



Fatal Dental Abscess: Descending Necrotising Mediastinitis

Ölümcül Bir Diş Apsesi: Desendan Nekrotizan Mediastinit

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Abstract

Mediastinitis is a rare infectious disease around the vital organs in the mediastinum. Descending necrotizing mediastinitis (DNM) is caused by odontogenic, pharyngeal, cervical infections, sternotomy or diagnostic and therapeutic instrumentation. Unless it is diagnosed in a timely manner and properly treated, the outcome is fatal. Delay in treatment leads to the spread of the infection down to the mediastinum. We present a case of DNM in 17-year-old girl suffering from a dental abscess.

Key words: Dental abscess, mediastinitis, pharyngeal infection.

Özet

Mediastinit, mediastendeki hayati organların etrafında nadir görülen enfeksiyöz bir hastalıktır. Desendan nekrotizan mediastinite odontojenik, farengeal, servikal enfeksiyonlar, sternotomi veya tanı ve tedavi amaçlı girişimler sebep olur. Zamanında tanı konulmaz ve uygun olarak tedavi edilmezse sonuç fatal olur. Tedavideki gecikme enfeksiyonun mediastene yayılmasına yol açar. Diş absesinden muzdarip 17 yaşındaki kızda gelişen desendan nekrotizan mediastinit olgusunu sunuyoruz.

Anahtar Sözcükler: Diş absesi, mediastinit, farengeal enfeksiyon.

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Mediastinitis is a severe infection involving mediastinal spaces after cervical infections spread along the facial planes, operations via sternotomy, endoscopic instrumentation, or blunt or sharp trauma. Its most severe form, descending necrotizing mediastinitis (DNM) following deep neck infections, is a rare but potentially fatal complication of dental abscesses. It can be misdiagnosed due to its rarity. A late diagnosis of DNM emerging from an odontogenic abscess may result in death. The disease has a fulminant course following a delay in diagnosis and inappropriate treatment. Management aiming for surgical drainage in addition to anti-biotherapy is essential.

CASE

A 17-year-old female patient with a toothache was examined by the dentist one week prior and given oral antibiotics. A new treatment was prescribed after 3 days following worsening complaints. No improvement was observed and she was admitted to the thoracic surgery department with complaints of respiratory distress and painful cervical and right submandibular swelling for 4 days following a dental abscess that had occurred 7 days earlier. The patient also complained of dysphagia for the previous 3 days. A physical examination revealed dysphagia, dysphonia, and productive cough, in addition to diffuse submental swelling. The patient's heart rate was 116 beats/minute, blood pressure was 105/70 mmHg, respiratory rate was 24 breaths/min, and body temperature was 38.7°C. Laboratory tests showed a white blood cell count of 13,900/mm³ and a hemoglobin level of 11.3 g/dL. Gram stain of the patient's purulent thoracentesis sample showed no bacteria. The condition was caused by an odontogenic infection descending into the mediastinum. The source of infection was a dental abscess affecting the lower right third molar tooth.

The chest x-ray showed an effusion in the right hemithorax (Figure 1). A tube thoracostomy was performed on the right hemithorax and 1,700 mL of purulent pleural effusion was drained (Figure 2). A cervicothoracic CT revealed gas and abscess formation in upper mediastinum on the right side of the neck and pleural effusion in the right hemithorax (Figure 3). The initial diagnosis was simple, and determined to be DNM, due to the obvious clinical symptoms and signs.

The cavity was irrigated with iodine and hydrogen peroxide. The pleural fluid culture was evaluated and the responsible agents were determined to be a mixture of gram-positive cocci and gram-negative rods. The combination of ceftriaxone and ornidazole were administered



Figure 1. Chest x-ray showing some fluid in the pleural cavity.



Figure 2. Chest x-ray after tube thoracostomy.

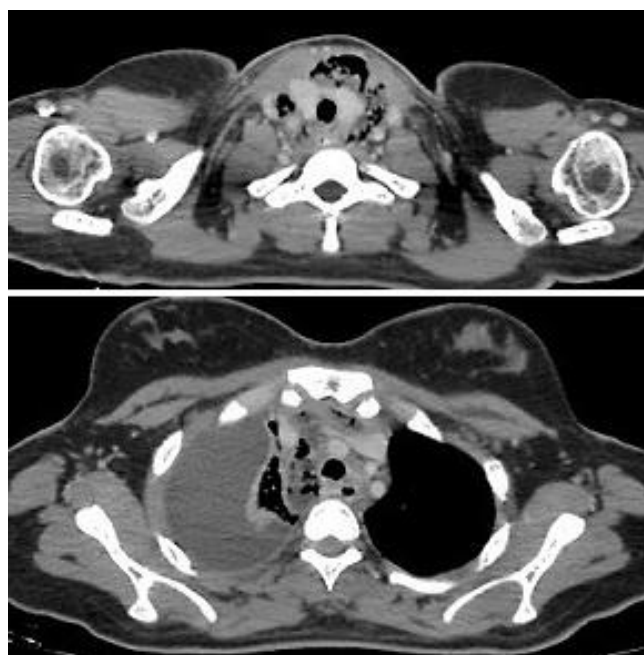


Figure 3. Tomographic scans of the thorax and neck.

