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Pneumology

Acute Forms of Pulmonary Tuberculosis

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Abstract **Original Research Article**

Introduction: Tuberculosis is a cosmopolitan infection disease caused by mycobacteria of the tuberculosis complex. It is a major public health problem. Acute forms of pulmonary tuberculosis are potentially lethal. The objective of this study is to determine the epidemiological, clinical, and evolving profile of patients with acute forms of pulmonary tuberculosis. ***Material and Methods***: We reported a case series conducted at the pneumology department of CHU Mohamed VI in Marrakech. All cases of acute tuberculosis bacteriologically confirmed were included in the study. ***Results*:** We collected 33 cases during this period. A male predominance was noted in 61% of cases. A history of pulmonary tuberculosis was noted in 5 cases (15.2%). A field of immunosuppression was found in 8 patients (24.2%) including 6 cases of diabetes and 2 cases of HIV seropositivity. The main symptoms were dyspnea in 18 cases (54.5%), cough in 16 cases (48%) and hemoptysis in 4 cases (12%). The chest X-ray objectified an aspect of miliary in 26 cases (78.7%), an aspect of bronchopneumonia in 4 cases (12%) and caseous pneumonia in 3 patients (9%). In the cases of miliary, the diagnosis was made by a compatible clinical and radiological signs in 20 cases (77%) and by bacteriological confirmation through direct examination of expectorations in 6 cases (23%). As for pneumonia and bronchopneumonia, bacteriological confirmation was obtained through direct examination of expectorations in 5 cases (71.4%) and through molecular biology (GenXpert) in the other cases (28.6%). The anti-bacillary treatment was started urgently, according to the national anti-bacillary program. Corticosteroid therapy at a dose of 1 mg/kg/day; was administered to 10 patients presenting with dyspneic miliaria. Side effects of anti-bacillary treatment were dominated by drug-induced hepatitis in its cytolytic form. 2 patients died (6%) following severe acute respiratory failure associated with pulmonary embolism in 1 case. ***Conclusion***: Despite their lower frequency, the acute forms of pulmonary tuberculosis remain serious and can be life-threatening.

Keywords: Pulmonary tuberculosis, acute forms, clinical aspects, treatment, evolution.

INTRODUCTION

Tuberculosis is a cosmopolitan infection disease caused by mycobacteria of the tuberculosis complex. It is a major public health problem worldwide and particularly in developing countries where it remains endemic [1].

Acute forms of pulmonary tuberculosis are potentially lethal but rare, dominated by miliary form, which represents less than 2% of tuberculosis according to some authors and about 8% of extrapulmonary tuberculosis, followed by other forms including caseous pneumonia and bronchopneumonia [2, 3].

The incidence of acute forms is on the rise due to rapid population growth and the advent of the HIV/AIDS pandemic and the use of immunosuppressive drugs [3, 4].

BCG, an integral part of Morocco's expanded vaccination program, plays a protective role in the occurrence of these severe forms of tuberculosis [5, 6].

This study aims to determine the epidemiological, clinical, and evolving profile of patients with acute forms of pulmonary tuberculosis.

MATERIALS AND METHODS

This was a case series conducted at the pneumology department of CHU Mohamed VI in Marrakech. All cases of acute tuberculosis bacteriologically confirmed were included in the study.

For each patient, we filled out an exploitation sheet to collect of socio-demographic data, history, clinical signs, radiological images, as well as the treatment received and the evolution. The data was analyzed using Excel software, version 2010.

RESULTS

We collected 33 cases during this period. A male predominance was noted in 61% of cases. The average age was 45 years with extremes ranging from 16 to 58 years. The most frequent age range was between 20 and 40 years (Figure 1).

