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Case Report

A rare complication developing after odontogenic intervention: Cervical fistula and descending mediastinitis

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Abstract

Introduction: Deep neck infections (DNIs) are potentially life-threatening conditions due to their rapid progression and risk of severe complications. Although odontogenic infections are well-known sources, the extension of infection into the posterior mediastinum with the formation of a cervical fistula is rare. Early diagnosis and multidisciplinary management are essential for improving patient outcomes.

Aim: This case report aims to present a rare and severe complication of an odontogenic infection leading to descending mediastinitis, emphasizing the importance of timely intervention, appropriate antimicrobial therapy, and surgical drainage.

Case study: A 44-year-old female patient presented with neck swelling, pain, dysphagia, and trismus one week after a tooth extraction. Physical examination revealed a 3 × 2 cm abscess-like lesion extending from the left submandibular region to the anterior and posterior neck spaces. Imaging confirmed a deep neck abscess with posterior mediastinal extension. Despite empirical antibiotic therapy, her condition worsened, necessitating surgical drainage and intensive care management. A fistula tract was identified between the gingiva and the superior sternal notch. The patient was successfully treated with a combination of broad-spectrum antibiotics, surgical intervention, and supportive care, leading to full recovery.

Results and discussion: DNIs can lead to descending mediastinitis with high morbidity and mortality. Early imaging, multidisciplinary care, and timely surgery are crucial. This case underscores the need for vigilance in dental infections to prevent severe complications.

Conclusions: (1) Odontogenic infections may rarely cause descending mediastinitis. (2) Early diagnosis and airway protection are essential. (3) Broad-spectrum antibiotics and timely surgery improve survival.

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1. INTRODUCTION

A thorough understanding of cervical fascia anatomy is crucial for the accurate diagnosis and treatment of deep neck infections (DNIs). The complex structure of the cervical fascia contributes to the wide range of severe complications associated with DNIs.[1] Although antibiotics have significantly reduced the incidence of DNIs, they remain a serious condition requiring rapid diagnosis and treatment.[2] Historically, pharyngeal and tonsillar infections were the primary causes of DNIs. However, odontogenic infections have now emerged as the leading etiology.[3]

Tooth extraction, a common procedure, can lead to life-threatening complications if not performed under proper conditions. Oral flora is rich in both aerobic and anaerobic microorganisms, facilitating the spread of infections to the neck via cervical fascia, resulting in DNIs. Post-extraction complications include head and neck emphysema, pneumomediastinum, parapharyngeal abscess, septic thrombophlebitis of the internal jugular vein (Lemierre's syndrome), mediastinitis, and mediastinal abscess. Mediastinal spread significantly increases morbidity and mortality, potentially leading to peribronchovascular inflammation, abdominal abscess, and septicemia. These complications are more common in immunosuppressed and diabetic individuals.[4] Surgical drainage is recommended in cases with radiologically confirmed abscess formation.[5]

2. AIM

The aim of this case report is to present a rare complication of odontogenic infection leading to cervical fistula and descending mediastinitis, and to emphasize the importance of early diagnosis and multidisciplinary management.
This study presents a case of DNI extending into the posterior mediastinum following tooth extraction, complicated by a cervical fistula. Early recognition, airway management, broad-spectrum antibiotics, and appropriate surgical intervention are crucial for improving outcomes and reducing mortality in DNI cases.

3. CASE STUDY

A 44-year-old female patient presented with complaints of swelling, pain, difficulty swallowing and inability to open her mouth on the left side of her neck. She had a history of tooth extraction 1 week ago. In her examination, there was a hard, tender, fluctuant, hyperemic, approximately 3 × 2 cm abscess-compatible lesion starting from the left submandibular region superiorly, extending to the submental region anteriorly, to the mastoid apex posteriorly, to the ipsilateral thyroid lodge inferiorly, and to the level of the 2nd rib on the opposite side (Figure 1).

A fistula line was observed in the gingiva at the level of the lower left premolar tooth, from which purulent discharge was drained (Figure 2). Flexible laryngoscopy revealed edema and dense mucopurulent discharge in the larynx.

Laboratory examination: CRP 289.2 mg/L (0–5 mg/L), WBC 23.23 × 10^3/uL (3.98–10.04 × 10^3/uL), neutrophil 21.51 × 10^3/uL (1.53–6.13 × 10^3/uL), Hgb 7.1 g/dL (11.2–15.7 g/dL), iron 7 ug/mL (37–145 ug/mL), iron binding capacity: 226 ug/mL (110–370 ug/mL). Anti-HIV and tularemia panel were negative.

