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Secondary Brain Abscess in a Patient Followed Up with Lung Abscess

Akciğer Apsesi ile Takip Edilen Hastada İkincil Beyin Apsesi

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Abstract

Respiratory tract infections are common in Down syndrome. A 24-year-old male patient with Down syndrome with concurrent diabetes mellitus underwent antibiotic treatment with a diagnosis of lung abscess in an external center with complaints of fever and vomiting, but was referred to us after his symptoms did not regress. Despite the improvement in the lung abscess noted in a radiological examination, the patient was identified with a brain abscess upon an examination due to the continuation of fever, vomiting and the onset of headache. Particular attention should be paid to additional abscess foci such as brain abscess in cases with lung abscess with an underlying comorbidity.

Key words: *Down syndrome, lung abscess, brain abscess.*

Öz

Down sendromunda solunum yolu enfeksiyonları sık olarak görülmektedir. Diabetes mellitusu da olan Down sendromlu 24 yaşındaki erkek hasta, ateş ve kusma şikayetleri ile gittiği dış merkezde akciğer apsesi tanısıyla antibiyotik tedavisi almış, ancak semptomlarının gerilememesi üzerine tarafımıza sevk edilmiştir. Radyolojik incelemede akciğer apsesinde düzelme olmasına rağmen ateş, kusmanın devam etmesi ve baş ağrısının da başlaması üzerine yapılan incelemelerde hastanın beyin apsesinin de olduğu saptandı. Özellikle altta yatan ek hastalığı olan akciğer apseli olgularda beyin apsesi gibi ek apse odakları açısından dikkatli olunmalıdır.

Anahtar Sözcükler: *Down sendromu, akciğer apsesi, beyin apsesi.*

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Down Syndrome (DS) is the most common of the chromosomal abnormalities, with an incidence of approximately 1/800 (1). The relationship between DS and 21st chromosome abnormalities was first identified in 1959 (2). Craniofacial anomalies, hypotonia, cognitive disorders, Alzheimer's dementia (3), gastrointestinal malformations, congenital heart defects, respiratory tract diseases, autoimmunity, thyroid dysfunction and hematological disorders can all be seen in DS (4)

Respiratory diseases are the most common cause of death in DS patients of any age (5), with infection and acute respiratory distress syndrome being the most common respiratory tract diseases (6). The respiratory tract in DS patients is usually narrow due to hypoplasia, macroglossia, narrowing of the nasopharynx, enlarged tonsils, choanal stenosis, shortening of the palate, subglottic stenosis, laryngomalacia, tracheomalacia, gastroesophageal reflux, obesity, and congenital anomalies in the bronchi and airways (7), leading to recurrent respiratory tract infections (8). Respiratory tract diseases can also be linked to delayed motor function, structural anomalies of the oronasal passages, and disorders in innate and acquired immunity (9,10). Congenital anomalies of the respiratory tract, delayed motor function and structural anomalies of the oral-nasal passages contribute not only to infection, but also to chronic aspiration (9).

These problems in DS patients may also contribute to the formation of lung abscesses, defined as a limited area of infectious parenchymal necrosis that forms in one or more suppurative spaces (10).

More than 90% of cases present with polymicrobial bacteria (11). Among the isolates that appear dominant in lung abscess, *Bacteroides fragilis, Fusobacterium capsulatum* and *necrophorum*, anaerobic peptostreptococcus and microearophillic streptococcus are anaerobes. While the aerobics are *Staphylococcus aureus, Streptococcus pyogenes* and *pneumonia, Klebsiella pneumonia, Pseudomonas aeruginosa, Hemophilus influenza* type-B, *Acinetobacter spp, Escherichia coli* and legionella (12). Identifying differences in clinical manifestations and in microbiological isolates of lung abscesses may have important implications in guiding clinical diagnostic evaluations and empirical antimicrobial management, particularly in immunocompromised hosts (13)

Clinically, lung abscess may develop silently within a few weeks, and most commonly tachypnea, cough and fever. They can be identified on a posteroanterior chest (PA) radiography, while ultrasound and computed tomography (CT) can confirm the diagnosis. Up to 90% can be treated with intravenous (IV) antibiotics (10).