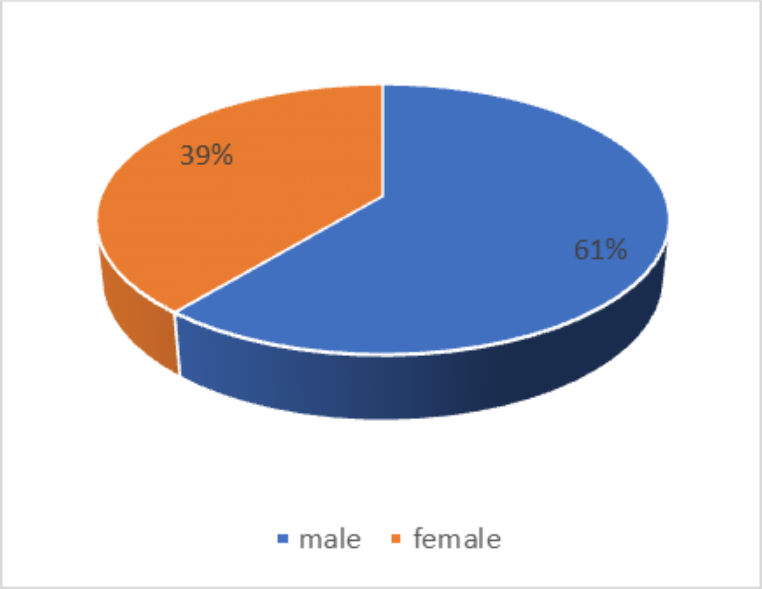

Figure 1: Distribution of patients by gender

87.9% of patients were vaccinated with BCG. A history of pulmonary tuberculosis was noted in 5 cases (15.2%) and concept of tuberculosis contagion in 7 cases (21.2%).

Toxic habits were marked by Smoking in 15 patients (45.5%) and alcoholism in 6 patients (18.2%).

A field of immunosuppression was found in 8 patients (24.2%) including 6 cases of diabetes and 2 cases of HIV seropositivity.

The main symptom was dyspnea in 18 cases (54.5%), cough in 16 cases (48%) and hemoptysis in 4 cases (12%).

General signs were represented by fever in 28 cases (85%) and deterioration in general condition in 100% of cases (Figure 2).

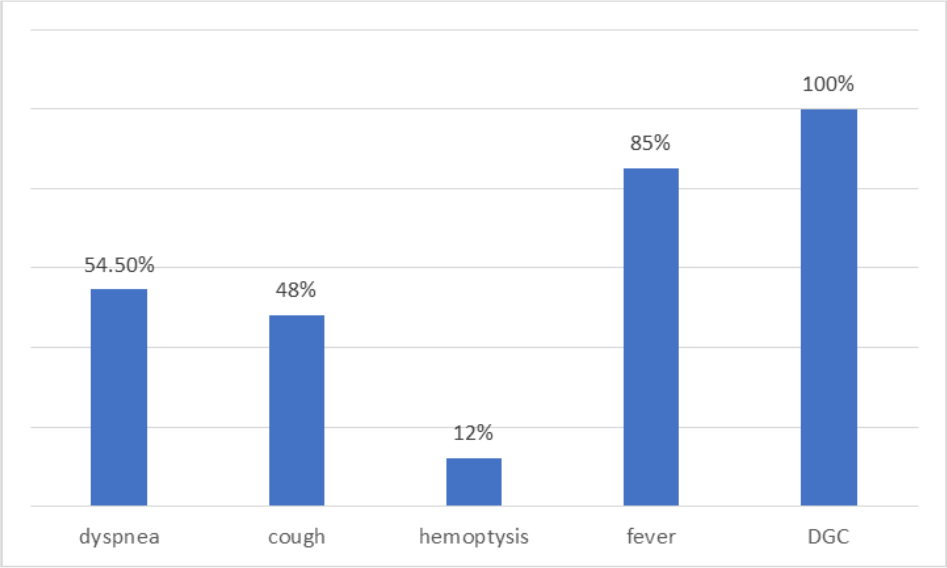

Figure 2: Distribution according to the functional and general signs

The biological assessment found lymphopenia in 8 patients (24.2%), leukopenia in 2 patients (6%) and anemia in 25 patients (75.7%).

The chest X-ray, performed in all patients, objectified an aspect of miliary in 26 cases (78.7%), an aspect of bronchopneumonia in 4 cases (12%) and caseous pneumonia in 3 patients (9%) (Figure 3, 4, 5, 6).

