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OLGU SUNUMU / CASE REPORT

Bloodstream infection caused by mycobacterium abscessus

Mycobacterium abscessus'un neden olduğu kan dolaşımı enfeksiyonu

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Abstract

Rapidly growing mycobacteria including M. abscessus complex are normal environmental inhabitants and may become opportunistic pathogens especially in immunosuppressed hosts. We report a bloodstream infection case caused by M. abscessus in a 10 year-old female patient with stage IV neuroblastoma diagnosis. After isolation of microorganism from blood culture bottle, the microorganism was identified by matrix assisted laser desorption ionization time-of-flight mass spectrometry and BD Phoenix automated identification and drug susceptibility device. Clarithromycin was added to her current antibiotic therapy and the patient was discharged with recovery. Non-tuberculosis mycobacteria are becoming serious opportunistic pathogens, physicians must take these microorganisms under consideration for especially immunosuppressed patients. Due to wide diversity of antimicrobial resistance patterns, species level identification is crucial.

Key words: Non-tuberculosis mycobacteria, rapidly-growing mycobacteria, opportunistic pathogens.

Öz

Mycobacterium abscessus kompleksin de dahil olduğu hızlı üreyen mikobakteriler, doğal ortamda bulunan ve özellikle bağışıklığı baskılanmış hastalarda fırsatçı patojen olabilen mikroorganizmalardır. Evre 4 nöroblastoma tanısı olan 10 yaşında bir kız hastada, M. abscessus tarafından oluşturulan kan dolaşımı enfeksiyonunu bildiriyoruz. Mikroorganizmanın kan kültürü şişesinden izole edilmesini müteakip; mikroorganizma, MALDI-TOF MS ve BD Phoenix otomatize tanımlama ve ilaç duyarlılık cihazı ile tanımlanmıştır. Hastanın mevcut antimikrobiyal tedavisine ek olarak klaritromisin eklenmiş ve hasta şifa ile taburcu edilmiştir. Tüberküloz dışı mikobakteriler ciddi fırsatçı patojenler olarak karşımıza çıkmakta ve hekimlerin özellikle bağışıklığı baskılanmış hastalarda bu mikroorganizmaları değerlendirmeye almaları gerekmektedir. Antimikrobiyal direnç profilindeki değişkenlikten dolayı, tür düzeyinde tanımlama kritik rol oynamaktadır.

Anahtar kelimeler: Tüberküloz dışı mikobakteriler, hızlı üreyen mikobakteriler, fırsatçı patojenler.

INTRODUCTION

Non-tuberculosis mycobacteria (NTM) are normal environmental inhabitants with over than 150 species and opportunistic pathogens especially in immunosuppressed hosts[1,2]. Laboratory isolation of these species was thought to be as contamination or colonization, but particularly with the pandemic of acquired immune deficiency syndrome (AIDS), NTMs have been inserted into the cluster of opportunistic pathogenic microorganisms[2]. Recently, there is an increasing status in NTM infections worldwide due to elevated numbers of immunosuppressed hosts (particularly transplantation and HIV positive patients). Of note, increased awareness, isolation and detection capabilities (including improved culture and molecular techniques) have also effect on this increasing status[1].

As environmental inhabitants, NTM have been isolated from many sources such as drinking water pipelines, water tanks, baths, soil, dust, ice and even from highly salted seawater and cigarettes[1,3]. NTM infections were reported from multiple countries and various climates, showing a wide variability on species distribution which is possibly related to geographic location, climate, type and prevalence of underlying diseases, population density and host

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factors[3]. Additionally, the infection shows itself in various forms of manifestations such as pulmonary, skin, soft tissue, catheter and disseminated infections[2].

Rapidly growing mycobacteria (RGM) including M. abscessus complex have been known to cause outbreaks in spite of their low-degree virulence, but also they have a high capability to create biofilms and to colonize particularly on catheters[4]. Organ transplantation and hematological malignancy patients occasionally develop disseminated infection with RGM, especially M. abscessus complex and M. chelonae[2]. Their susceptibility to antibiotics varies on species level and thus, certain identification is crucial because of different susceptibility patterns. Members of M. abscessus complex (M. abscessus subsp. abscessus, M. abscessus subsp. massiliense, and M. abscessus subsp. bolletii) are multidrug resistant via multiple drug-resistance mechanisms[5]. Members of this complex have a wide spectrum of skin and soft tissue diseases, bloodstream and central nervous system infections, and ocular and other manifestations[5,6].

