LETTER TO THE EDITOR / EDİTÖRE MEKTUP

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A Rare Cause of Brain Abscess: *Streptomyces* spp.

Nadir Görülen Bir Beyin Apsesi Nedeni: *Streptomyces* spp.

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Anahtar Kelimeler: Beyin apsesi, pemfigus vulgaris, stereotaktik biyopsi, tedavi

Dear Editor,

Invasive *Streptomyces* infections have been reported rarely in the literature. There is no optimal treatment[1-4]. Two cases of brain abscess caused by *Streptomyces* spp. have been reported in the literature and both cases were diagnosed by stereotactic brain biopsy[3,4]. In this paper, we present two patients who were operated due to brain abscess and surgical samples yielded *Streptomyces* spp.

A 59-year-old male patient, who was using 16 mg/day methylprednisolone and azathioprine for five months due to pemphigus vulgaris, was admitted to our hospital with the complaints of headache and dizziness. Stereotactic brain biopsy was performed by the neurosurgery clinic after the result of cranial magnetic resonance imaging (MRI) which showed nodular lesions measuring 1.3 and 1 cm in diameter (compatible with abscess) at the white matter of the left cerebral parieto-occipital junction. After being discharged from the hospital, he was hospitalized again with the diagnosis of right femoral abscess. On physical examination, there was no pathological finding except erythema, swelling, discharge and temperature increase at the medial side of the right femur. Laboratory results were as follows: leukocyte: 14220/mm^3, neutrophile: 90%, and C-reactive protein (CRP): 2.65 mg/dL. *Streptomyces* spp. were identified on the sheep blood agar during the first 48 hours with the gray white chalk appearance colony morphology, sharp moist smell and filamentous branching structure in the Gram staining procedure. Ampicillin-sulbactam (12 g/day, iv) plus linezolid (1.2 g/day, po) treatment was started. In addition, femoral abscess culture was positive for *Streptomyces* spp. On the 10th day, ampicillin-sulbactam was switched to meropenem due to febrile episode and linezolid was continued. No vegetation was seen on transthoracic echocardiography. Serologic testing for HIV was negative. After a total treatment duration of two months (ampicillin/sulbactam 10 days, meropenem 50 days, linezolid 60 days), repeated MRI revealed regression of abscess size. The patient was referred for neurosurgery consultation and monthly follow-up was suggested. There was no relapse after six months of follow-up.

A 41-year-old male patient treated with methylprednisolone (64 mg/day) due to Still's disease for three months was admitted to another hospital with the complaints of fever, loss of strength in the right arm and speech impairment. Since cranial MRI revealed a bilobulated intracranial mass measuring 3x2x3 cm (compatible with abscess) at the level of basal ganglia of the left temporal lobe, the patient was transferred to our hospital and emergency operation for brain abscess was performed by the neurosurgery clinic. After the operation, the Glasgow coma scale (GCS) score was calculated to be three. Laboratory results were as follows: leucocyte: 11170/mm^3, neutrophile: 75% and CRP: 11 mg/dL. Meropenem (6 g/day) and linezolid (1.2 g/day, iv) were started. *Streptomyces* spp. were identified on the sheep blood agar during the first 48 hours with the gray white chalk appearance colony morphology, sharp moist smell and filamentous branching structure in the Gram staining. The treatment was continued after the brain abscess culture positivity. On the 12th day, meropenem was switched to colistin

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(450 mg/day, iv) and amikacin (15 mg/kg/day, iv, for 10 days) due to hospital-acquired pneumonia with the result of deep tracheal aspiration culture positivity for carbapenem resistant, colistin and amikacin sensitive *Acinetobacter baumannii* plus *Pseudomonas aeruginosa.* Repeated MRI at the first month of treatment showed an intracranial mass surrounded with edema at the level of the left temporal lobe as well as contrast-enhancing nodular lesions at the post-contrast series and subcutaneous collection area. One week after this result, the patient was reoperated by neurosurgery clinic. HIV serology was negative. Histopathological evaluation showed plasma cell and lymphocyte-predominant glial tissues and granulation signs accompanied by myofibroblast proliferation (histiocytes and polymorphonuclear leucocytes were also seen). After 45 days of the treatment (meropenem 12 days, colistin 10 days, amikacin 10 days, linezolid 45 days), repeated MRI revealed regression of abscess size and the patient was discharged with a GCS of 11. No relapse was seen at the 6th month of the follow-up.

Streptomyces spp. are saprophytic organisms usually found in soil. They rarely cause invasive infections in humans. Kapadia et al.[1] published a series of six invasive *Streptomyces* spp. infections (two lung abscess/pneumonia, three central venous catheter-related bacteremia and one possible hipersensitivity pneumonia) in 2007; with the systematic review of 13 cases (only one brain abscess case). Malignancy, AIDS/HIV, central catheter, and prosthetic valve were the major risk factors. Both our cases were immunocompromised patients on treatment for pemphigus vulgaris and Still's disease. Similarly, Riviere et al.[2] from France reported an immunosupressed patient with splenectomy who was treated successfully for six months due to invasive pulmonary infection with imipenem (2 gr/d, 14 days) and amikacin (1 gr/d, 3 days) plus oral rifampin (1.2 gr/day) and ciprofloxacin (1.5 gr/day) based on the results of bronchoalveolar lavage cytology. In a study from the US Center for Disease Control and Prevention Actinomyces Reference Laboratory, a total of 92 *Streptomyces* spp. isolates from local laboratories were identified at the species level via classical biochemical methods and minimum inhibitory concentration levels for *Nocardia* and *Actinomycetes* were reported for all antibiotics according to the Clinical and Laboratory Standards Institute guidelines[3,5]. Susceptibility rates were 100% for amikacin and linezolid, 77% for minocycline, and 67% for imipenem. Less than 50% of *Streptomyces* isolates were found to be susceptible to beta-lactams, ciprofloxacin and sulphonamides[3,5].

In the presented cases, linezolid (due to high cerebrospinal fluid penetration) and meropenem (that was preferred to imipenem due to risk for epileptic episodes)[6,7] were used. Antibiotic susceptibility tests could not be performed, but clinical and laboratory responses were successful. Molecular confirmation of *Streptomyces* spp. (16 s RNA analysis, etc.) could not be performed.

In conclusion, although infections due to *Streptomyces* spp. are rarely seen, it should be kept in mind in terms of differential diagnosis especially for immunocompromised patients. Additionally, our cases reemphasize the importance of stereotactic biopsy for patients with brain abscess. To the best of our knowledge, our cases are the first patients with *Streptomyces* infection (also brain abscess due to *Streptomyces* spp. and treated with linezolid plus meropenem) that are reported from Turkey.

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Ethics

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Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: U.O., O.R.S., T.T., Concept: O.R.S., U.O., Design: M.T., Data Collection or Processing: Ş.A., Analysis or Interpretation: B.A., Literature Search: O.R.S., U.O., M.T., Writing: U.O., O.R.S.

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