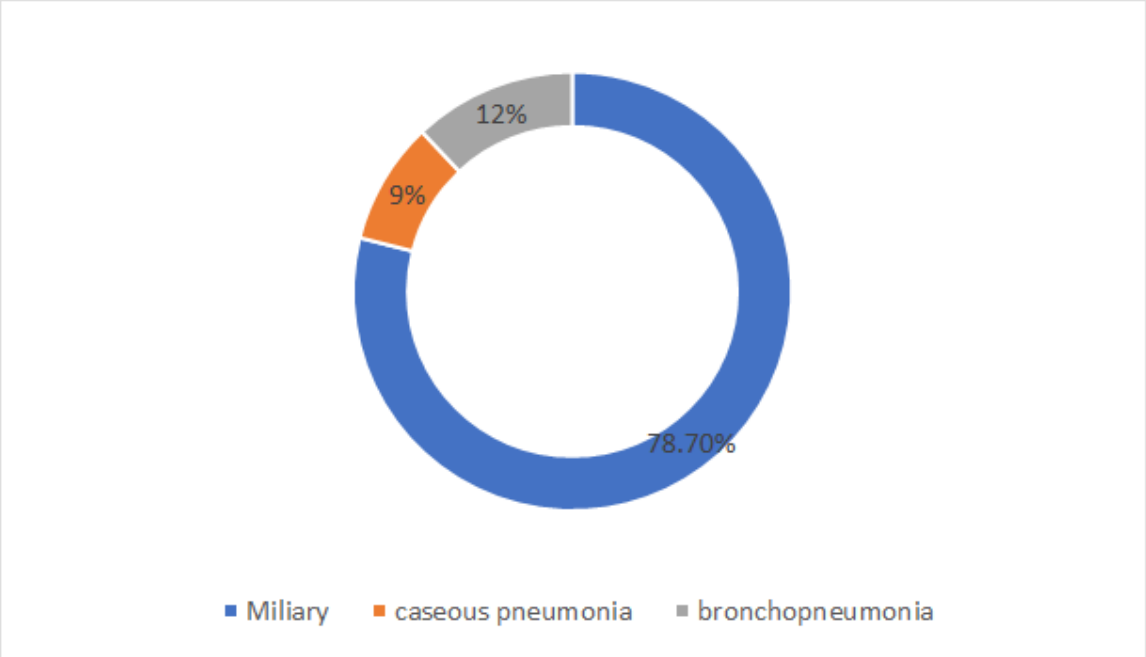

Figure 3: Acute forms of pulmonary tuberculosis

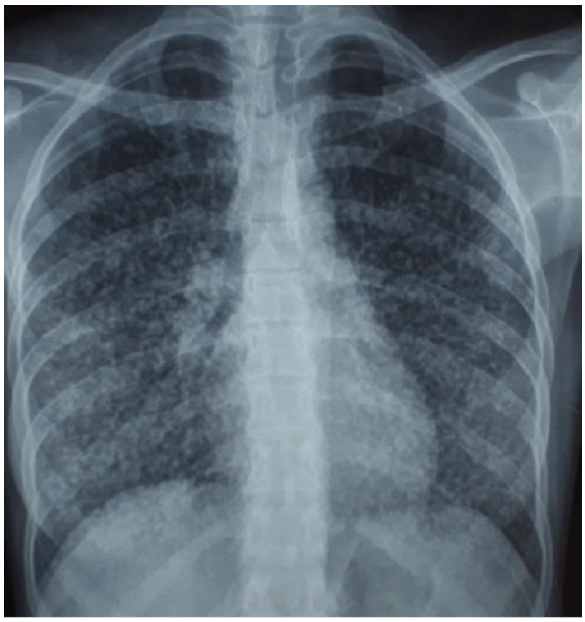

Figure 3: Bilateral micronodular interstitial pattern indicative of miliary tuberculosis

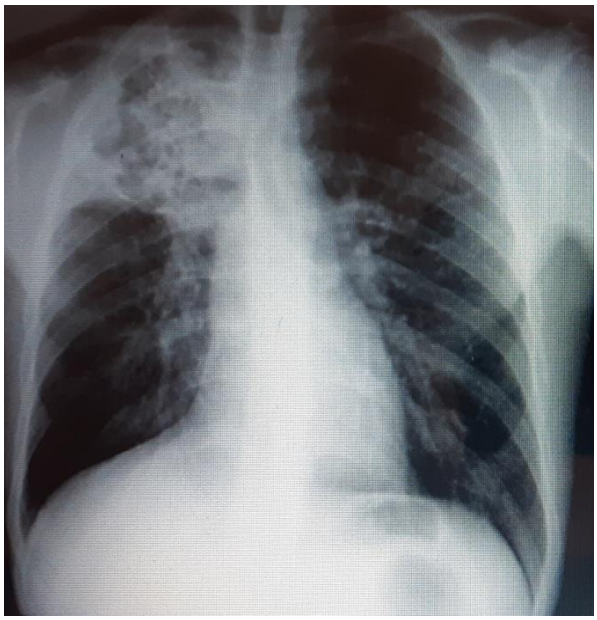

Figure 4: Systematized alveolar opacity with excavations indicative of caseous pneumonia

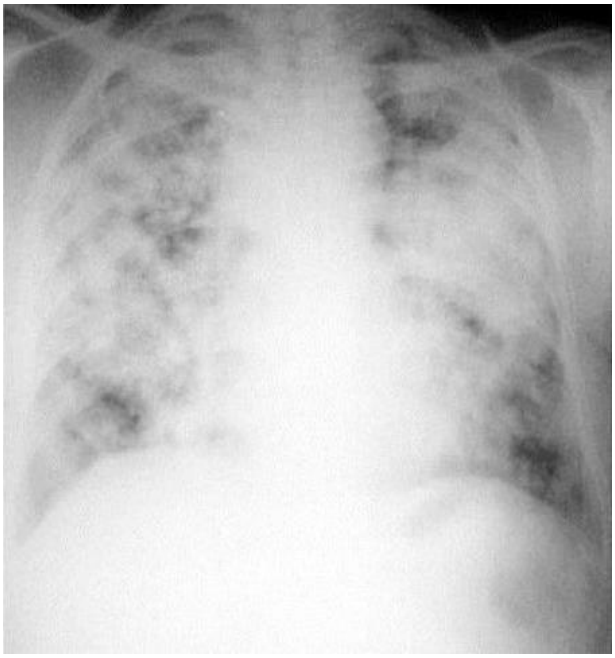

Figure 5: Disseminated alveolar opacities, confluent nodules indicative of bronchopneumonia