intravenously. After the patient was clinically stabilized, she was prepared for further mediastinal and cervical debridement. Further evaluation of the dental infection could not be obtained. Twelve hours following admittance, the patient died due to her deteriorating condition.

DISCUSSION

DNM is an uncommon, acute, polymicrobial infection of the mediastinum that can develop rapidly after an odontogenic or oropharyngeal infection spreading to the mediastinum, facilitated by gravity and respiratory movements (1). These infections spread downward through the deep cervical fascia, which consist of superficial, visceral, and prevertebral layers. These are potential spaces, confined in the three layers of the deep cervical fascia. The infection advances through the pretracheal space and descends into the mediastinum. It is predominantly a disease of young people and 60% to 70% of cases are of odontogenic origin (2). Several factors suppressing the body defense contribute to the pathogenesis of this life-threatening disease. The risk of DNM is increased in patients with poor physical status, malnutrition, diabetes mellitus, alcoholism, immune deficiency, metabolic disorders, and drug addiction. Advanced age and underlying diseases have been reported to be the fatal risk factors (3,4). Systemic effects of the disease become widespread as the infection spreads. Respiratory distress, empyema, and dehydration inhibit respiratory function. The disease has a fulminant course causing sepsis and mortality. Causative agents can be a mixture of aerobic and anaerobic bacteria of the oral flora. Among aerobes, streptococci are the most common, and found in more than half of the cases. No bacterial agent from the isolates infers that they have no role in the development of the disease.

Odontogenic infections do progress and may complicate and create serious outcomes unless they are properly treated. The infectious process reaches the upper mediastinum within the first two or three days as a result of extension. This makes mediastinotomy essential to management. An infection originating from the head and neck region may spread downward through the facial spaces or deep planes of the neck into the mediastinum, pleural cavities, and pericardium, due to gravity and negative intrathoracic pressure (4,5). The suggested criterion for the diagnosis of DNM is as follows: 1) severe oropharyngeal infection, 2) radiographic evidence of mediastinitis, 3) perioperative confirmation of both infections, and 4) the establishment of a relation between oropharyngeal infection and mediastinitis (6). Clinically, the patients

present with tender swelling in the neck, fever, odynophagia, dyspnea and hypotension. Specific clinical symptoms of mediastinitis, including dyspnea, dysphagia, pain, cough, sputum, fever, and swelling in the submandibular region, which were observed in the presented case. Radiological tests, mediastinal widening, mediastinal emphysema, displacement of the tracheal air column and unilateral or bilateral effusions are easily observed in the chest x-ray. The CT reveals changes in soft tissues and confirms the diagnosis. CT examination showed the infection in the parapharyngeal space and anterior mediastinum via the pretracheal space. CT not only determines the spread of the inflammatory-necrotic process into the cervical and mediastinal area, but also allows for the determination of the optimal surgical drainage approach (5,7).

Treatment of DNM consists of broad-spectrum antibiotic therapy and early drainage of the mediastinum and pleural cavity to remove the cause of infection (5,8,9). Once DNM is diagnosed, antibiotic treatment should be initiated. The responsible pathogens for DNM are primarily a mixture of aerobic and anaerobic bacteria of the oral microflora (7,10). In the present case, no agents were isolated in the specimen obtained by mediastinal drainage due to previous anti-biotherapy. Antibiotic therapy is selected to treat both aerobic and anaerobic bacteria. The surgical approach for more aggressive drainage depends on the anatomic location of the abscesses within the neck and mediastinum (11,12). These include transcervical, posterolateral thoracotomy, median sternotomy, and the transthoracic clamshell approach. Each method offers advantages and disadvantages. The standard posterolateral thoracotomy provides the advantage of a good approach to all compartments of the mediastinum. Transthoracic drainage is recommended for mediastinitis extending below the level of carina to deeper regions (6,12). In the current case, pleural drainage was performed with a tube thoracostomy. Treatment success of DNM with odontogenic origin depends on early diagnosis and aggressive drainage and debridement, performed by cervicotomy and thoracotomy. Video-assisted thoracoscopic approaches for successful mediastinal drainage have been reported by some authors (13). DNM is a rare but highly lethal condition. Mortality rates range from 16 % to 80 % (7,14).