Brain abscesses may occur secondary to neurosurgical procedures, or primarily due to the hematogenous spread of sinusitis, periodontal infection, mastoiditis and pulmonary infections (14). Periodontal disease is an independent risk factor for brain abscess (15). When compared to typically developed people and those with intellectual disabilities, the incidence of early progressive periodontal disease is increased in patients with DS (16).

In cases with lung abscess due to an underlying disease, the risk of brain abscesses may be increased. We present here a case of DS with abscesses in both the brain and lungs.

CASE

A 24-year-old male patient with a known diagnosis of DS and diabetes mellitus (DM) was diagnosed with lung abscess at an external center with complaints of fever and nausea, and was treated with IV sulbactam-ampicillin for 4 days and piperacillin-tazobactam (PTZ) for 8 days. He was referred to us after his fever and nausea continued, and complained of headache as well as fever and nausea upon admission. A PA chest X-ray of the patient revealed an appearance consistent with a cavity above the diaphragm of the right lung (Figure 1a). A thorax CT of the right lower lobe laterobasal segment revealed a consolidated area of 3.2x1.2 cm and a cavitary appearance that was thought to open into a bronchus of 1x0.5 cm in size, suggesting an abscess.

The patient was consulted to department of infectious diseases in terms of arranging his antibiotic therapy at his hospitalization. The patient, who was in a good general condition, underwent IV antibiotic therapy for a total of 12 days in another center, was recommended to take cultures and to continue PTZ antibiotic therapy. Bronchoscopy was performed on the patient, who could not produce sputum due to continued fever. There was no reproduction in the culture of a bronchial lavage taken. Regression was observed in the control PA chest radiograph (Figure 1b). No control thorax CT was taken, as the lesion was noted to have improved in the chest X-ray taken after the treatment. As the patient's fever continued on the 16th day of PTZ treatment, the patient was started on imipenem. Neurology consultation was requested for the patient, whose general condition was good but whose complaints of headache and vomiting continued. Cranial magnetic resonance imaging (MRI) of the patient revealed a space-occupying lesion at the level of the parie-

tooccipital junction, and a thin, cerebral abscess with regular contrast enhancement on the periphery (Figure 2). Since imipenem lowered the seizure threshold, it was substituted by meropenem. A further neurosurgery consultation was requested, and it was decided to operate on the brain abscess. A biopsy taken at the end of the operation revealed cerebrum tissues showing liquefaction necrosis. After the surgery, the patient's complaints of fever, nausea, vomiting and headache subsided.

