin hastaların %69,4'ünde olumlu olduğu değerlendirildi.

Sonuç: TB'de kardiyovasküler hasar Bujumbura Hastaneleri'nde sık görülen ve ciddi bir patolojidir. Teşhis ve tedavi sıklıkla gecikiyor, hatta kullanılamıyor, bu da birçok ölümle sonuçlanıyor. Prognozları hastalığın türüne ve acil tedavisine bağlıdır ve bunlar kronik, sakatlığa yol açan hastalıklardır.

Anahtar Kelimeler: Tüberküloz, kardiyovasküler hasar, analiz

Introduction

Tuberculosis (TB) remains a major public health problem with nearly 8 million new cases each year and more than 1 million deaths per year.

The distribution of TB cases appears to be uneven worldwide, with more than 95% of cases and more than 98% of TB deaths reported in Africa, Asia, and Latin America (1).

Despite the existence of effective measures such as chemotherapy and vaccination, TB continues to progress worldwide, which can be explained in part by a high frequency of co-infection with the human immunodeficiency virus (HIV) and by the emergence of resistant strains (1,2).

In Burundi, in 2021, 6,874 new cases of TB of all forms were recorded, i.e., an incidence rate of 100 per 100,000 people. The mortality rate was 20 per 100,000 people. TB/HIV co-infection remains a concern (prevalence of HIV among TB patients: 12%, as does multi-resistant TB: 200 cases of multidrug-resistant TB are estimated (3,4). Cardiovascular damage during TB has been described for a long time, and tuberculous pericarditis is the most common. Chronic pulmonary heart disease, also known as cor pulmonale, is the enlargement and failure of the right ventricle of the heart as a response to increased vascular resistance. It is a possible progressive complication of the disease, followed by mutilating scleral-retractile, bronchopleural, and pulmonary vascular bed lesions. TB is a risk factor for thromboembolic disease (deep vein thrombosis, pulmonary embolism), and a state of hypercoagulability due to genetic predisposition could be incriminated (5).

Our study aimed to investigate the epidemiological, clinical, and evolutionary aspects of cardiovascular damage during pulmonary TB in Bujumbura.

Materials and Methods

This was a retrospective descriptive study conducted at CHUK in the Internal Medicine Department of University Teaching Hospital of Kamenge over 5 years from September 1, 2017, to September 30, 2022. Ethics Committee permission was previously requested from the administrative authorities of the hospital before conducting our study and was granted on 15.01.2023. Informed consent was obtained from all participants included in the study. Patients hospitalized in this department with progressive or sequelae TB with cardiovascular involvement were included.

The information collected covered sociodemographic, clinical, and evolutionary aspects.

Statistical Analysis

Text processing was performed using Microsoft Word version 2016. Data entry and analysis were performed using KoboCollect v2022.2.3 softwar.

Results

During the study period, 374 patients were admitted for TB, 49 of whom had at least one cardiovascular disease, representing a prevalence of 13.10%. Cardiovascular disease affected 25 women and 24 men, with a sex ratio of 0.96 in favor of women. The mean age was 50.73 years, with extremes of 22 and 90 years (Figure 1). Low-income rural areas were most affected. Cardiovascular disorders were dominated by chronic pulmonary heart disease (53.06%), tuberculous pericarditis (34.70%), and thromboembolic disease (12.24%) and were diagnosed by electrocardiogram, echocardiography, Doppler

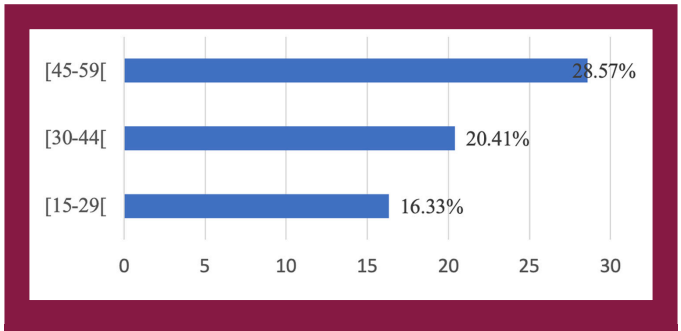

Figure 1. Distribution of patients by age group

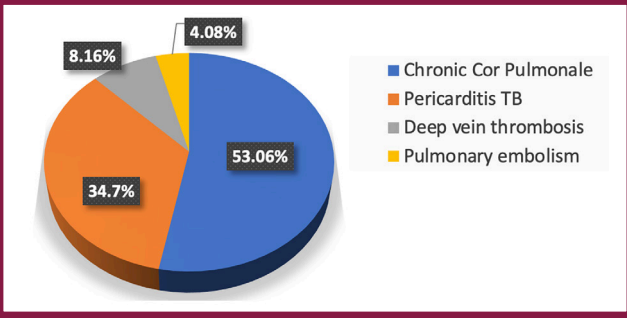

Figure 2. Distribution of patients according to cardiovascular conditions
TB: Tuberculosis

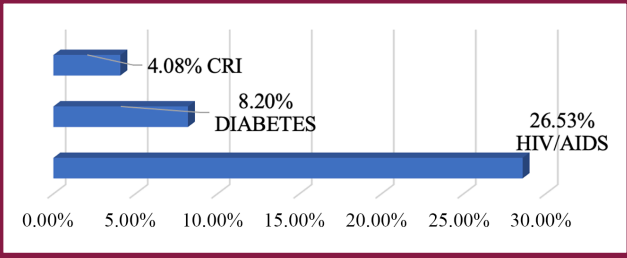

Figure 3. Distribution of patients by comorbidities
CRI: Chronic respiratory insufficiency, HIV: Human immunodeficiency virus, AIDS: Acquired immune deficiency syndrome

ultrasound, and chest computerized tomography (Figure 2). Comorbidities including HIV/acquired immune deficiency syndrome infection, diabetes, and chronic respiratory insufficiency were associated with 26.53%, 8.20%, and 4.08% of cases, respectively (Figure 3). Respectively; dyspnea, cough and chest pain in 75.5%, 59.7% and 38.77% of patients dominate the clinical picture. Progression on treatment was considered favorable in 69.4% of patients, compared with 30.6% who died in respiratory distress.

