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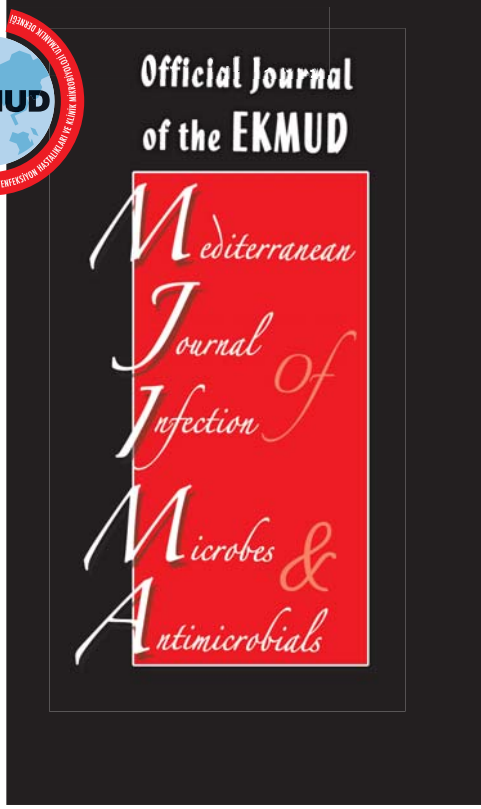
OLGU SUNUMU ● CASE REPORT



Odontogenic Descending Necrotizing Mediastinitis in a Patient with Severe Allergy to Beta-Lactam Antibiotics: A Case Report and Literature Review

Beta-Laktam Antibiyotiklere Ciddi Allerjisi Olan Bir Hastada Odontojenik Desendan Nekrotizan Mediastinit: Bir Olgu Sunumu ve Literatür Derlemesi

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ABSTRACT

Descending necrotizing mediastinitis (DNM) is caused by aerobic and anaerobic bacteria as a rare but severe complication of oropharyngeal abscesses developing secondary to odontogenic infections. Patients with hypersensitivity reaction to beta-lactam antibiotics pose challenges in the treatment. To our knowledge, only two cases of postoperative mediastinitis treated with tigecycline have been reported in the English medical literature to date. In this paper, we present a case of descending mediastinitis developing one week after dental extraction. The patient was given tigecycline treatment with the diagnosis of complicated deep neck infection, which progressed to descending mediastinitis because of severe allergic reaction to beta-lactam group antimicrobials. He successfully recovered after early surgical drainage and debridement together with four weeks of tigecycline therapy. Tigecycline may be an alternative option for treatment of odontogenic infections and descending mediastinitis in beta-lactam-allergic patients. It may be used effectively and successfully with concurrent standard early surgical intervention in selected patients, especially in those with severe hypersensitivity reaction.

Anahtar kelimeler: Descending necrotizing mediastinitis, odontogenic, beta-lactam allergy, hypersensitivity reaction, tigecycline

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ÖZET

Desendan nekrotizan mediastinit (DNM), aerop ve anaerop bakterilerle oluşan, odontojenik enfeksiyonlara sekonder gelişen orofaringeal apselerin nadir fakat ciddi bir komplikasyonudur. Beta-laktam antibiyotiklere karşı hipersensitivite reaksiyonu olan hastalarda tedavisi zordur. Bildiğimiz kadarıyla, İngilizce tıbbi literatürde şu ana kadar, tigesiklin ile tedavi edilen sadece iki post-operatif mediastinit olgusu bildirilmiştir. Bu yazıda, diş çekiminden bir hafta sonra gelişen bir DNM olgusu sunmaktayız. Komplike derin boyun enfeksiyonuyla başlayıp desendan mediastinite ilerleyen olguda, beta-laktam grubu antimikrobiyallere ciddi allerjik reaksiyon nedeniyle tigesiklin verilmiştir. Erken cerrahi drenaj ve debridman ve dört haftalık tigesiklin tedavisi ile hasta tamamen iyileşmiştir. Beta-laktam antibiyotiklere allerjisi olan hastalarda odontojenik enfeksiyonlar ve desendan mediastinitin tedavisinde tigesiklin alternatif bir ajan olabilir. Özellikle, ciddi hipersensitivite reaksiyonu olan seçilmiş hastalarda, eş zamanlı standart erken cerrahi müdahale ile birlikte kullanımı etkili ve başarılı olabilir.

