GSC Advanced Research and Reviews
eISSN: 2582-4597 CODEN (USA): GARRC2
Cross Ref DOI: 10.30574/gscarr
Journal homepage: https://gsconlinepress.com/journals/gscarr/

(CASE REPORT)

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Deep Neck Abscess: A case report

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GSC Advanced Research and Reviews, 2025, 22(01), 208-213

Publication history: Received on 04 December 2024; revised on 13 January 2025; accepted on 16 January 2025

Article DOI: https://doi.org/10.30574/gscarr.2025.22.1.0016

Abstract

Background: Deep Neck Abscess is a severe neck infection characterized by abscess formation in the submandibular and sublingual spaces, typically originating from odontogenic infections. Despite declining incidence due to antibiotics, the condition remains a critical concern in developing countries. It can cause life-threatening complications like airway obstruction and mediastinitis if left untreated.

Objective: To report a case of Deep Neck Abscess in a 32-year-old female with an odontogenic infection.

Case Report: A 32-year-old female presented with progressive neck swelling, trismus, and pain originating from a lower molar infection. Examination revealed fluctuating masses in the submandibular and submental regions, with CT imaging confirming extensive abscess formation. Laboratory tests showed leukocytosis.

Clinical question: What is the management of Deep Neck Abscess with an odontogenic infection?

Methods: Evidence-based literature study of Deep Neck Abscess with an odontogenic infection.

Result: Treatment for Deep Neck Abscess are surgical drainage and antimicrobial therapy.

Conclusion: Timely diagnosis, appropriate imaging, surgical intervention, and targeted antimicrobial therapy are crucial for successful management of Deep Neck Abscess. This case demonstrates the importance of a multidisciplinary approach to prevent life-threatening complications and achieve favorable outcomes.

Keywords: Deep Neck Abscess; Odontogenic Infection; Abscess; Airway Obstruction; Surgical Drainage; Antibiotic Therapy

1. Introduction

Deep Neck Abscess is a severe infection characterized by abscess formation in the submandibular and sublingual spaces, often resulting from odontogenic infections. First described by Wilhelm Frederick Von Ludwig in 1836, this condition represents a progression of Ludwig's Angina, transitioning from cellulitis to abscess formation. Although its incidence has significantly decreased with the advent of antibiotics, Deep Neck Abscess remains a critical concern in developing countries due to limited healthcare access and poor dental hygiene practices. In the pre-antibiotic era, over 70% of cases were attributed to infections of the pharynx and tonsils, whereas today, dental infections, particularly those originating from the lower molars, account for the majority of cases[1]. Anatomically, the condition affects the potential spaces of the neck, particularly the suprahyoid region, which includes the sublingual, submandibular, and submental compartments. These spaces are interconnected, allowing infections to spread rapidly. The proximity of these spaces to vital structures

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such as the airway, great vessels, and mediastinum increases the risk of life-threatening complications. If left untreated, Deep Neck Abscess can lead to airway obstruction, mediastinitis, cranial nerve paralysis, or rupture of the carotid artery[2]. The pathogenesis of Deep Neck Abscess often begins with an odontogenic infection, such as pulp necrosis caused by deep caries or periodontal abscesses. These infections spread via connective tissue, blood vessels, or lymphatics. The submandibular and sublingual spaces are particularly vulnerable because of their anatomical connections and the thin cortical bone in the mandibular region, which facilitates infection spread from the molars. Once the infection extends into these spaces, it can cause rapid swelling, elevating the tongue and potentially obstructing the airway[1]. Clinically, Deep Neck Abscess presents with both systemic and localized symptoms. Systemic manifestations include fever, malaise, and leukocytosis, reflecting the inflammatory response to the infection. Localized symptoms include neck swelling, erythema, and induration in the submandibular region. Intraorally, patients may experience pain, tongue elevation, dysphagia, and trismus. In severe cases, signs of respiratory distress such as stridor, cyanosis, and difficulty swallowing saliva may develop, necessitating immediate airway management[3].