In the cases of miliary, the diagnosis was made based on a bundle of arguments, in front of a compatible clinical and radiological signs in 20 cases (77%) and by bacteriological confirmation through direct examination of expectorations in 6 cases (23%). As for pneumonia and bronchopneumonia, bacteriological confirmation was obtained through direct examination of expectorations in 5 cases (71.4%) and through molecular biology (GenXpert) in the other cases (28.6%).

The extension assessment in the miliary form objectified a double localization in 4 cases (15.4%): ophthalmological in 3 cases with the presence of Bouchut's nodule associated with posterior uveitis in one patient, and pleural localization in another case.

The anti-bacillary treatment was started urgently, according to the national anti-bacillary program. The therapeutic protocol was 2RHZE/7RH in miliary tuberculosis (Rifampicin, Isoniazid, Pyrazinamide, Ethambutol for two months, followed by seven months of Rifampicin and Isoniazid). The 2RHZE/4RH protocol was administered in the other cases.

Corticosteroid therapy at a dose of 1 mg/kg/day; was administered to 10 patients presenting with dyspneic miliaria, with progressive reduction over an average of 50 days.

Side effects of anti-bacillary treatment were noted in 5 cases (15.2%), dominated by drug-induced hepatitis in its cytolytic form.

Of all the patients, 2 patients died (6%) following severe acute respiratory failure associated with pulmonary embolism in 1 case.

DISCUSSION

Once Mycobacterium tuberculosis is inhaled through the lungs, a series of immunological events occur leading to 3 possible outcomes: Eradication, primary infection or latent infection.

Acute forms of pulmonary tuberculosis are potentially fatal. They can be primary or occur after reactivation of a latent infection [7, 8]. Primary infection in most individuals is either asymptomatic or mild, only 3% to 10% of patients develop acute symptomatic disease. Approximately one third of the world's population is affected by latent TB, and they are potentially at risk for reactivation and acute disease. Less frequently, reinfection with TB can also result in an acute clinical syndrome.

Risk factors for reactivation include advanced age, ethnic background, immunosuppressive treatments, and chronic conditions such as HIV infection, diabetes, organ transplants, and chronic kidney failure.

In our series, the risk factors found were represented by HIV infection and diabetes with respective frequencies of 6 and 18%.

In our series, the risk factors found were represented by HIV infection and diabetes with respective frequencies of 6 and 18%.

1. Miliary Tuberculosis

Miliary tuberculosis is a serious form, involving the vital prognosis. It is a dissemination of small tuberculous granulations, classically the size of a grain of millet, localized in the lungs or disseminated throughout the body. This dissemination is most often hematogenous but can be bronchogenic or more rarely lymphatic, essentially causing cold miliary [9, 10].

The predominance of miliary tuberculosis in young subjects is noted in the majority of countries with high tuberculosis endemia, particularly in Africa [11-14] and India [15, 16]. Thus, the average age was 36 years old for Ouédraogo [12], 39 years old for Haloui [6], 35 years old for Sharma [3] and 36 years old for Zaghba [11].

In the literature, male predominance is classic [19], however, a slight female predominance is described by some authors [5, 6, 13-16, 19-21].

The notion of tuberculous contagion must be systematically searched, it would vary according to the authors from 15 to 35% [22, 32].

The protective power of BCG vaccination has been demonstrated, particularly in children and against serious extra-pulmonary forms. In Morocco, it is part of the national immunization program and it is compulsory at birth. In our series, the majority of our patients are vaccinated.

Smoking would probably play a role in the appearance of miliary tuberculosis due to the local alteration of defense mechanisms [24].

The frequency of the association of tuberculosis with HIV is well established, it is reported by several authors [3, 6, 24], particularly in pulmonary localization. Haloui [6] and Touré [7], report frequencies of 77.7 and 32% respectively in their series, while Zaghba [18] reports 23.4%.

Clinically, fever is often present [5, 18], and cough remains the most frequently functional sign [5, 25, 26]. Pleuropulmonary examination may be normal or find crackling rales in both lung fields. Meningeal signs may exist, often discreet accompanied by cutaneous hyperesthesia.