Key words: Desendan nekrotizan mediastinit, odontojenik, beta-laktam allerjisi, hipersensitivite reaksiyonu, tigesiklin

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INTRODUCTION

Mediastinitis occurs due to perforation of the esophagus or after cardiac surgery, head and neck infections, and dissemination from another focus of infection[1]. Suppurative odontogenic infections may cause life-threatening complications by extending along deep fascial layers of the head and neck[2]. Descending necrotizing mediastinitis (DNM) occurs as a rare but severe complication of oropharyngeal abscesses developing secondary to odontogenic infections[3,4]. The relevant mortality has been reported to be 40-50% because of rapid dissemination of the infection[5,6]. Early diagnosis, control of the infective focus and effective long-lasting antibiotic treatment are life-saving principles in the management of mediastinitis. In this paper, we present a case of descending mediastinitis developing one week after dental extraction.

CASE REPORT

An 18-year-old male admitted to our setting with fever, swelling and pain in the neck. He had undergone dental extraction one week ago, and three days later, he developed fever. He had received amoxicillin-clavulanic acid 2 x 1 g peroral (PO) (3 days), then ampicillin-sulbactam 4 x 1 g intravenous (IV) (1 day) with the diagnosis of periodontitis. On the fourth day, he developed maculopapular itchy rash, respiratory distress and angioedema because of severe allergy to beta-lactam antibiotics and readmitted to the emergency unit. Antihistaminics and steroids were given intravenously. On the physical examination, he had swelling, erythema and tenderness on palpation in the neck and disseminated maculopapular and urticarial rash all over his body. Initial laboratory tests revealed white blood cells (WBC): 22.200/mm^3, polymorphonuclear leukocytes (PNL): 19.200/mm^3, C-reactive protein (CRP) > 216 mg/L (N: < 3), erythrocyte sedimentation rate (ESR): 65 mm/hour, and total IgE 440 IU/mL (Normal: < 87). A cervical ultrasonography revealed multiple lymphadenopathies (largest: 19 x 7 mm), and a 45 x 13 mm hypoechoic abscess containing calcifications. Needle aspiration under ultrasonographic guidance and aerobic and anaerobic culture of the abscess material were performed. Blood cultures were also obtained. Because of beta lactam- induced anaphylactic reaction empirical tigecycline (100 mg loading dose initially, maintenance with 2 x 50 mg IV) was initiated. A computerized tomography (CT) of the neck revealed a hypodense disseminated abscess with contrast enhancement peripherally, which was more prominent on the right anteriorly and at the laryngeal and tracheal level. Deep cervical infection reaching the upper mediastinum anteriorly on the thoracic CT was consistent with mediastinitis (Figure 1a). Collar incision and neck dissection operation were performed; a copious amount of purulent material was drained and mechanical debridement was done. Aerobic, anaerobic and fungal cultures of the drained purulent material remained sterile. His fever resolved after five days. The swelling, erythema and tenderness in his neck resolved after one week. The leukocyte count and CRP level gradually decreased. Cervical and thoracic CT scans on the seventh postoperative day showed significant regression of the neck abscess and disappearance of the retrosternal infection, when compared to his previous CT (Figure 1b). He was discharged from the hospital after successful therapy with early surgical drainage, debridement and four weeks of tigecycline administration.

