

## CITROBACTER FREUNDII ABSCESS MIMICKING METASTATIC BRAIN TUMOR IN AN ADULT: CASE REPORT

Soner ÇİMİ, Emre DURDAĞ, Alp BORCEK, Ozgen AYDINCAK, Memduh KAYMAZ

### ABSTRACT:

Brain abscesses related to *Citrobacter freundii* are rarely encountered during adulthood. Usually, central nervous system (CNS) infections linked with this agent are reported in infancy and childhood. Although rare, there are reported cases of CNS infections with *C. freundii* under the predisposition of various factors such as multiple facial fractures, previous history of neurosurgical interventions, chronic alcoholism, and diabetes mellitus. A 55-year-old woman with a history of breast tumor was admitted to our clinic with the diagnosis of metastatic brain tumor. Other possible factors causing intracranial masses were not considered in the differential diagnosis due to her previous medical history. The patient was operated on under the supposition that she had a metastatic brain tumor; however, intraoperative findings of the lesion were similar to those of an abscess. Microbiological evaluation of the resected specimen revealed an intracranial abscess with a positive culture for *C. freundii*. This case highlights the wide spectrum of intracranial abscesses in immune compromised patients and necessitates a high index of suspicion for appropriate management. Many rare pathogens can be encountered in chronically ill individuals.

**Key words:** *Citrobacter freundii*, Metastatic Brain Tumor, Adult

### ERİŞKİNLERDE METASTATİK BEYİN TÜMÖRÜNÜ TAKLİT EDEN CİTROBAKTER FREUNDII APSESİ: OLGU SUNUMU

#### ÖZ:

*Citrobacter freundii*'ye bağlı beyin absesi durumu yetişkin çağda nadir görülür. Bu etkene bağlı görülen SSS enfeksiyonu bebeklik ve çocukluk çağında bildirilmistir. Yetişkin çağda bu etkene bağlı SSS enfeksiyonu durumu multipl fasial fraktür, nörosürjikal girişim, alkolizm, DM gibi predispozan faktörler eşliğinde bildirilmistir. Daha önce meme CA tanısı nedeni ile operasyon öyküsü olan 55 yaşında bayan hasta metastatik beyin tümörü tanısı ile kliniğimize başvurdu. Hastanın hikayesi mevcut patolojinin metastaz lehine yorumlanmasına ve ayırıcı tanıda intrakranial yer kaplayıcı lezyonlardan uzaklaşılmasına neden olmuştur. Hikayede mevcut olan sistemik hastalık, RT ve KT tedavisinde immünyetmezliğe neden olmuştur. Operasyon sonrasında elde edilen materyalden yapılan kültürlerden *Citrobacter freundii* izole edildi. Bu olgu daha önce bebeklik ve çocukluk çağında pek çok kez izole edilmiş olan bu bakterinin yetişkin çağda immünyetmezliği olan bir hastadaki serebral apse durumlarında akılda bulundurulması gerekliliğini işaret etmektedir.

**Anahtar Kelimeler** *Citrobacter freundii*, Metastatik Beyin Tümörü, Yetişkin

### INTRODUCTION

Brain abscess is a clinical condition leading to capsulated or incapsulated purulent tissue in the brain parenchyma after an acute inflammatory disease.<sup>1</sup> Direct spreading of the infections within the cranial cavity (mastoid, nasal sinuses, skull osteomyelitis) or from the infections linked with the skull fractures or from the infections existing elsewhere within the body can be the etiological cause of a brain abscess. The organisms producing the infection could be one of the frequently encountered pathogenic bacteria; the most frequent of such organisms are *Staphylococcus aureus*, *Streptococcus viridans*, *Streptococcus hemolyticus*, and *Streptococcus pneumoniae*. Intraparenchymal abscess formation frequently reveals itself as intraparenchymal mass lesions.<sup>1,2</sup> *Citrobacter* spp. are distinct species of bacteria of the family Enterobacteriaceae.<sup>3</sup> Central nervous system (CNS) infections with this pathogen are encountered more frequently during early childhood and the neonatal period. Formation of brain abscesses linked with the *Citrobacter freundii* is rarely mentioned in the literature.<sup>3-6</sup> CNS infections are usually experienced in connection with the bacteria and reported in patients who had a history of a head trauma or a neurosurgical operation, especially in those with an immune compromised background.<sup>3</sup>