Biological abnormalities often consist of lymphopenia, leukopenia associated or not with anemia and/or thrombocytopenia [3, 27, 28].

Radiologically, miliaria is characterized by the presence of micronodules 1 to 3 mm in diameter with clear contours, uniformly distributed in the two pulmonary fields. Sometimes there are unilateral unequal or confluent granulations, associated with cavitary or reticulo-nodular images. CT is more sensitive for the detection of micronodules and the determination of their distribution at the level of the two pulmonary fields [29-33]. Reconstructions in MIP mode (maximum intensity projection) sensitize their detection and the analysis of their distribution. CT can also be used to search for other asymptomatic locations such as cerebral locations [34].

The dissemination assessment must be systematically carried out in search of other localizations, including: search for BK in the urine, fundus examination, lumbar puncture, osteomedullary biopsy, abdominopelvic ultrasound, and depending on the warning signs, a lymph node biopsy, pleural biopsy puncture, cerebral CT, echocardiography, spinal MRI [35, 16].

In our series, the diagnosis was confirmed bacteriologically in 23% of cases. According to the literature, the percentage of confirmed miliary tuberculosis is variable. Thus, it is 82% for Kim *et al*., [37], 77.7% for Zaghba *et al*., [18], 36% for Ouédraogo *et al*., [17] and 24% for Toloba *et al*., [25].

On the therapeutic level, the advent of anti-tuberculosis drugs and the improvement of resuscitation methods have modified the evolution and prognosis of this condition and have contributed to reducing its mortality. It is not legitimate to wait for the results of additional examinations (bacilloscopy, ECBU, fundus examination, etc). before starting anti-tuberculosis treatment [18].

2. Tuberculosis Pneumonia and Bronchopneumonia

Pneumonia and tuberculous bronchopneumonia (PT) are rarer forms of pulmonary tuberculosis, but are not exceptional in areas with a high prevalence of tuberculosis.

Pneumonia is an exudative alveolitis that can affect one or more segmental or lobar territories. Bronchopneumonia is a bacillary attack by bronchogenic way of several pulmonary lobules.

As in miliary tuberculosis, specific predisposition grounds are noted such as diabetes, chronic renal failure, gastrectomy, immunosuppression conditions (HIV+, long-term corticosteroid therapy or chemotherapy or biotherapy) [38].

Early diagnosis is not always easy, can be confused with pneumonia and bronchopneumonia due to common germs, which often makes diagnosis late. In caseous pneumonia, for example, the average diagnostic delay in the series of Ouedraogo [39], and Ouiam [40] is 4 and 6 weeks respectively.

The clinical signs are not specific, such as fever, asthenia, weight loss and anorexia, reported in the majority of patients. Functional respiratory signs are dominated by productive cough present in all patients and may be associated with hemoptysis, also dyspnea is common with acute respiratory failure in severe cases [41].

On the radiological level, in tuberculous pneumonia, systematized alveolar opacity with fuzzy boundaries is found, and sometimes associated with cavities. Homo or contralateral nodules may also be associated. In tuberculous bronchopneumonia, the chest radiograph shows disseminated nodules of variable size, sometimes confluent and excavated.

The search for acid-fast-bacillus (AFB) on direct sputum examination is the first-line examination in adults with any suspicion of pulmonary tuberculosis. Its performance is not constant. The originality of these forms of tuberculosis lies in the difficulty of detecting AFB, prompting the repetition of the examination and the use of genXpert. If the results are not contributory, other examinations such as gastric tubing or endobronchial aspiration and culture of samples are often essential to highlight the tubercle bacillus [39, 40]. In our series, bacteriological confirmation was obtained by direct examination of sputum in 5 cases

(71.4%) and by molecular biology (Gene X pert) in the other cases (28.6%).

3. Treatment and Prognosis:

According to our National Tuberculosis Program, four major anti-tuberculosis drugs are used: rifampicin (R), isoniazid (H), pyrazinamide (Z) and ethambutol (E).

Thus, the treatment of miliary tuberculosis is 9 months according to the 2RHZE/7RH regimen. In tuberculous pneumonia and bronchopneumonia, treatment is administered for 6 months, including an attack phase consisting of 2 months of rifampicin (10 mg / kg / day), isoniazid (5 mg / kg / day), Ethambutol (15- 20 mg/kg/day) and pyrazinamide (25-30 mg/kg/day) followed by a four-month maintenance phase of rifampicin and isoniazid (2RHZE/4RH).