DISCUSSION

Odontogenic infections may cause severe local and systemic complications like deep cervical infection, osteomyelitis, necrotizing mediastinitis, purulent meningitis, subdural empyema, and infective endocarditis by contagious and hematogenous dissemination,

Figure 1a

Preoperative Cervical and Thoracic CT Image reveals a hypodense disseminated abscess formation with contrast enhancement peripherally, which was more prominent on the right anteriorly and soft tissues and muscles at the laryngeal and tracheal level. Deep cervical infection reached the anterior part of the upper mediastinum.

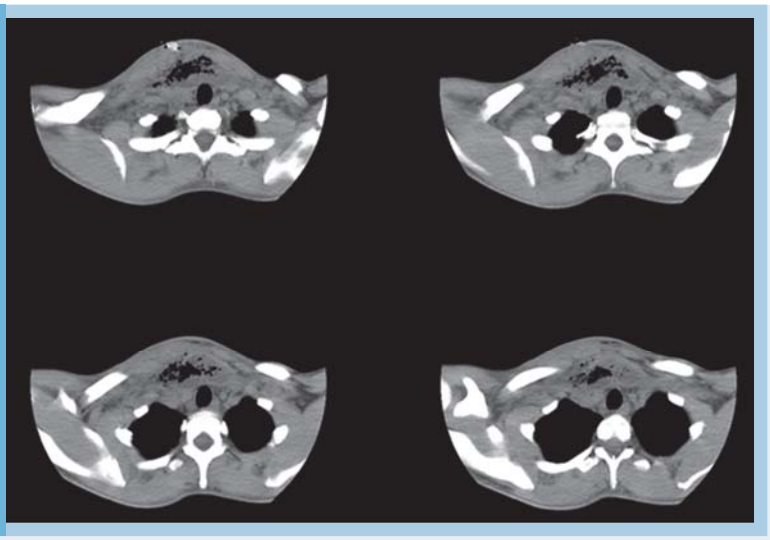
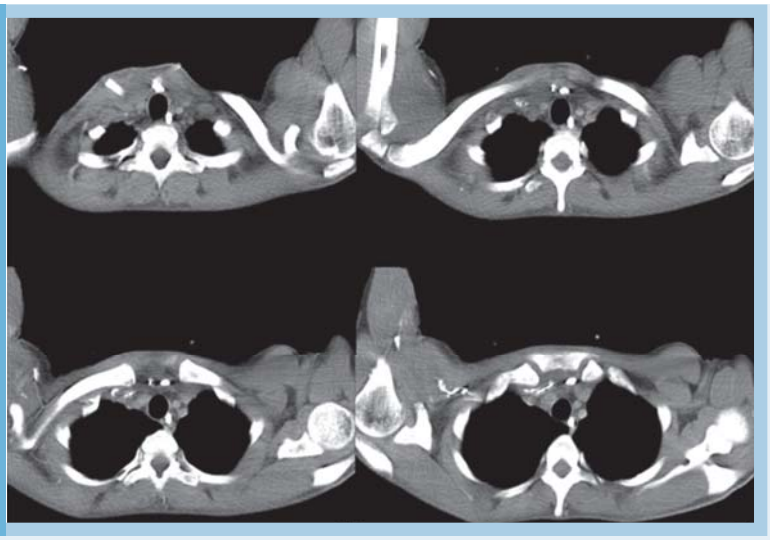


Figure 1b

Postoperative Cervical and Thoracic CT Image shows obvious regression of the abscess.



particularly in the elderly, diabetics and patients receiving steroids or radiotherapy[7-9]. Our patient was diagnosed as DNM because of clinical and specific imaging and surgical findings and their relationship with the oropharyngeal infection.

In the case series of Boscolo-Rizzo and his coworkers including 167 patients with deep neck infection, only six cases had DNM[10]. In another case series of 10 patients, only three cases developed mediastinitis secondary to odontogenic abscess after dental extraction. Eight of these 10 patients were treated successfully where as two cases (1 patient over 75 years old and the other diabetic) died because of septic shock and multiorgan failure[11]. In a report of 105 cases (aged 18-93 years) with deep cervical infection, older age (> 65 years), accompanying systemic dis-

ease, and in appropriate empirical antimicrobial therapy were statistically significant parameters for life-threatening complications[12].