Discussion

We conducted a retrospective descriptive study on the epidemiological, clinical, and evolutionary analysis of cardiovascular disease during pulmonary TB in Bujumbura Hospitals. Our study showed that this pathology represents a public health problem, as out of 374 patients admitted for TB in the targeted Internal Medicine Department of the CHUK, we reported 49 cases with at least one cardiovascular involvement, i.e., a prevalence of 13.10%. Coulibaly (6) in 2015 in Mali found a prevalence of 6.8%.

In Bujumbura, this high frequency can be explained by the fact that most of our patients were co-infected with HIV/TB, and sometimes non-adherence to antiretroviral treatment led to severe forms such as tuberculous pericarditis (7). However, the delay in diagnosis and management, as well as smoking in some of our patients, led to sclero-retractile lung lesions, the cause of chronic pulmonary heart disease, which increased over time (8).

Analysis of the results showed a slight female predominance, with 25 women (51%) and 24 men (49%). The male/female sex ratio was 0.96. Our results concurred with those of Hadjer et al. (9) in 2017 in a study of venous thromboembolism (VTE) during TB, where he found a sex ratio of 0.71. However, numerous other studies have found male predominance. The fact that the Burundian population is predominantly female explains this (10).

In our series, the mean age of the sample was 50.73 years, with extremes of 22 and 90 years. Our results were close to those of Coulibaly (6) in 2015 in Mali, who found a mean age of 51.2±17.4 years. The 60+ age group was the most represented with 34.69% of the workforce. This is because the weakening of the immune defenses of elderly subjects and the reawakening of old TB lesions would explain this recruitment with age (11).

Many authors have found that the dominant functional signs were dyspnea, altered general condition, cough, and chest pain.

These results were in agreement with our own: dyspnea (77.34%), altered general condition (71.42%), cough (59.17%), and chest pain (38.77%).

This predominance of respiratory signs could be linked to the pulmonary localization of the tubercle bacillus and the extent of irreversible damage caused by TB.

Cardiovascular disorders in TB in our series defined the cardiovascular conditions responsible for the clinical pictures, with chronic pulmonary heart disease and tuberculous pericarditis predominating in 53.06% and 34.70% of patients, respectively. Thromboembolic venous disease alone accounted for a frequency of 12.24%. Our results on the frequency of chronic pulmonary heart disease agree with those of the literature, which ranged from 20% to 91% (12). Those of pericarditis and VTE were 36.6% in Coulibaly (6) and 9.8% in Amar et al. (13).

Acute and subacute complications of TB are attributable to structural damage or vascular compromise caused by *Mycobacterium* TB, as well as metabolic abnormalities and inflammatory responses of the host. Despite the successful cure of TB, chronic complications may result from anatomical alterations at disease sites, notably impaired pulmonary function, which will impact the heart (14).

The high incidence of chronic pulmonary heart disease is linked to the classically mutilating bronchopulmonary sequelae of TB in black people and to the high association of tobacco use as a bronchopulmonary cofactor (6).

Pericardial involvement is relatively frequent in TB. Myocarditis and aortitis due to TB are rare (15).

Although no cases of myocarditis were recorded in our series, myocardial involvement may be associated with pericarditis in the form of myopericarditis, which may cover other clinical scenarios. Tuberculous myocarditis is particularly rare (16).

In addition, patients with TB are predisposed to the development of thromboembolism. Inflammation activates the coagulation cascade while reducing the activity of the anticoagulant mechanism. Moreover, the hypercoagulable state persists for 2 weeks even after the initiation of anti-TB medication and improves with continued treatment (17).

During the stay, we recorded 15 deaths (30.6%), i.e., 10.20% patients from tuberculous pericarditis, 16.32% from chronic cor pulmonale, and 4.08% from pulmonary embolism. On discharge, 34 patients had favorable outcomes. Coulibaly (6) in 2015 in Mali found a favorable outcome rate in 75.6% of cases, with three cases of death (7.3%).

Conclusion

Cardiovascular damage in TB is a serious pathology, both in terms of clinical severity and lethality. Strengthening prevention and raising public awareness of the morbidity and mortality associated with TB, as well as encouraging early consultation and compliance with treatment, will certainly help to reduce the prevalence of TB and limit its complications.

Ethics

Ethics Committee Approval: This was a retrospective descriptive study conducted at CHUK in the Internal Medicine Department of University Teaching Hospital of Kamenge over 5 years from September 1, 2017, to September 30, 2022. Ethics Committee permission was previously requested from the administrative authorities of the hospital before conducting our study and was granted on 15.01.2023.

Informed Consent: Informed consent was obtained from all participants included in the study

Authorship Contributions

Surgical and Medical Practices: T.S., T.I., J.C.N., D.N., Concept: T.S., T.I., J.C.N., D.N., Design: T.S., T.I., J.C.N., D.N., Data Collection or Processing: T.S., T.I., J.C.N., D.N., Analysis or Interpretation: T.S., T.I., J.C.N., D.N., Literature Search: T.S., T.I., J.C.N., D.N., Writing: T.S., T.I., J.C.N., D.N.

Conflict of Interest: No conflict of interest was declared by the authors.

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