Early diagnosis is critical to prevent complications. The diagnostic process includes a thorough history, physical examination, and imaging studies. Computed tomography (CT) is the preferred imaging modality, as it provides detailed information on the extent of the abscess and its relation to surrounding structures. Laboratory tests, including complete blood counts and culture studies, are also essential for confirming infection and guiding antibiotic therapy[2]. Management of Deep Neck Abscess requires a multidisciplinary approach. The first priority is airway stabilization, which may involve endotracheal intubation or tracheostomy in severe cases. Antibiotics covering both aerobic and anaerobic pathogens are administered intravenously, often in combination with corticosteroids to reduce edema. Surgical drainage is essential for evacuating pus and relieving pressure, typically performed through incisions in the neck or oral cavity[1]. We were interested to report a case of a 32-year-old female with Deep Neck Abscess and an odontogenic infection.

2. Case report

A 32-year-old female presented with complaints of neck swelling that began four days prior to hospital admission. The swelling was preceded by pain in her left lower jaw, which she had been experiencing for seven days. Despite seeking treatment from a dentist, the symptoms worsened, leading to severe neck pain, difficulty opening her mouth, and pain during swallowing. The patient also reported a history of fever, which had improved with paracetamol, but there were no complaints of shortness of breath. Her medical history was unremarkable, with no history of systemic diseases, smoking, or alcohol consumption.

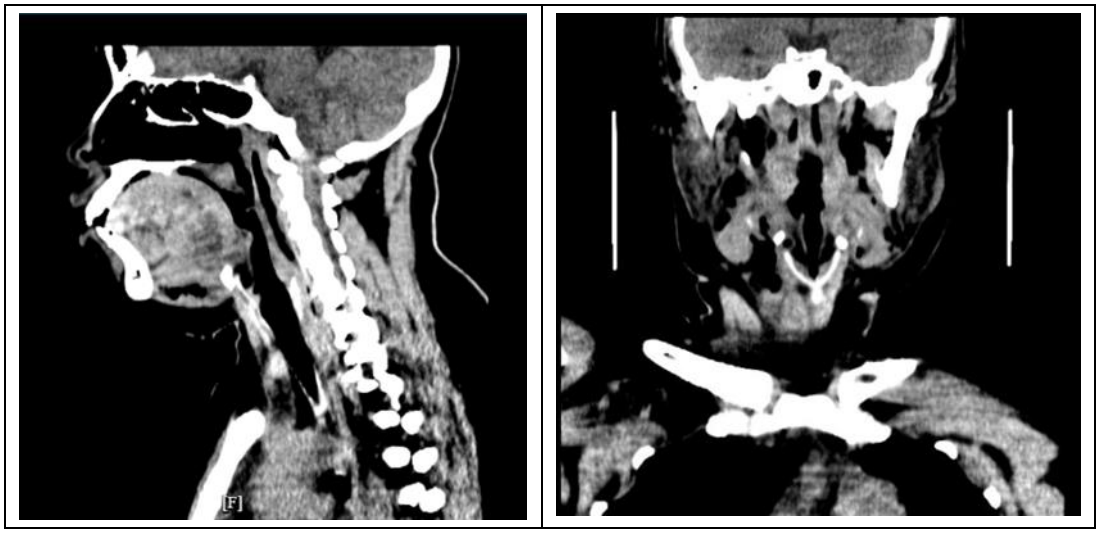

Figure 1 Midface colli CT-Scan with contrast of the patient

Physical examination revealed fluctuating masses in the submandibular and submental regions, accompanied by the presence of pus. Oral examination showed trismus and swelling of the mouth floor. Laboratory results indicated leukocytosis (WBC: 11.72) consistent with an acute infection.

Based on CT scan (figure 1) Impressive picture of abscess in the right and left submandibular space region, submental region, right and left buccal space, right maxillofacial to right periorbita, right and left prevertebral to parotid space,

right and left retropharyngeal space, right and left visceral space neck that pushes the oropharynx and laryngeal inlet to the left side, spread to right sternocleidomastoideus and left coli to right supraclavicular. Currently there are no signs of mediastinitis. Multiple reactive lymphadenopathy at right and left Ia/b, la/b. III, IV, Va/b levels.