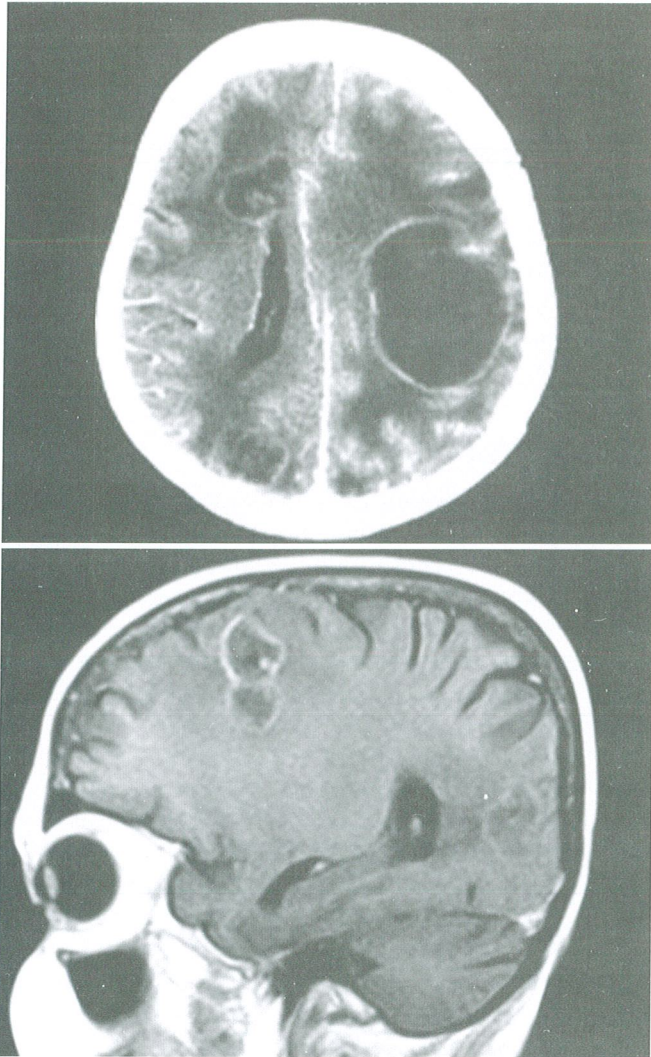
Brain metastasis occurs with the secondary spreading of the neoplasms originating from the tissues except for the central nervous system. The symptoms, physical examination, neurological examination, and radiological imaging findings of the patient do not display a significant differential diagnosis from the primary intraparenchymal neoplasms or intraparenchymal abscess formation.<sup>7</sup>

We present an interesting case of an intracranial *Citrobacter freundii* abscess that was misinterpreted as a metastatic brain tumor due to the patient's previous medical history.

### CASE REPORT

A 55-year-old female patient with a previous history of an operation for breast cancer was evaluated. She had been administered radio- and chemotherapy postoperatively. She presented with numbness in her right hand and speech disorder. Computer tomography imaging (CTI) and magnetic resonance imaging (MRI) revealed multiple lesions that were interpreted as metastatic disease (Figure 1 a-b). Due to her medical history, no additional intervention was applied and she was administered 30 Gy of fractionated whole brain radiotherapy (WBRT).

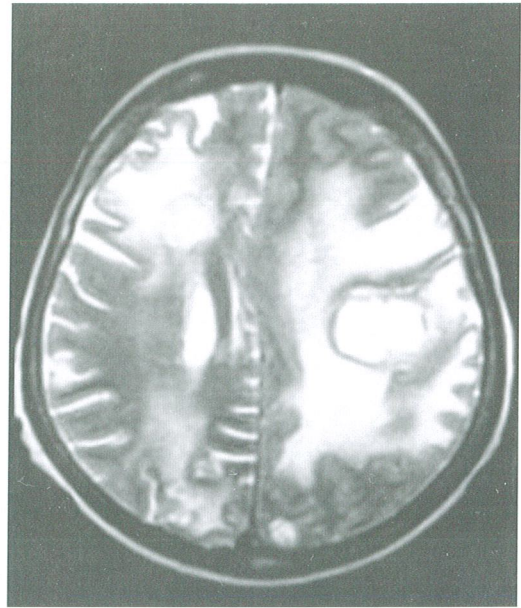
However, 28 days after WBRT she presented with dysphasia, right central facial paralysis, and mild hemiparesis in her right



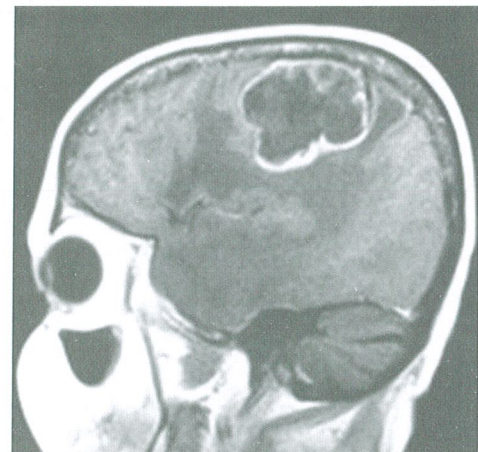
**Figure 1:** a) Axial contrast enhanced CTI of the patient, b) Sagittal contrast enhanced T1 weighted MRI of the patient.

