



BÖLÜM 12

Tüberküloz

Mehmet CİNGÖZ¹

GİRİŞ

Tüberküloz (Tb), *Mycobacterium tuberculosis* (*M. tuberculosis*) basilinin neden olduğu ve özellikle gelişmekte olan ülkelerde önemli bir morbidite ve mortalite sebebi olan, hava yoluyla bulaşan, sıklıkla akciğerler olmak üzere tüm organ ve dokuları tutabilen bulaşıcı bir enfeksiyon hastalığıdır (1-3). *M. tuberculosis* yanı sıra *Mycobacterium bovis*, *Mycobacterium africanum*, *Mycobacterium microti* ve *Mycobacterium canettii* de hastalıktan sorumlu ajanlar arasında yer almaktadır. Aktif tüberkülozu bulunan kişilerin öksürmesi, hapsirması ya da konuşmasıyla 1-5 µm boyutundaki damlacıklar şeklinde mikobakteriler saatlerce havada asılı kalabilir. Tb basiline maruz kalan tüm yetişkinler enfekte olmaz; kişiden kişiye bulaş Tb kaynağının enfektivitesi ve maruz kalan kişinin immün durumu ile ilişkilidir. Havadaki damlacıklar inhalasyon yolu ile terminal hava yollarına ulaşır ve burada alveolar makrofajları enfekte eder. Enfekte bireylerin %5'inde immün sistem başlangıçtaki enfeksiyonu kontrol etmede yetersiz kalır ve 1-2 yıl içinde primer Tb olarak bilinen aktif Tb gelişir (4). Enfekte kişilerin diğer %5'inde immün sistem başlangıçtaki enfeksiyonu kontrol altına alabilecek kadar efektiftir ancak canlı mikobakteri daha sonra reaktive olmak üzere dormant halde kalır; bu durum ise postprimer ya da reaktivasyon Tb olarak bilinir. Basil ile karşılaşan kişilerin geriye kalan %90'ında semptomatik Tb gelişmez ve hastalık latent Tb enfeksiyonu şeklinde subklinik seviyede atlatılır. Latent enfek-

¹ Uzm. Dr., Başakşehir Çam ve Sakura Şehir Hastanesi, Radyoloji Kliniği, cingozmehmett@hotmail.com, ORCID iD: 0000-0002-6937-2692