The findings confirmed the diagnosis of Deep Neck Abscess originating from an odontogenic infection. From the panoramic X-Ray imaging (figure 2) Impression: missing teeth of 18,28,35,36,38,46 and Caries occlusal teeth of 24.

The patient underwent abscess drainage and odontectomy of the affected teeth under general anesthesia. Postoperatively, she was treated with intravenous antibiotics, corticosteroids, and daily wound care. Her condition improved significantly, and she was discharged with a favorable prognosis.

Figure 2 Panoramic X-Ray image of the patient

3. Clinical question

What is the management of Deep Neck Abscess with an odontogenic infection?

4. Review method

Literature search was performed with keywords “Deep Neck Abscess” AND “odontogenic infection” through 4 search engines: PubMed, Clinical Key, Cochrane, and Google Scholar. The selection of literatures was based on inclusion criteria, which were: 1) Deep Neck Abscess with an odontogenic infection. 2) studies that discuss Deep Neck Abscess with an odontogenic infection as the primary cause or a major contributing factor. 3) peer-reviewed clinical studies, case reports, and systematic reviews that provide evidence on the management, diagnosis, and outcomes of Deep Neck Abscess in relation to odontogenic sources. The exclusion criterion was inconsistent with study design. The critical review was conducted on 15 literatures, before applying inclusion and exclusion criteria.

5. Result

The literature search obtained scientific publications which were released in the last 10 years, relevant with the topics and the complete academic scripts were available.

Novialdi et al. (2010) reported that deep neck abscesses, including Deep Neck Abscess, are more common in regions with limited access to healthcare. They noted that prior to the antibiotic era, 70% of cases originated from infections of the pharynx and tonsils, while current cases are primarily odontogenic in origin[1].

Furst et al. (2001) documented a case of Ludwig's Angina progressing to mediastinitis, highlighting the critical importance of early intervention. Their findings emphasized the life-threatening complications of untreated infections in the neck spaces, including airway obstruction and systemic sepsis[7].

Imanto (2015) analyzed the management of deep neck abscesses in a tertiary hospital in Indonesia. They found that antibiotic therapy combined with surgical drainage significantly improved outcomes. Common pathogens included aerobic and anaerobic bacteria, justifying the use of broad-spectrum antibiotics[5].

Rizzo et al. (2009) described a severe case of submandibular space infection complicated by airway obstruction. This case reinforced the need for urgent airway management and multidisciplinary care to prevent fatal complications[4,13].

6. Discussion

Deep Neck Abscess is a progression of Angina Ludovici that occurs when infection advances, leading to abscess fluctuation in the submandibular and sublingual regions. If not promptly and appropriately treated, this condition can result in severe complications, such as airway obstruction, mediastinitis, cranial nerve paralysis, and even rupture of the internal carotid artery. Clinically, patients with Deep Neck Abscess often present with extraoral symptoms such as swelling of the neck, erythema, localized temperature elevation, and changes in voice, commonly described as "hot potato voice" due to vocal organ edema. Intraoral findings typically include swelling of the mouth floor, pain, tongue elevation, and difficulty opening the mouth (trismus)[2].

In this case, the patient, a 32-year-old female, presented with neck swelling that had progressively worsened following a history of dental pain originating from the left lower jaw seven days prior to hospital admission. Despite seeking dental treatment, the symptoms persisted, and the swelling extended to the neck. The patient also experienced difficulty swallowing, opening her mouth, and fever during the early stages of her illness. These symptoms are consistent with the clinical manifestations of Deep Neck Abscess, as described in the literature.

On physical examination, characteristic findings in Deep Neck Abscess include redness and swelling of the mouth floor, induration of the submandibular space, and the presence of pus upon palpation. The tongue may be pushed upward and posteriorly, which can lead to airway obstruction. In severe cases, patients may exhibit signs of respiratory distress, such as dyspnea, stridor, and cyanosis. In this case, the examination revealed fluctuating masses in the submental and submandibular regions, with the presence of pus, confirming the diagnosis of an abscess[4].