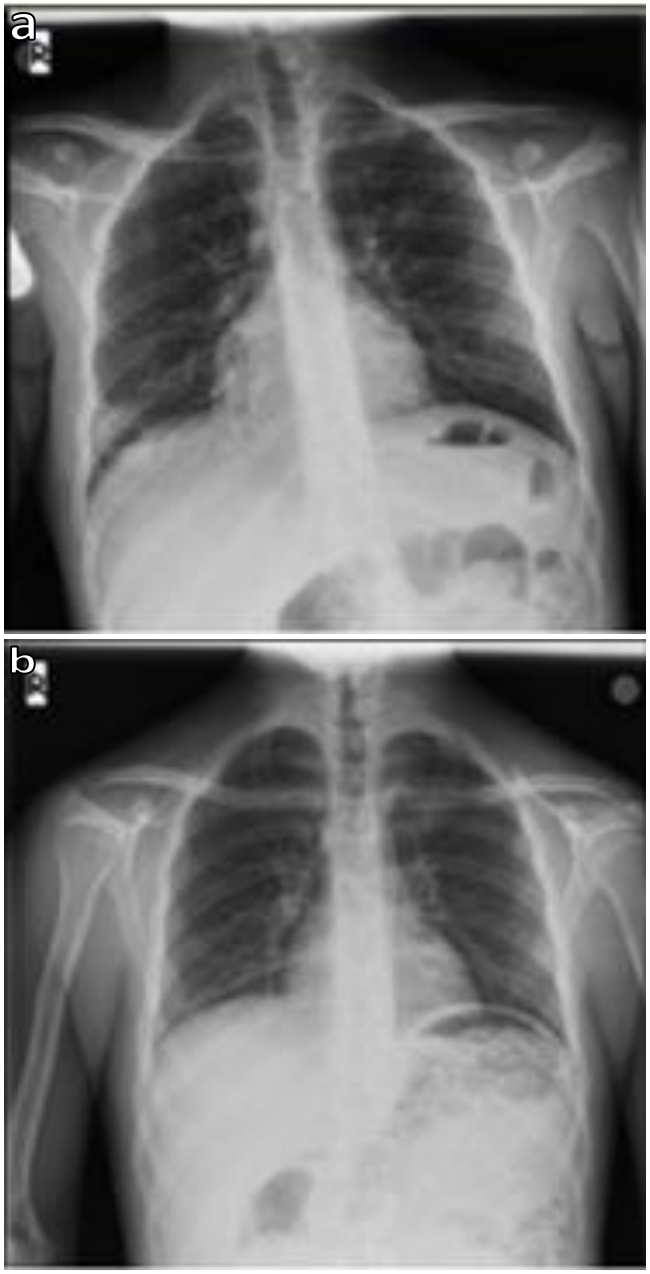

Figure 1a and b: First chest X-ray of the patient at hospital admission (a), Control chest x-ray of the patient (b)

DISCUSSION

Lung abscesses are necrotic cavitary lesions of the lung parenchyma and are usually caused by anaerobic bacteria or mixed flora, occurring typically after aspiration. Primary lung abscesses occur in healthy individuals without underlying disease and are usually solitary, while secondary lung abscesses occur in patients with underlying or predisposing conditions, and may be multiple. The first finding is usually the cavity view, which gives the air-fluid level on the PA chest x-ray. Typically, the cavity wall is thick and irregular, and there is usually a surrounding pulmonary infiltrate that requires prolonged antibiotic therapy (17). In our case, the diagnosis was made by PA Chest X-ray.

In the presence of lung abscesses, it is difficult to isolate anaerobic bacteria under these conditions, as most respiratory tract samples (sputum or bronchoscopy aspirates) are contaminated with upper airway flora, and are therefore unsuitable for anaerobic culture (12). In our case, concurring with literature, there was no reproduction in the culture in the lavage sample taken with bronchoscopy. Congenital anomalies of the respiratory tract, delayed motor function, structural anomalies of the oronasal passages, and defects in innate and acquired immunity may have contributed to the predisposition of our DS patient to respiratory tract infections, chronic aspiration and the formation of lung abscess. A review of literature revealed no other case of lung abscess in DS.