CASE

The aim of this article is to report a bloodstream infection caused by M. abscessus. The patient was 10-year-old female diagnosed with stage IV neuroblastoma, followed by our pediatric department. The patient was applied for a bone marrow transplantation (BMT) and the transplanted tissue accepted as to be adapted after the 28th day of transplantation. At the 118th day of transplantation, a seizure occurred with shaking fever (40^{0}C) and routine blood testing and cultures were scheduled. Ralstonia sp was isolated from blood culture and immediate antibiotic treatment was begun according to drug susceptibility tests. Clinical condition of the patient improved instantly, but due to the patient's immunosuppressed condition, collecting routine blood samples and cultures (blood, urine, etc.) were continued. One blood culture was detected as positive by BACTEC 9240 automated blood culture system (Becton Dickinson, Sparks, Maryland, USA). The gram staining did not indicate any visual agent, but after incubation of 48 hours at 37^{0}C and in 5% CO_2 atmosphere, small, white colonies were observed on subculture plates. The strain was applied gram staining again; probable gram positive bacilli with atypical staining were seen. Both matrix assisted laser desorption ionization time-of-flight mass spectrometry (MALDI-TOF MS) (Bruker Daltonics, GmbH, Bremen, Germany) and BD Phoenix automated identification and drug susceptibility device (Becton Dickinson, Sparks, Maryland, USA) were used for identification. Both devices defined the strain as Mycobacterium abscessus. For further evaluation the strain was transferred to our mycobacteriology laboratory. Acid-fast staining was performed and acid-fast bacilli were seen on microscopic examination. PCR and GenoType MDRsl reverse hybridization method (Hain Lifescience GmbH, Nehren, Germany) were used to verify previous identification. The results were reported to the physician with a commentary of possibility to be contamination because of absence of additional confirmatory blood culture bottle. Conventional culture with Löwenstein-Jensen solid medium and BACTEC MGIT 960 (Becton Dickinson, Sparks, Maryland, USA) liquid culture system were also used. In BACTEC MGIT 960 system, discrimination of Mycobacterium tuberculosis complex (MTBC) and NTM was achieved by selective inhibition of MTBC via presence of para-nitro benzoic asid (PNB) and we also performed rapid species identification by using BD MGIT TBc Identification immunochromatographic assay (Becton Dickinson, Sparks, Maryland, USA). Because of immunosuppressive status of the patient, antibiotic treatment (macrolide) was scheduled in addition to the patient's current antimicrobial therapy. The patient discharged and no growth was detected from successive blood cultures.

DISCUSSION

Members of M. abscessus complex make visible non-pigmented colonies on Löwenstein-Jensen media in approximately 7 days. These microorganisms may grow on routine media such as 5% sheep blood agar or chocolate agar in a few days. Because most of these species grow well on routine automated blood culture systems, isolation does not require any particular interventions. Biochemical tests are time consuming and may not identify at species-level but, molecular methods provide accurate and rapid identification of RGM[6,7].

MALDI-TOF MS is a new identification technique, and gives reliable identification results within minutes[8]. This device has been evaluated by many researchers for Mycobacterium tuberculosis complex and NTM. The identification rates of

MALDI-TOF MS for NTMs vary, but especially after application of new mycobacteria extraction protocol, the rates seem to be more promising. It is crucial to identify the exact species for determining appropriate antimicrobial therapy and so, this device seems to be useful for differentiation of RGM, especially M. abscessus complex from cultures[8,9].

M. abscessus complex may cause various infections. Members of M. abscessus complex are resistant to many disinfectants and may cause surgical, post-procedural, respiratory tract, skin, soft tissue, central nervous system, disseminated and bloodstream infections. In addition, because of variable resistance patterns, infections caused by this complex are more difficult to treat. Surgical procedures, intravascular catheterization and other invasive interventions can be the portal of entry[5]. Our patient was applied multiple intravascular interventions, which may be possible reason of our patient's bloodstream infection. After removal of catheters and using appropriate antibiotic regimen, the patient was discharged with cure.