Neck tomography reported a fluid collection starting from the lower neck on the right side, extending along the corpus sterni to the anterior part of the right hemithorax,

Figure 1. A firm, tender, fluctuant, and hyperemic lesion approximately 3 × 2 cm in size, consistent with an abscess, extending to the right thyroid lodge and up to the level of the second rib on the same side.

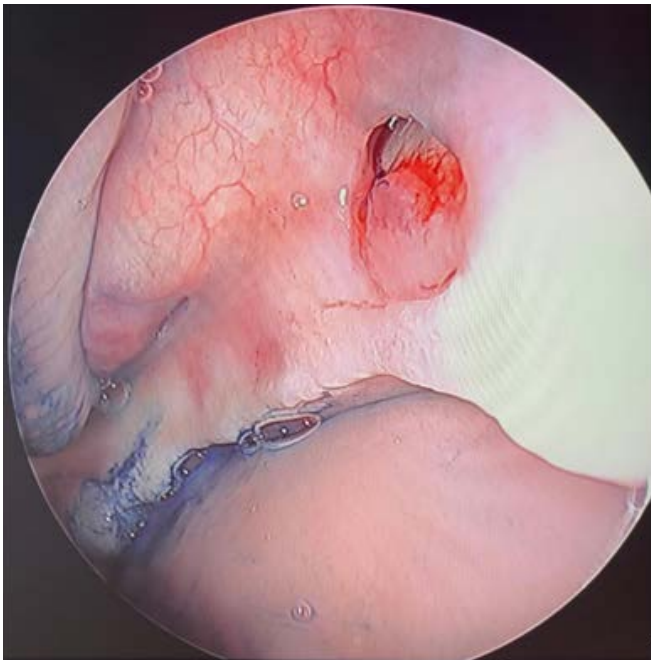

Figure 2. While the fistula tract in the gingiva at the level of the left lower premolar tooth was evaluated using methylene blue.

Figure 3. Contrast-enhanced neck MRI showing an abscess collection extending from the submental area to the second rib, indicated by a white arrow: (A) Sagittal section; (B) Axial section.

and a deep neck abscess starting from the anterior part of the thyroid on the left side, extending to the proximal 1/3 of the esophagus in the retropharyngeal area, with no clear plane between it and the esophagus. No mediastinal collection was observed in thoracic tomography (Figure 3). Abscess drainage was performed. It was thought to be a DNI and infectious diseases were consulted and empirical antibiotic treatment was started: 4 × 2000 mg ampicillin sulbactam, 2 × 100 mL metronidazole, ciprofloxacin 2 × 200 mg, 60 mg prednol, anti-inflammatory and gargle were started. Fluid intake was regulated. Abscess drainage was performed. Internal medicine was consulted due to existing iron deficiency anemia and iron supplementation was performed. The patient was transferred to the intensive care unit on the 5th day of his hospitalization in the ward due to dyspnea and progression of neck abscess. During intensive care follow-up, it was observed that the orocutaneous fistula line starting from the left lower premolar tooth level was fistulized to the sternal notch superior. Oral was stopped and a nasogastric tube was inserted. Fistula dressing was started with madeccasol, rifampicin and baum de peru. After his current condition stabilized, he was transferred to our service. In the laboratory examination on the 8th day of his hospitalization: CRP 25.5 mg/L (0–5 mg/L), WBC 12.47 × 10^3/uL (3.98–10.04 × 10^3/uL), neutrophil 10.67 × 10^3/uL (1.53–6.13 × 10^3/uL), Hgb 8.5 g/dL (11.2–15.7 g/dL). The infectious diseases department was consulted again, ampicillin was stopped, cefoperazone and linezolid 2 × 600 mg were added to the treatment. The patient's fistula tract was seen to be closed when evaluated with methylene blue on the 16th day of his hospitalization, and the nasogastric tube was removed and oral intake was started. Since gastric aspirate came from the abscess fluid during his follow-up, the abscess fluid was examined, and chylothorax was ruled out. The thoracic surgery department was consulted for drainage, and emergency surgery was not considered according to his current condition. The patient's laboratory values returned to normal after 28 days of follow-up and the fistula tract. After the induration and inflammation signs regressed, the patient was discharged to be followed up as an outpatient. In the control dressings, it was observed that the fistula tract was completely closed.

4. RESULTS AND DISCUSSION

DNIs are infections that affect all age groups, are difficult to diagnose due to differences in location, and have a high complication rate.[6] DNIs are bacterial infections that originate from the upper aerodigestive system and affect the deep tissues of the neck. Infection can be seen as lymphadenitis, cellulitis of the neck tissues, and abscess formation can also be observed. They are potentially life-threatening conditions that require intensive medical treatment and surgery.

While the most common cause in children is upper respiratory tract infection, it is due to odontogenic causes in adults.[7,8] In a retrospective study of 210 cases by Parhiscar and Har-el,[9] the most common cause was determined to be odontogenic (43%). Our case was also a DNI due to odontogenic intervention.