Diagnostic evaluation for Deep Neck Abscess often includes laboratory tests and imaging studies. Blood tests typically reveal leukocytosis, indicating acute infection. Imaging modalities such as CT scans are crucial for assessing the extent of the abscess and its spread to adjacent structures. CT findings in this case showed abscess formation in multiple regions, including the submandibular and submental spaces, buccal spaces, and prevertebral and retropharyngeal areas. These findings align with the typical patterns of infection spread in Deep Neck Abscess[5].

The management of Deep Neck Abscess requires a multidisciplinary approach prioritizing airway stabilization and infection control. Airway management is of utmost importance, as swelling and abscess formation in the neck can quickly compromise the patient's ability to breathe. In cases of severe airway obstruction, emergency tracheostomy may be necessary. In this case, the patient's airway was assessed, and appropriate interventions were planned to ensure its patency throughout the treatment process[4].

Empiric antibiotic therapy is initiated promptly to cover common aerobic and anaerobic pathogens until culture and sensitivity results guide targeted therapy. Antibiotics such as high-dose penicillin G, metronidazole, clindamycin, or cephalosporins are frequently used. In this case, the patient was treated with intravenous ceftriaxone and metronidazole, combined with corticosteroids to reduce edema and enhance antibiotic penetration. This combination therapy is supported by current guidelines for managing deep neck infections[6].

Surgical intervention is often required to drain the abscess and remove necrotic tissue. The standard surgical approach involves horizontal incisions at the level of the hyoid bone to decompress the affected spaces and evacuate pus. In this patient, abscess drainage was performed alongside odontectomy of infected teeth. Surgical drainage is critical for preventing further spread of the infection to deeper spaces, such as the mediastinum, which could lead to life-threatening complications[7,8].

The treatment provided to this patient was consistent with established protocols for Deep Neck Abscess. Daily wound care and follow-up evaluations were conducted to monitor healing and prevent recurrence. The patient responded well to the treatment, with significant improvement in symptoms and no evidence of further complications during hospitalization[9].

Complications of Deep Neck Abscess are often severe and include airway obstruction, mediastinitis, sepsis, and vascular complications such as carotid artery rupture. Intracranial spread can result in cavernous sinus thrombosis, meningitis, or brain abscess. Early recognition and intervention are key to preventing these outcomes. Fortunately, no complications were observed in this case, likely due to timely and appropriate management[10].

The prognosis of Deep Neck Abscess depends largely on the speed and accuracy of diagnosis, as well as the promptness of airway protection and infection control. Before the advent of antibiotics, mortality rates were as high as 50%. However, with modern advances in antibiotic therapy, surgical techniques, and intensive care, mortality rates have declined to less than 5%. In this case, the prognosis was favorable due to early diagnosis, effective treatment, and close monitoring[11,12].

This case underscores the importance of a multidisciplinary approach in managing complex infections like Deep Neck Abscess. Collaboration among specialists in otolaryngology, anesthesia, and oral surgery was crucial for ensuring comprehensive care. Furthermore, adherence to evidence-based protocols and the use of advanced diagnostic tools such as CT imaging played a pivotal role in guiding treatment decisions and achieving a successful outcome[13,14,15].

7. Conclusion

Deep Neck Abscess is a rare but serious condition that requires prompt diagnosis and a multidisciplinary approach to management. This case highlights the importance of early recognition, detailed imaging studies, and timely surgical intervention to prevent complications such as airway obstruction and mediastinitis. The successful outcome in this patient was achieved through a combination of empiric antibiotic therapy, corticosteroid use, and surgical drainage, supported by vigilant postoperative care. This case underscores the critical role of evidence-based protocols and collaboration among healthcare providers in managing complex infections like Deep Neck Abscess. By ensuring timely intervention and addressing the source of infection, clinicians can significantly improve patient outcomes and reduce the risk of mortality associated with this condition.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

This study has obtained an Ethics Approval issued by the Research Ethics Committee.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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