According to the American Society for Infectious Diseases, the indications for corticosteroid therapy are classified into 3 categories [42]: tuberculous pericarditis [43], tuberculous meningitis [44, 45] and tuberculous pleurisy [42]. Other forms [45] such as dyspneic miliaria are to be discussed on a case-by-case basis. The initial daily dose is between 0.5 and 1 mg/kg of prednisone and must be quickly reduced to achieve withdrawal in 3 months [35].

The prognosis of acute forms of tuberculosis depends on the early diagnosis and treatment. Several complications can be seen, such as the occurrence of acute respiratory distress syndrome [46], pneumothorax [47, 48], purulent pleurisy [49], hematological complications such as intra-coagulation disseminated vascular disease (DIC) [46], macrophage activation syndrome [50] and Schwartz-Bartter syndrome [51]. Other complications are due to associated localizations [52, 53], decompensation of a comorbidities, adverse effects of antituberculosis treatment and sequelae of pulmonary tuberculosis. In our study, the complications were essentially related to the side effects of anti-bacillary treatment, in particular drug-induced hepatitis, recorded in 15.2% of the cases. The mortality rate was 9% related to severe acute respiratory failure.

CONCLUSION

Despite their lower frequency, the acute forms of pulmonary tuberculosis remain serious and can be life-threatening. We insist through our work on the need for rapid diagnosis and adequate care in order to have a better prognosis.

COMPLIANCE WITH ETHICAL STANDARDS

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REFERENCES

1. Ait Khaled, N., Enarson, D., & Billo, N. (1997). Epidémiologie de la tuberculose et de la résistance aux antituberculeux. *Revue des maladies respiratoires. Supplément*, *14*(5), 5S8-5S18.
2. Escobedo-Jaimes, L., Cicero-Sabido, R., Criales-Cortez, J. A., Ramirez, E., Romero, M., Rivero, V., ... & Escobar-Gutierrez, A. (2003). Evaluation of the polymerase chain reaction in the diagnosis of miliary tuberculosis in bone marrow smear. *The International Journal of Tuberculosis and Lung Disease*, *7*(6), 580-586.
3. Sharma, S. K., Mohan, A., Sharma, A., & Mitra, D. K. (2005). Miliary tuberculosis: new insights into an old disease. *The Lancet infectious diseases*, *5*(7), 415-430.
4. Kwong, J. S., Carignan, S., Kang, E. Y., Muller, N. L., & FitzGerald, J. M. (1996). Miliary tuberculosis: diagnostic accuracy of chest radiography. *Chest*, *110*(2), 339-342.
5. Rakotomizao, J. (2006). Caractéristiques épidémiocliniques des miliaires tuberculeuses. *Rev Mal Resp*, 23, 51.
6. Haloui, I., & El Biaz, M. (2006). La miliaire tuberculeuse à propos de dix cas. *Rev Mal Resp*, 23, 2.
7. Sudre, P., Ten Dam, G., & Kochi, A. (1992). Tuberculosis: a global overview of the situation today. *Bulletin of the World Health Organization*, *70*(2), 149-159.
8. Jacob, J. T., Mehta, A. K., & Leonard, M. K. (2009). Acute forms of tuberculosis in adults. *The American journal of medicine*, *122*(1), 12-17.
9. Sharma, S. K., Mohan, A., Sharma, A., & Mitra, D. K. (2005). Miliary tuberculosis: new insights into an old disease. *The Lancet infectious diseases*, *5*(7), 415-430.
10. Kwong, J. S., Carignan, S., Kang, E. Y., Muller, N. L., & FitzGerald, J. M. (1996). Miliary tuberculosis: diagnostic accuracy of chest radiography. *Chest*, *110*(2), 339-342.
11. Mahouachi, R., & Chtouri, A. (2006). Miliaires tuberculeuses à propos de 16 cas. *Rev Mal Resp*, 23, 28.
12. Rachid, A. (2003). Miliaires tuberculeuse à propos de 32 cas. Thèse de Médecine, CHU de Casablanca, no 279.
13. Fetal, N., & Abdelmalek, M. (2009). La miliaire tuberculeuse à propos de 19 cas. *Rev Mal Resp*, 26, 23.
14. Domoua, K., Gahoussou, C., N'dhatz, M., Aka-Danguy, E., Konan, J., & Kouadio, Y. (1990). Miliaires tuberculeuses à propos de 90 cas observés en 6 ans dans le service de pneumophtisiologie du CHU de Treichville. *Publications médicales africaines*, (106), 46-51.