extremities. Her vital signs were normal. The neurological examination of the patient revealed dysphasia, right central facial paralysis, a slightly loss of strength in the right upper extremity, and 3/5 motor strength in the right lower extremity. The only significant laboratory value observed was an abnormally high WBC (white blood cell) count of 21,300/mm<sup>3</sup> (normal value of WBC is 4300-10,800/mm<sup>3</sup>). The chest radiogram was normal. Cranial MRI showed multiple, well-circumscribed lesions in the subcortical white matter. The central zone of lesions exhibited high signal characteristics and was surrounded by a thin rim with low signal intensity on T2W1 (Figure 2). The lesions were surrounded by areas of large vasogenic edema. Post-contrast T1W1 images revealed ring-like contrast enhancement at the periphery of the lesions (Figure 3).

After 8 weeks, the follow-up MRI examination revealed an apparent increase in the size, number, and peripheral edema of the lesions. The third and left lateral ventricles were compressed by the lesions and their edema. Additionally there was prominent subfalcine herniation.



**Figure 2:** Axial T2 weighted MRI examination.



**Figure 3:** Sagittal contrast enhanced T1 weighted MRI of the patient.

The largest lesion, which was the cause of compression, was explored with left parietal craniotomy. A lesion having a necrotic and purulent structure and causing erosion in the cortex was excised with the capsule. Aerobic, anaerobic, and fungal cultures were obtained from the material for the purpose of demonstrating possible pathogens. The microbiological evaluation of the samples revealed the presence of gram-negative bacilli and so empiric meropenem treatment (3 x 2 g) was initiated for the patient. *Citrobacter freundii* was isolated in the culture of the abscess material. Since the antibiotic susceptibility test revealed that the bacterium was susceptible to meropenem, meropenem therapy was continued. During the follow-up, the patient developed respiratory failure. Her physical examination, laboratory tests, chest radiography, and thorax CT were performed and bilateral pleural effusion was diagnosed. The clinical picture of the patient was concordant with immune deficiency related multiple organ failure due to systemic spread of the malign disease. In spite of all support-

ive treatments patient's condition deteriorated gradually and she died 6 days after the operation.

## DISCUSSION

The brain abscess is a focal intracerebral infection initiated as a localized focal focus of cerebritis progressing to well circumscribed infectious collection. Although many pathogens leading to abscess formation in the brain have been isolated to date, the bacteria had been shown as the most frequent agents.<sup>1</sup> Gram-negative bacteria such as *Proteus*, *Escherichia coli*, *Klebsiella*, and *Pseudomonas* are isolated from 23-33% of patients with a brain abscess.<sup>3</sup> Fever, headache, and focal neurological deficit are classical presenting symptoms of brain abscess; however, less than 50% of the patients present with this classical triad of symptoms. Immune suppression, which underlies brain abscess in most cases, may be one of the reasons.<sup>1</sup> When single or multiple lesions are determined, the patients must undergo surgery immediately. Lesions larger than 2.5 cm should be removed operatively or should be aspirated by stereotaxic surgery. The samples obtained should be sent to the microbiology and pathology laboratories for further inspection. If the size of the lesion is equal to or less than 2.5 cm, aspiration should be performed on the largest lesion in order to identify the organism.<sup>6</sup>

Brain metastasis is the most common complication and the most important cause of co-morbidity and mortality in cancer patients. Clinical symptoms of patients with intracranial metastasis are headache, focal neurologic deficit, and mental and behavioral disorders like with other intracranial masses. MRI and enhanced CT scans provide us with important signs of involvement in systemic cancers, but they cannot always allow a differential diagnosis between metastasis and brain abscess. Especially in the late phases of brain abscess, findings are similar to those of most metastatic intracranial diseases such as the zone of edema that surrounds the mass, which is one of marked high signal intensity on T2; a discrete rim sign that is isointense to mild hyper intense, well-defined enhancement of the mass capsule occurs when paramagnetic agents are injected on T1 weighted MRI imaging.<sup>1,8</sup>

In the situation of systemic malignancy the intracranial space occupying lesion diagnosed in radiological examinations tends to be diagnosed as brain metastasis. In the case of failure of treatment with cytotoxic chemotherapy, radiotherapy, and corticosteroids, cerebral abscess should always be kept in mind<sup>7</sup>. Urgent surgical exploration such as excision or stereotactic aspiration of the lesion should be performed for precise management of the treatment.

Correspondence Address: Emre DURDAĞ  
Gazi University Medical School Hospital,  
Nevrosurgery, Ankara, Turkey  
Pbx: 0312 202 54 96  
E-mail: emredurdag@yahoo.com

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