M. abscessus complex is relatively more resistant to antibiotics, which may cause therapeutic failure. Discrimination of these species and certainly identifying the causative pathogen are crucial to prevent expensive and time-consuming treatments. Even though these species are resistant to most anti-mycobacterial agents, including tetracyclines, fluoroquinolones and sulphonamides, they are usually susceptible to clarithromycin and amikacin (over than 80%) and the infections of these species are recommended to be treated with these antibiotics or combinations of them[10,11]. On the other hand, recent studies reported that M. abscessus subsp. abscessus and M. abscessus subsp. bolletii harboring inducible erm gene may show intrinsic resistance to macrolides[5]. In vitro susceptibility testing for M. abscessus complex is recommended via broth microdilution method[6]. In this case, the organism was isolated only from one blood culture bottle, for this reason drug susceptibility test was not performed.

Studies indicated that aminoglycosides, clarithromycin, tigecycline and cefoxitin have the best antimicrobial activity against the M. abscessus complex, but susceptibilities may vary on subspecies level. Macrolides are the only drugs which can be used orally among these antibiotics but monotherapy is not recommended that may lead to the resistance later on. Instead, combination with clarithromycin, one aminoglycoside (preferably amikacin) and one injectable drug such as cefoxitin or imipenem is recommended, although further studies for clinical evaluation are still necessary for this form of therapy[11]. In this case, clarithromycin was added to the patient's previous antimicrobial therapy.

In conclusion, due to rising importance of NTMs as becoming serious opportunistic pathogens, physicians should take these microorganisms under consideration for especially immunosuppressed patients. Laboratories should also be informed for these kinds of cases that these microorganisms should not be considered as contamination only. MALDI-TOF MS is rapid identification method, but it should be confirmed by other identification methods. Antimicrobial susceptibility testing is recommended in cases that M. abscessus complex is a real pathogen, but combination therapies may be used as empiric treatment.

REFERENCES

1. Falkinham JO. Environmental sources of nontuberculous mycobacteria. Clin Chest Med. 2015;36:35-41.
2. Henkle E, Winthrop KL. Non-tuberculous mycobacteria infections in immunosuppressed hosts. Clin Chest Med. 2015;36:91-9.
3. Halstrom S, Price P, Thomson R. Review: Environmental mycobacteria as a cause of human infection. Int J Mycobacteriol. 2015;4:81-91.
4. El Helou G, Viola GM, Hachem R, Han XY, Raad II. Rapidly growing mycobacterial bloodstream infections. Lancet Infect Dis. 2013;13:166-74.
5. Lee Meng-Rui, Sheng WH, Hung CC, Yu CJ, Lee LN, Hsueh PR. Mycobacterium abscessus complex infections in humans. Emerg Infect Dis. 2015;21:1638.
6. Brown-Elliott BA, Wallace Jr. RJ. Mycobacterium: clinical and laboratory characteristics of rapidly growing mycobacteria. In Manual of Clinical Microbiology, 11th Ed. (Eds JH Jorgensen, MA Pfaller):595-612.. Washington DC, ASM Press, 2015.
7. Della-Latta P. Mycobacteriology and anti-mycobacterial susceptibility testing. In Clinical Microbiology Procedures Handbook, 3rd Ed. (Eds: LS Garcia, HD Isenberg):1071-139. Washington DC, ASM Press, 2010.
8. Panagea T, Pincus DH, Grogono D, Jones M, Bryant J, Parkhill J et al. Mycobacterium abscessus Complex identification with matrix-assisted laser desorption ionization–time of flight mass spectrometry. J Clin Microbiol. 2015;53:2355-8.
9. La'Tonzia LA, Salee P, Dionne K, Carroll K, Parrish

N. A novel protein extraction method for identification of mycobacteria using MALDI-TOF MS. J Microbiol Methods. 2015;119:1-3.
10. Maurer FP, Bruderer VL, Ritter C, Castelberg C, Bloemberg GV, Böttger EC. Lack of antimicrobial bactericidal activity in Mycobacterium abscessus. Antimicrob Agents Chemother. 2014;58:3828-36.
11. Nessar R, Cambau E, Reyrat JM, Murray A, Gicquel B. Mycobacterium abscessus: a new antibiotic nightmare. J Antimicrob Chemother. 2012;67:810-8.