15. Aggarwal, B., & Menon, B. (2007). A case with pulmonary tuberculosis, pleural effusion, miliary tuberculosis, cervical and mediastinal lymphadenopathy, tubercular arthritis, psoas abscess and severe anemia. *Respiratory Medicine Extra*, *3*(2), 79-82.
16. Vijayan, V. K. (2007). Miliary tuberculosis and its squeals. *Indian J Med Resp*, 126, 176-178.
17. Ouedraogo, M., & Ouedraogo, G. Aspect épidémiologique et clinique des miliaires à Burkina Faso, à propos de 93 cas. *Med Afr*, 47, 180-183.
18. Zaghba, N., El Hachimi, K., Benjelloun, H., & Yassine, N. (2018). La miliaire tuberculeuse, une série rétrospective marocaine. *Revue de Pneumologie Clinique*, *74*(1), 28-34.
19. Rachid, A. (2003). Miliaires tuberculeuse à propos de 32 cas. Thèse de Médecine, CHU de Casablanca, no 279.
20. Mahouachi, R., & Chtouri, A. (2006). Miliaires tuberculeuses à propos de 16 cas. *Rev Mal Resp*, 23, 28.
21. Riah, A., & Afif, N. (2009). Miliaires tuberculeuses à propos de 48 cas. *Rev Mal Resp*, 26, 23.
22. Ballouhey, Q., Lau, S., Accadbled, F., Wahn, U., Kaiser, D., Rothe, K., & Magdorf, K. (2012). Miliary tuberculosis complicated by pulmonary cavitations and pneumothorax in a 14-month old boy. *Annals of Thoracic and Cardiovascular Surgery*, *18*(4), 355-358.
23. Kim, D. K., Kim, H. J., Kwon, S. Y., Yoon, H. I., Lee, C. T., Kim, Y. W., ... & Lee, J. H. (2008). Nutritional deficit as a negative prognostic factor in patients with miliary tuberculosis. *European Respiratory Journal*, *32*(4), 1031-1036.
24. Touré, N. O., Cissé, M. F., Diatta, A., Ndiaye, E. H., Thiam, K., & Hane, A. A. (2011). Miliary tuberculosis: a report of 49 cases. *Revue des Maladies Respiratoires*, *28*(3), 312-316.
25. Toloba, Y., Diallo, S., Maïga, Y., Sissoko, B. F., & Keïta, B. (2011). Miliary tuberculosis in Mali during the decade 2000-2009. *Revue de Pneumologie Clinique*, *68*(1), 17-22.
26. Graffin, B., N'GUYEN, G., Maslin, J., Raillat, A., HENO, P., & KRAEMER, P. (2000). Une fièvre au long cours inhabituelle en France. *Revue de pneumologie clinique (Paris)*, *56*(6), 375-378.
27. Escobedo-Jaimes, L., Cicero-Sabido, R., Criales-Cortez, J. A., Ramirez, E., Romero, M., Rivero, V., ... & Escobar-Gutierrez, A. (2003). Evaluation of the polymerase chain reaction in the diagnosis of miliary tuberculosis in bone marrow smear. *The International Journal of Tuberculosis and Lung Disease*, *7*(6), 580-586.
28. Kwong, J. S., Carignan, S., Kang, E. Y., Muller, N. L., & FitzGerald, J. M. (1996). Miliary tuberculosis: diagnostic accuracy of chest radiography. *Chest*, *110*(2), 339-342.
29. Andreu, J., Caceres, J., Pallisa, E., & Martinez-Rodriguez, M. (2005). Manifestations radiologiques de la tuberculose pulmonaire. EMC-Radiologie Paris: Elsevier Masson SAS, 2, 121-132.
30. Burrill, J., Williams, C. J., Bain, G., Conder, G., Hine, A. L., & Misra, R. R. (2007). Tuberculosis: a radiologic review. *Radiographics*, *27*(5), 1255-1273.
31. Harisinghani, M. G., McLoud, T. C., Shepard, J. A. O., Ko, J. P., Shroff, M. M., & Mueller, P. R. (2000). Tuberculosis from head to toe. *Radiographics*, 20, 449-547.
32. Jeong, Y. J., & Lee, K. S. (2008). Pulmonary tuberculosis: up-to-date imaging and management. *AJR Am J Roentgenol*, *191*(3), 834-844.
33. Koh, W. J., Jeong, Y. J., Kwon, O. J., Kim, H. J., Cho, E. H., Lew, W. J., & Lee, K. S. (2010). Chest radiographic findings in primary pulmonary tuberculosis: observations from high school outbreaks. *Korean journal of radiology*, *11*(6), 612-617.
34. Hantous-Zannad, S., Zidi, A., Néji, H., Attia, M., Baccouche, I., & Miled-M'rad, K. B. (2015). Apport de l'imagerie dans la tuberculose thoracique. *Revue de pneumologie clinique*, *71*(2-3), 93-109.
35. Fouzi, S., Ketata, F. W., Marwen, I., Msaad, S., & Yangui, A. A. (2010). La miliaire tuberculeuse: à propos de 29 cas. *Revue Tunisienne d'Infectiologie*, 46-52.
36. Zaghba, N., Bakhatar, A., Yassine, N., & Bahlaoui, A. (2011). Association d'un tuberculome intramédullaire du cône terminal, de tuberculomes cérébraux et d'une tuberculose miliaire et hématologique. *Médecine et maladies infectieuses*, *41*(3), 157-158.
37. Kim, D. K., Kim, H. J., Kwon, S. Y., Yoon, H. I., Lee, C. T., Kim, Y. W., ... & Lee, J. H. (2008). Nutritional deficit as a negative prognostic factor in patients with miliary tuberculosis. *European Respiratory Journal*, *32*(4), 1031-1036.
38. Schlossberg, D. (2010). Acute tuberculosis. *Infect Dis Clin North Am*, 24(1), 139-146.
39. Ouedraogo, M., Ouedraogo, S. M., Toloba, Y., Kouanda, S., Lougue, C., Boncoungou, K., ... & Koshinga, B. A. (2006). Pneumonie tuberculeuse en zone de forte prévalence tuberculose/VIH. *Mali medical*, *11*(3), 32-35.
40. Bakouh, O., Aniked, S., & Bourkadi, J. (2014). La pneumonie tuberculeuse: une nouvelle série de 27 cas. *Pan African Medical Journal*, *19*(1).
41. Levy, H., Kallenbach, J. M., Feldman, C., Thorburn, J. R., & Abramowitz, J. A. (1987). Acute respiratory failure in active tuberculosis. *Critical care medicine*, *15*(3), 221-225.
42. Bouvet, E. (2002. Traitement de la tuberculose et organisation dessoins. *Rev Prat*, 52, 2144-150.
43. Stucki, A., Cottagnoud, P., & Fischli, S. (2005). Rare cause of right heart failure: two