Clinical findings may vary depending on the affected area and the anatomical features of the area. Generally, neck swelling and neck asymmetry, sore throat, increased temperature, otalgia, dyspnea, dysphagia, odynophagia, trismus (due to pterygoid muscle involvement) and dysphonia are observed. Torticollis and limitation of neck movements may be observed. Systemically, general infection findings may include fever, general weakness, weakness and loss of appetite, tachycardia and respiratory distress.[10] Febrile intermittents (fever with legs) may be observed in complications such as septic embolism and internal jugular vein thrombosis. The agent is polymicrobial and is mostly caused by aerobic and anaerobic bacteria together.[11] In the presence of an abscess, a culture must be taken. Appropriate antibiotic therapy

should be initiated according to the culture result. Previous antibiotic use and cultures taken with inappropriate methods may cause negativity. Organisms frequently identified in culture are staphylococci (*S. aureus*, *S. pyogenes*, *S. epidermidis*), *streptococci* (*S. milleri* group, *S. viridans*), *peptostreptococcus*, *Klebsiella*, *bacteroides* and *fusobacterium* species.[11,12]

Treatment should be started as early and effectively as possible. The first step in treatment is airway safety and close monitoring is required. In case of respiratory distress, intubation and tracheotomy may be required for airway safety, although it is related to the clinical situation. In treatment, the location of the infection, its prevalence, presence of abscess, accompanying diseases and age group should be taken into consideration. Although recent reviews are based on nonrandomized studies, they recommend a 48-hour antibiotic treatment if the respiratory system is not affected in infections in the phlegmon stage and DBEs smaller than 2 cm.[11] However, patients should be closely monitored during this period and attention should be paid to the progression of the infection and possible complications. The treatment process usually includes 2–3 weeks of antibiotic treatment. Without culture results, empirical antibiotic treatment, gram-positive and anaerobic microorganisms should be automatically regulated. Due to the prevalence of beta-lactamase-producing products, penicillins resistant to beta-lactamases can be combined with antianaerobic agents. Third generation cephalosporins or clindamycin or quinolone group antibiotics are also available in case of penicillin allergy. If *Pseudomonas aeruginosa* is detected in the culture, imipenem/cilastatin, piperacillin/tazobactam or ticarcillin/clavulanate can be combined. If resistant *staphylococcus* species persist, vancomycin can be added to the treatment.

Surgical drainage is a treatment method especially when abscess is necessary. Peritonsillar and retropharyngeal abscesses can be drained orally, while abscesses in other parts can usually be connected to drainage through incisions made in the neck. Drainage can be performed with imaging guidance (USG, CT) in deeply located and loculated abscesses. Plain radiography can be useful in providing information about the spread of infection to the mediastinum or lungs, while the gold standard for diagnosis is contrast-enhanced neck CT.[11] Classical findings of abscess in neck CT are low density in the center of the abscess, contrast enhancement around the mass, soft tissue swelling, mass effect and effacement of fatty planes.[13] Neck MRI can be preferred because it does not give ionizing radiation and has higher soft tissue resolution. Neck MRI can be used in certain cases. It can provide useful information especially in infections of the retropharyngeal space and lateral pharyngeal space.

Following the progression of the infection, empyema, pericarditis, mediastinitis, and pericardial effusion may occur. Carotid artery rupture and aortopulmonary fistula may be observed. In addition, complications such as cranial nerve palsies, cervical necrotizing fasciitis, jugular vein thrombosis, venous embolism, septic shock, disseminated intravascular coagulation, renal failure, meningitis, and epidural abscess may also be seen.[11,14,15] Previous publications have suggested that involvement of more than one site, female gender, underlying diabetes, immune deficiency, respiratory distress, and delayed diagnosis and treatment are risk factors for the development of complications. The development of these complications increases mortality and morbidity and should definitely be considered in cases treated with DBE.

6. CONCLUSIONS

(1) DNIs can cause serious morbidity and mortality.
(2) A detailed history, physical examination, imaging, and laboratory tests should be performed according to presenting symptoms.
(3) Airway safety must be ensured and appropriate antibiotic therapy initiated for the causative microorganisms.
(4) If there is no adequate response to medical treatment, surgical drainage should be performed promptly and effectively.
(5) Risk groups must be identified and potential complications managed carefully.
(6) Careful clinical observation and timely surgical intervention are essential for favorable outcomes.
(7) Despite urgent treatment, deep neck infections can still be fatal; however, rapid and well-planned intervention may be life-saving.

Conflict of interest
None declared.

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Ethics
Written informed consent was obtained from the patient for publication of this case report and the accompanying images.

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