KAYNAKLAR

1. Cegielski JP, Chin DP, Espinal MA, Frieden TR, Cruz RR, Talbot EA, et al. The global tuberculosis situation: progress and problems in the 20th century, prospects for the 21st century. *Infectious Disease Clinics*. 2002;16(1):1-58.
2. Corbett EL, Watt CJ, Walker N, Maher D, Williams BG, Raviglione MC, et al. The growing burden of tuberculosis: global trends and interactions with the HIV epidemic. *Archives of internal medicine*. 2003;163(9):1009-21.
3. Tufariello JM, Chan J, Flynn JL. Latent tuberculosis: mechanisms of host and bacillus that contribute to persistent infection. *The Lancet infectious diseases*. 2003;3(9):578-90.
4. Leung AN. Pulmonary tuberculosis: the essentials. *Radiology*. 1999;210(2):307-22.
5. Bagcchi S. WHO's Global Tuberculosis Report 2022. *Lancet Microbe*. 2023;4(1):e20.
6. T.C. Sağlık Bakanlığı, Halk Sağlığı Genel Müdürlüğü, Tüberküloz Dairesi Başkanlığı. Ulusal Tüberküloz Kontrol Programı. Ankara; 2022.
7. Jeong YJ, Lee KS. Pulmonary tuberculosis: up-to-date imaging and management. *AJR Am J Roentgenol*. 2008;191(3):834-44.
8. Blumberg HM, Burman WJ, Chaisson RE, Daley CL, Etkind SC, Friedman LN, et al. American Thoracic Society/Centers for Disease Control and Prevention/Infectious Diseases Society of America: treatment of tuberculosis. *Am J Respir Crit Care Med*. 2003;167(4):603-62.
9. Houben ENG, Nguyen L, Pieters J. Interaction of pathogenic mycobacteria with the host immune system. *Current Opinion in Microbiology*. 2006;9(1):76-85.
10. Kaufmann SH. Protection against tuberculosis: cytokines, T cells, and macrophages. *Ann Rheum Dis*. 2002;61 Suppl 2(Suppl 2):ii54-8.
11. Schwander S, Dheda K. Human lung immunity against *Mycobacterium tuberculosis*: insights into pathogenesis and protection. *Am J Respir Crit Care Med*. 2011;183(6):696-707.
12. Ahmad S. Pathogenesis, immunology, and diagnosis of latent *Mycobacterium tuberculosis* infection. *Clin Dev Immunol*. 2011;2011:814943.
13. Patterson JE. *A Clinician's Guide to Tuberculosis*. Michael D. Iseman; Philadelphia, PA: Lippincott Williams & Wilkins, 2000;448 pages. *Infection Control & Hospital Epidemiology*. 2001;22(5):322-3.
14. Ober WB. Ghon but not forgotten: Anton Ghon and his complex. *Pathol Annu*. 1983;18 Pt 2:79-85.
15. American Thoracic Society. Diagnostic standards and classification of tuberculosis. *Am Rev Respir Dis*. 1990;142(3):725-35.
16. MacGregor RR. Tuberculosis: from history to current management. *Semin Roentgenol*. 1993;28(2):101-8.
17. Self-study modules on tuberculosis. Centers for Disease Control and Prevention website. <http://www.cdc.gov/tb/education/ssmodules/>. 2016.
18. Jauregui-Amezaga A, Turon F, Ordás I, Gallego M, Feu F, Ricart E, et al. Risk of developing tuberculosis under anti-TNF treatment despite latent infection screening. *J Crohns Colitis*. 2013;7(3):208-12.
19. Burrill J, Williams CJ, Bain G, Conder G, Hine AL, Misra RR. Tuberculosis: a radiologic review. *Radiographics*. 2007;27(5):1255-73.
20. McAdams HP, Erasmus J, Winter JA. Radiologic manifestations of pulmonary tuberculosis. *Radiol Clin North Am*. 1995;33(4):655-78.
21. Marais BJ, Parker SK, Verver S, van Rie A, Warren RM. Primary and postprimary or reactivation tuberculosis: time to revise confusing terminology? *AJR Am J Roentgenol*. 2009;192(4):W198; author reply W9-200.
22. Verver S, Warren RM, Beyers N, Richardson M, van der Spuy GD, Borgdorff MW, et al. Rate of reinfection tuberculosis after successful treatment is higher than rate of new tuberculosis. *Am J Respir Crit Care Med*. 2005;171(12):1430-5.