cases. *Deutsche Medizinische Wochenschrift (1946)*, *130*(21), 1314-1317.

44. Thwaites, G. E., Bang, N. D., Dung, N. H., Quy, H. T., Oanh, D. T. T., Thoa, N. T. C., ... & Farrar, J. J. (2004). Dexamethasone for the treatment of tuberculous meningitis in adolescents and adults. *New England Journal of Medicine*, *351*(17), 1741-1751.
45. Billy, C., & Perronne, C. (2002). Traitement de la tuberculose sensible et résistante aux antituberculeux: La tuberculose. In *Annales de médecine interne (Paris)* (Vol. 153, No. 2, pp. 119-127).
46. Baziz, A. (1995). Détresse respiratoire aiguë et miliaire tuberculeuse. *Ann Med Interne*, 146, 114.
47. Wammanda, R. D., Ameh, E. A., & Ali, F. U. (2003). Pneumothorax bilatéral compliquant la miliaire tuberculeuse chez les enfants: rapport de cas et examen de la littérature. *Ann Trop Pediatr*, *23*, 149-152.
48. Mert, A., Bilir, M., Akman, C., Ozaras, R., Tabak, F., Ozturk, R., ... & Aktuglu, Y. (2001). Spontaneous pneumothorax: a rare complication of miliary tuberculosis. *Annals of thoracic and cardiovascular surgery: official journal of the Association of Thoracic and Cardiovascular Surgeons of Asia*, *7*(1), 45-48.
49. Runo, J. R., Welch, D. C., Ness, E. M., Robbins, I. M., & Milstone, A. P. (2003). Miliaire tuberculeuse comme cause de l'empyème aigu. *Respiration*, *70*, 529-532.
50. Dilber, E., Erduran, E., Kalyoncu, M., Aynaci, F. M., Okten, A., & Ahmetoglu, A. (2002). Syndrome hemophagocytaire comme première présentation de la miliaire tuberculeuse sans résultats pulmonaires. *Scand J Infect Dis*, *34*, 689-692.
51. Nishizawa, Y., Yamamori, C., Nishimura, Y., Iwai, K., Okaishi, K., Morimoto, S., ... & Fujimura, M. (2003). A case of pulmonary tuberculosis initially presented with syndrome of inappropriate secretion of antidiuretic hormone (SIADH). *Kekkaku (Tuberculosis)*, *78*(1), 27-31.
52. Elouazzani, H., Bouchentouf, R., Rguibi, M., Rhorfi, I., Ouarssani, A., & Yassir, Z. (2002). La tuberculose multifocale: A propos d'un cas. *Revue de pneumologie clinique (Paris)*, *58*(1), 39-42.
53. Stelianides, S., Belmatoug, N., & Fantin, B. (1997). Manifestations et diagnostic de la tuberculose extrapulmonaire. *Revue des maladies respiratoires. Supplément*, *14*(5), 5S72-5S87.