Pathogens causing mediastinitis include aerobic and anaerobic Gram-positive cocci and bacilli, and *Candida albicans*[1]. However, prior antibiotic use, just as in our patient, decreases the possibility of microbial isolation from the culture. CT is important in the early diagnosis and surgical management of DNM[13].

The primary treatment of DNM is surgical eradication of the pharyngeal or odontogenic infectious focus and concurrent drainage of the cervical and/or mediastinal collection. Relevant mortality is considerably high despite appropriate therapy[14]. Hsu and his colleagues reported in their DNM series of 29 patients that treatment with early, aggressive transcervical drainage and debridement was equally as successful as combined cervical and thoracic drainage[15]. The decision regarding type of surgical approach is made according to the extent of the infection and the experience of the surgeon[16,17]. Cervical and mediastinal drainage was performed by transcervical approach in our patient.

Ampicillin-sulbactam, amoxicillin-clavulanate, penicillin G and metronidazole combination, cefoxitin, or cefotetan is recommended in the treatment of odontogenic infections in immunocompetent patients. For beta-lactam-allergic patients, clindamycin or moxifloxacin may be recommended. Broad-spectrum beta-lactam and beta-lactamase combinations and tigecycline are the alternative drugs for immunosuppressed cases[18]. The majority of the patients reported in the medical literature received beta-lactam group antibiotics. Because of severe hypersensitivity to beta-lactam agents, we administered tigecycline to our patient under close monitoring.

Tigecycline, an antibiotic from the glycylcycline class, has a wide antibacterial spectrum with activity against gram-positive and gram-negative aerobic and anaerobic bacteria and good tissue penetration[19]. Although it is a bacteriostatic antibiotic, some *in vitro* studies revealed its cidal activity against *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Neisseria gonorrhoeae*[20,21]. In the literature to date, only two case reports of mediastinitis mentioned its safety and therapeutic success when used together with surgical debridement and drainage. One of them was pan-resistant *Acinetobacter baumannii* mediastinitis and the other was multi-drug-resistant *Klebsiella pneumoniae mediastinitis*[22,23]. Their characteristic features in comparison to the case presented herein are summarized in Table 1. Despite its bacteriostatic feature, tigecycline has been reported to be used successfully in the treatment of severe infections[24,25]. It has high penetration into skin and soft tissues[26]. Our patient was treated successfully with tigecycline as he was young, immunocompetent, with no underlying disease and because of the early diagnosis by means of CT and urgent surgical intervention.

Table 1. Comparative characteristic features of the two previously reported cases and the present case of mediastinitis treated with tigecycline

	Ref. 21 (Meagher)	Ref. 22 (Tekce)	Present Case
Age, gender	58 years old, female	55 years old, male	18 years old, male
Comorbidity	Diabetes mellitus, chronic obstructive pulmonary disease, hypertension	Diabetes mellitus	None
History of surgical procedure	Coronary artery bypass grafting	Coronary artery bypass grafting	Dental extraction
Pathogen	Pan-resistant *Acinetobacter baumannii*	Multidrug-resistant *Klebsiella pneumoniae*	No microorganisms isolated
Antibiotic therapy prior to tigecycline	Imipenem-cilastatin plus teicoplanin empirically	None	Amoxicillin-clavulanate PO (3 days), then ampicillin sulbactam (1 day)
Duration of tigecycline treatment	3 weeks	65 days	4 weeks
Outcome	Cure	Cure	Cure

In conclusion, tigecycline has the potential to be an alternative option for treatment of odontogenic infections and descending mediastinitis. It may be used effectively and successfully with concurrent standard surgical intervention in selected patients, especially in those with severe hypersensitivity reaction to beta-lactam antibiotics.

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