23. Bandera A, Gori A, Catozzi L, Degli Esposti A, Marchetti G, Molteni C, et al. Molecular epidemiology study of exogenous reinfection in an area with a low incidence of tuberculosis. *J Clin Microbiol.* 2001;39(6):2213-8.
24. Restrepo CS, Katre R, Mumbower A. Imaging Manifestations of Thoracic Tuberculosis. *Radiol Clin North Am.* 2016;54(3):453-73.
25. Andreu J, Cáceres J, Pallisa E, Martínez-Rodríguez M. Radiological manifestations of pulmonary tuberculosis. *Eur J Radiol.* 2004;51(2):139-49.
26. Woodring JH, Vandiviere HM, Fried AM, Dillon ML, Williams TD, Melvin IG. Update: the radiographic features of pulmonary tuberculosis. *AJR Am J Roentgenol.* 1986;146(3):497-506.
27. Wetscherek MTA, Sadler TJ, Lee JYJ, Karia S, Babar JL. Active pulmonary tuberculosis: something old, something new, something borrowed, something blue. *Insights Imaging.* 2022;13(1):3.
28. Van Dyck P, Vanhoenacker FM, Van den Brande P, De Schepper AM. Imaging of pulmonary tuberculosis. *Eur Radiol.* 2003;13(8):1771-85.
29. Im JG, Itoh H, Shim YS, Lee JH, Ahn J, Han MC, et al. Pulmonary tuberculosis: CT findings--early active disease and sequential change with antituberculous therapy. *Radiology.* 1993;186(3):653-60.
30. Valdés L, Alvarez D, San José E, Penela P, Valle JM, García-Pazos JM, et al. Tuberculous pleurisy: a study of 254 patients. *Arch Intern Med.* 1998;158(18):2017-21.
31. Curvo-Semedo L, Teixeira L, Caseiro-Alves F. Tuberculosis of the chest. *Eur J Radiol.* 2005;55(2):158-72.
32. Hopewell PC. A clinical view of tuberculosis. *Radiol Clin North Am.* 1995;33(4):641-53.
33. Rozenshtein A, Hao F, Starc MT, Pearson GD. Radiographic appearance of pulmonary tuberculosis: dogma disproved. *AJR Am J Roentgenol.* 2015;204(5):974-8.
34. Nachiappan AC, Rahbar K, Shi X, Guy ES, Mortani Barbosa EJ, Jr., Shroff GS, et al. Pulmonary Tuberculosis: Role of Radiology in Diagnosis and Management. *Radiographics.* 2017;37(1):52-72.
35. Goodwin RA, Des Prez RM. Apical localization of pulmonary tuberculosis, chronic pulmonary histoplasmosis, and progressive massive fibrosis of the lung. *Chest.* 1983;83(5):801-5.
36. Hadlock FP, Park SK, Awe RJ, Rivera M. Unusual radiographic findings in adult pulmonary tuberculosis. *AJR Am J Roentgenol.* 1980;134(5):1015-8.
37. Poey C, Verhaegen F, Giron J, Lavayssiere J, Fajadet P, Duparc B. High resolution chest CT in tuberculosis: evolutive patterns and signs of activity. *J Comput Assist Tomogr.* 1997;21(4):601-7.
38. Pérez-Guzman C, Torres-Cruz A, Villarreal-Velarde H, Salazar-Lezama MA, Vargas MH. Atypical radiological images of pulmonary tuberculosis in 192 diabetic patients: a comparative study. *Int J Tuberc Lung Dis.* 2001;5(5):455-61.
39. Rajeswaran G, Becker JL, Michailidis C, Pozniak AL, Padley SP. The radiology of IRIS (immune reconstitution inflammatory syndrome) in patients with mycobacterial tuberculosis and HIV co-infection: Appearances in 11 patients. *Clin Radiol.* 2006;61(10):833-43.
40. Leung AN, Müller NL, Pineda PR, FitzGerald JM. Primary tuberculosis in childhood: radiographic manifestations. *Radiology.* 1992;182(1):87-91.
41. Grzybowski S, Fishaut H, Rowe J, Brown A. Tuberculosis among patients with various radiologic abnormalities, followed by the chest clinic service. *Am Rev Respir Dis.* 1971;104(4):605-8.
42. Hamid S, Hussain S, Ali I. Comparative analysis of case screening with varying cough duration and sputum samples for diagnosis of tuberculosis in patients attending the OPD at a tertiary care hospital at Srinagar, India. *Nigerian Journal of Clinical Practice.* 2012;15(4):430-5.
43. Mathew P, Kuo YH, Vazirani B, Eng RH, Weinstein MP. Are three sputum acid-fast bacillus smears necessary for discontinuing tuberculosis isolation? *J Clin Microbiol.* 2002;40(9):3482-4.