CONCLUSION

It is critical to recognize the patients at risk of mediastinitis if an infection can progress rapidly from a toothache to a life-threatening infection. All dental infections should be

considered as risk factors for DNM. Mediastinitis can result from an odontogenic abscesses, and the extent of its infectious process should never be underestimated. Prompt diagnosis, aggressive drainage, removal of the cause of the infection, and careful postoperative management can save a patient with DNM, in spite of its high mortality rate. However, a delay in diagnosis and/or inappropriate treatment can result in death. Collaboration between the dentist and maxillofacial and thoracic surgeons is recommended for successful treatment of this life-threatening infection. Dental surgeons play a key role in preventing the condition.

CONFLICTS OF INTEREST

None declared.

REFERENCES

1. Van Natta LT, Iannettoni MD. Acute necrotizing mediastinitis. In: Patterson AG, Pearson GF, Cooper JD, et al (eds). *Pearson's Thoracic and Esophageal Surgery*. 3rd Edition. Elsevier Inc; 2008: 1521-33.
2. Ho MW, Dhariwal DK, Chandrasekhar J, Patton DW, Silvester KC, Sadiq S, et al. Use of interventional radiology in the management of mediastinitis of odontogenic origin. *Br J Oral Maxillofac Surg* 2006; 44: 538-42. [\[CrossRef\]](#)
3. Mathieu D, Neviere R, Teillon C, Chagnon J L, Lebleu N, Wattel F. Cervical necrotizing fasciitis: clinical manifestations and management. *Clin Infect Dis* 1995; 21: 51-6. [\[CrossRef\]](#)
4. Freeman RK, Villieres E, Verrier ED, Karmy-Jones R, Wood DE. Descending necrotizing mediastinitis: an analysis of the effects of serial surgical debridement on patient mortality. *J Thorac Cardiovasc Surg* 2000; 119: 260-7. [\[CrossRef\]](#)
5. Gonzales- Garcia R, Risco- Rojas R, Roman-Romero L, Moreno-Garcia C, Lopez Garcia C. Descending necrotizing mediastinitis following dental extraction. Radiological features and surgical treatment considerations. *J Cranio-maxillofac Surg* 2011; 39: 335-9. [\[CrossRef\]](#)
6. Estrera AS, Landau MJ, Grisham JM, Sinn D P, Platt MR. Descending necrotizing mediastinitis. *Surg Gynecol Obstet* 1983; 157: 545-52.
7. Mihos P, Potaris K, Gakidis I, Papadakis D, Rallis G. Management of descending necrotizing mediastinitis. *J Oral Maxillofac Surg* 2004; 62: 966-72. [\[CrossRef\]](#)
8. Makeieff MN, Gresillion NP, Berthet JP, Garrel R, Cramette L, Marty-Ane C, et al. Management of descending necrotizing mediastinitis. *Laryngoscope* 2004; 114: 772-5. [\[CrossRef\]](#)
9. Sakamoto H, Aoki T, Kise Y, Watanabe D, Sasaki J. Descending necrotizing mediastinitis due to odontogenic infections. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2000; 89: 412-9. [\[CrossRef\]](#)
10. Juretic M, Belusic-Gobic M, Kukuljan M, Cerovic R, Golubovic V, Gobic D. Mediastinitis and bilateral pleural empyema caused by odontogenic infection. *Radiol Oncol* 2007; 41: 57-62. [\[CrossRef\]](#)
11. Findikcioglu AD, Kilic D, Akin S, Hatipoglu A. Descending necrotizing mediastinitis: treatment of a delayed case. *Acta Chir Belg* 2007; 107: 462-4.
12. Novellas S, Kechabtia K, Chevallier P, Sedat J, Bruneton JN. Descending necrotizing mediastinitis: a rare pathology to keep in mind. *Clin Imaging* 2005; 29: 138-40. [\[CrossRef\]](#)
13. Nakamura Y, Matsumura A, Katsura H, Sakauchi M, Ito N, Kitahara N, et al. Successful video-thoroscopic drainage for descending necrotizing mediastinitis. *Gen Thorac Cardiovasc Surg* 2009; 57: 111-5. [\[CrossRef\]](#)
14. Suehara AB, Goncalves AJ, Alcadipani FA, Kavapata NK, Menezes MB. Deep neck infection: analysis of 80 cases. *Braz J Otorhinolaryngol* 2008; 74: 253-9.