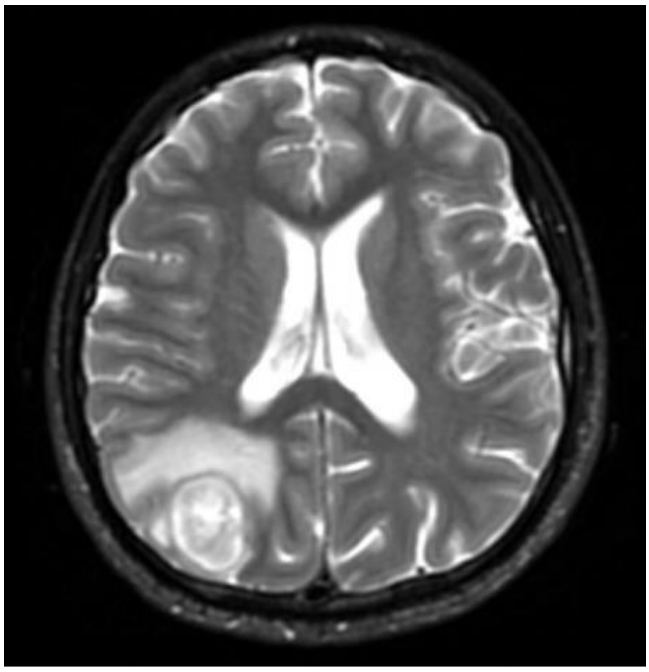

Figure 2: Parietooccipital region abscess appearance

Brain abscesses are necrotic focal areas with a membrane surrounding the brain parenchyma. They are usually caused by bacteria or fungi, and rarely as a result of trauma, and have high morbidity and mortality rates. Brain abscesses may occur secondary to neurosurgical procedures, or primarily due to hematogenous spread such as through pulmonary infections (14). In our case, the abscess likely spread from the lung abscess via a hematogenous route. In our case, the compatibility of the pathological outcome with liquefaction necrosis, the bacterial or fungal infection, and the response to antibiotic treatment suggest that the infection was of bacterial origin. In about two-thirds of cases, symptoms last 2 weeks or fewer. Diagnoses are made on average 8 days after the onset of symptoms. Most of the symptoms of a brain abscesses are nonspecific, leading to a delay in diagnosis, and most of the symptoms linked to space-occupying lesions are related to its size and location. The triad of fever, headache and focal neurologic deficit is seen in less than half of the patients. The most common symptoms are headache, mental status changes, focal neurological deficits, fever, seizures, nausea and vomiting (18). Our case had complaints of fever, headache and nausea. Periodontal disease is often associated with DM, and may remain clinically silent. Periodontal disease is an independent risk factor for brain abscess (15). Our patient also had both DS and DM disease, both of which are linked to periodontal disease, which also featured in our patient's history.

MRI is the imaging modality of choice for diagnosis. In the early period, it is sensitive in revealing lesions in the brain, and especially in the brain stem, and also any necrosis of the lesion. It provides greater contrast between cerebral edema and the brain, and it is more sensitive in the detection of the spread of inflammation to the ventricles and subarachnoid space (19). In our case, the brain abscess was observed in a brain MRI taken together at the time of a neurological evaluation due to prolonged nausea and vomiting. Treatment is usually both medical and surgical (14), and our case was both operated and placed on long-term antibiotic therapy.

Radoi et al. (20), in a retrospective study involving 52 consecutive brain abscess patients, the authors reported the most common cause of brain abscess to be hematogenous spread. In our case, we concluded that the brain abscess developed secondary to hematogenous spread from the lung abscess.

Our brain abscess case had both DS and DM, which led to a disorder in the immune system, and these two diseases increase the risk of periodontal disease. Since brain abscesses are mostly spread secondarily via the hematogenous route, we concluded that in our case the brain abscess may have spread from the lung abscess via the hematogenous route. A review of literature revealed no cases of brain abscess secondary to lung abscess in DS, or brain abscesses without lung abscesses.

It should be kept in mind that a brain abscess may also be present in cases stated on antibiotic therapy for a lung abscess and that demonstrate radiological improvement, but with continued fever, vomiting and headache. It should be further noted that in cases with lung abscess with an underlying comorbidity, a brain abscess or other abscess foci may also be present.

CONFLICTS OF INTEREST

None declared.

AUTHOR CONTRIBUTIONS

Concept - Ö.A., P.Y.G., M.F.E., E.G.B.; Planning and Design - Ö.A., P.Y.G., M.F.E., E.G.B.; Supervision - Ö.A., P.Y.G., M.F.E., E.G.B.; Funding - Ö.A.; Materials - Ö.A.; Data Collection and/or Processing - Ö.A.; Analysis and/or Interpretation - Ö.A., P.Y.G.; Literature Review - Ö.A., P.Y.G.; Writing - Ö.A.; Critical Review - Ö.A.

YAZAR KATKILARI

Fikir - Ö.A., P.Y.G., M.F.E., E.G.B.; Tasarım ve Dizayn - Ö.A., P.Y.G., M.F.E., E.G.B.; Denetleme - Ö.A., P.Y.G., M.F.E., E.G.B.; Kaynaklar - Ö.A.; Malzemeler - Ö.A.; Veri Toplama ve/veya İşleme - Ö.A.; Analiz ve/veya Yorum - Ö.A., P.Y.G.; Literatür Taraması - Ö.A., P.Y.G.; Yazıyı Yazan - Ö.A.; Eleştirel İnceleme - Ö.A.

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