44. Hobby GL, Holman AP, Iseman MD, Jones JM. Enumeration of tubercle bacilli in sputum of patients with pulmonary tuberculosis. *Antimicrob Agents Chemother.* 1973;4(2):94-104.
45. Diagnostic Standards and Classification of Tuberculosis in Adults and Children. This official statement of the American Thoracic Society and the Centers for Disease Control and Prevention was adopted by the ATS Board of Directors, July 1999. This statement was endorsed by the Council of the Infectious Disease Society of America, September 1999. *Am J Respir Crit Care Med.* 2000;161(4 Pt 1):1376-95.
46. Lee ES, Park CM, Goo JM, Yim JJ, Kim HR, Lee HJ, et al. Computed tomography features of extensively drug-resistant pulmonary tuberculosis in non-HIV-infected patients. *J Comput Assist Tomogr.* 2010;34(4):559-63.
47. Guidance for national tuberculosis programmes on the management of tuberculosis in children. Chapter 2: anti-tuberculosis treatment in children. *Int J Tuberc Lung Dis.* 2006;10(11):1205-11.
48. Mazurek GH, Jereb J, Vernon A, LoBue P, Goldberg S, Castro K. Updated guidelines for using Interferon Gamma Release Assays to detect Mycobacterium tuberculosis infection - United States, 2010. *MMWR Recomm Rep.* 2010;59(Rr-5):1-25.
49. Adams LV, Waddell RD, Von Reyn CF. T-SPOT.TB Test(R) results in adults with Mycobacterium avium complex pulmonary disease. *Scand J Infect Dis.* 2008;40(3):196-203.
50. Erasmus JJ, McAdams HP, Farrell MA, Patz EF, Jr. Pulmonary nontuberculous mycobacterial infection: radiologic manifestations. *Radiographics.* 1999;19(6):1487-505.
51. Diagnosis and treatment of disease caused by nontuberculous mycobacteria. This official statement of the American Thoracic Society was approved by the Board of Directors, March 1997. Medical Section of the American Lung Association. *Am J Respir Crit Care Med.* 1997;156(2 Pt 2):S1-25.
52. Lee KS, Song KS, Lim TH, Kim PN, Kim IY, Lee BH. Adult-onset pulmonary tuberculosis: findings on chest radiographs and CT scans. *AJR Am J Roentgenol.* 1993;160(4):753-8.
53. Winer-Muram HT, Rubin SA. Thoracic complications of tuberculosis. *J Thorac Imaging.* 1990;5(2):46-63.
54. Im JG, Webb WR, Han MC, Park JH. Apical opacity associated with pulmonary tuberculosis: high-resolution CT findings. *Radiology.* 1991;178(3):727-31.
55. Logan PM, Müller NL. CT manifestations of pulmonary aspergillosis. *Crit Rev Diagn Imaging.* 1996;37(1):1-37.
56. Moon WK, Im JG, Yeon KM, Han MC. Tuberculosis of the central airways: CT findings of active and fibrotic disease. *AJR Am J Roentgenol.* 1997;169(3):649-53.
57. Galdermans D, Verhaert J, Van Meerbeeck J, de Backer W, Vermeire P. Broncholithiasis: present clinical spectrum. *Respir Med.* 1990;84(2):155-6.
58. Song JW, Im JG, Shim YS, Park JH, Yeon KM, Han MC. Hypertrophied bronchial artery at thin-section CT in patients with bronchiectasis: correlation with CT angiographic findings. *Radiology.* 1998;208(1):187-91.
59. Santelli ED, Katz DS, Goldschmidt AM, Thomas HA. Embolization of multiple Rasmussen aneurysms as a treatment of hemoptysis. *Radiology.* 1994;193(2):396-8.
60. Remy J, Smith M, Lemaitre L, Marache P, Fournier E. Treatment of massive hemoptysis by occlusion of a Rasmussen aneurysm. *AJR Am J Roentgenol.* 1980;135(3):605-6.
61. Moon WK, Im JG, Yeon KM, Han MC. Mediastinal tuberculous lymphadenitis: CT findings of active and inactive disease. *AJR Am J Roentgenol.* 1998;170(3):715-8.
62. Lee JY, Kim Y, Lee KS, Chung MP. Tuberculous fibrosing mediastinitis: radiologic findings. *AJR Am J Roentgenol.* 1996;167(6):1598-9.
63. Mönig SP, Schmidt R, Wolters U, Krug B. Esophageal tuberculosis: a differential diagnostic challenge. *Am J Gastroenterol.* 1995;90(1):153-4.

64. Suchet IB, Horwitz TA. CT in tuberculous constrictive pericarditis. *J Comput Assist Tomogr.* 1992;16(3):391-400.
65. Song JW, Im JG, Goo JM, Kim HY, Song CS, Lee JS. Pseudochylous pleural effusion with fat-fluid levels: report of six cases. *Radiology.* 2000;216(2):478-80.
66. Westcott JL, Volpe JP. Peripheral bronchopleural fistula: CT evaluation in 20 patients with pneumonia, empyema, or postoperative air leak. *Radiology.* 1995;196(1):175-81.
67. Glicklich M, Mendelson DS, Gendal ES, Teirstein AS. Tuberculous empyema necessitatis. Computed tomography findings. *Clin Imaging.* 1990;14(1):23-5.
68. Ridley N, Shaikh MI, Remedios D, Mitchell R. Radiology of skeletal tuberculosis. *Orthopedics.* 1998;21(11):1213-20.