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Emergency Treatment of Submandibular Abscess Spreading to Buccal and Submental Spaces in Uncontrolled Diabetic Patients: A Case Study

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Abstract

Dental infections can extend to the maxillofacial space causing severe infections such as abscesses. Abscess in the maxillofacial space aggravated by the systemic disease of diabetes mellitus can delay healing and cause further complications. This case report discusses the emergency treatment of a submandibular abscess that extends to the buccal and submental spaces in a patient with diabetes mellitus.

Case Report: A 41-year-old female patient came to the Emergency Department of Hasan Sadikin Hospital in Bandung, complaining of swelling on the right cheek. The swelling was felt for seven days which started in the right submandibular area and extended to the right cheek and submental area. The patient had a history of diabetes mellitus for eight years, and on arrival, his current blood sugar was 365 mg/dL. The patient was diagnosed with a submandibular abscess that extends to the right buccal and submental area with uncontrolled diabetes mellitus. Treatment includes a drainage incision, Penrose drain, extraction of the causative tooth, and administration of ceftriaxone, metronidazole, ketorolac, and omeprazole drugs.

Conclusion: Submandibular abscess that extends to several maxillofacial spaces is an emergency condition that requires immediate management to prevent the spread of infection to other tissues, which can cause mortality.

Keywords: Abscess, Submandible, Buccal, Submental, Diabetes Mellitus

Introduction

The submandibular abscess is an inflammation accompanied by the formation of pus in the submandibular area, which is limited by the mylohyoid muscle. There is generally caused by infection of the teeth, the floor of the mouth, the pharynx, submandibular lymph nodes, trauma, or surgery.[1] Submandibular space is divided into the submental and submaxillary spaces, which are bounded by the anterior digastric muscle.[2] A 2009 study estimated that more than 3,400 cases annually in the United States are deep neck space infections.[3] A study in Taiwan showed that the most common deep neck infections were pharyngeal abscess (38.4%), submandibular abscess (15.7%), Ludwig's angina (12.4%), parotid (7%), and retropharynx (5.9%).[4] In Indonesia, submandibular abscess is the most common deep neck infection (42.3%).[5] Studies at dr. M. Djamil Padang showed that there were 33 cases of deep neck infection, namely peritonsillar abscess (32%) and submandibular abscess (26%) from October 2009 to September 2010.[6] Patients

with submandibular abscess were mostly men (51.9%). This is following the study at RSU Prof. Dr. R.D. Kandauou, Manado, where patients with submandibular abscesses were dominated by men (53%). The submandibular abscess is often found in patients aged over 50 years (33%). However, there is no age limit for submandibular abscess. The youngest patient was found in children aged one year and the oldest at 70.[7]

The most common causes of submandibular abscess are dental infection, sialadenitis of the submandibular gland, lymphadenitis, trauma, or other spread of infection from the deep neck space. Age factor plays a role in the cause of the submandibular abscess. In adults, the infection originates from the teeth and salivary glands, whereas in children, it originates from other deep neck infections that spread, such as the tonsils and pharynx.[8-9]

Abscesses are formed as a result of the normal flora that infects through lacerations or perforations. The bacteria that most often cause submandibular abscess due to dental infection is Streptococcus viridians, while the bacteria that cause non-infectious tooth abscess is Staphylococcus aureus. In patients with diabetes mellitus, the most common bacteria found in Klebsiella pneumoniae.[10-12]

Submandibular abscess is often caused by a mixed infection of several bacteria, both aerobic, anaerobic, and facultative anaerobes.[10] In addition to dental infection, another cause of a submandibular abscess is a decrease in the immune system. In patients with diabetes mellitus, the immune system decreases so that they are susceptible to infection. Complications of diabetes mellitus are angiopathy and endothelial dysfunction so that the wound healing process is disrupted.[13-14]

Complications of a submandibular abscess are spread to the submental space, which lies between the superior mylohyoid muscle, the inferior platysma muscle, and the chin. Second and third molar abscesses invade the mandible and may spread submental. Spread to the parapharyngeal space can cause airway obstruction and death. Other complications are mandibular osteomyelitis, mediastinitis, and sepsis. The mortality rate from complications of submandibular abscess is about 40%.[2,8,11]

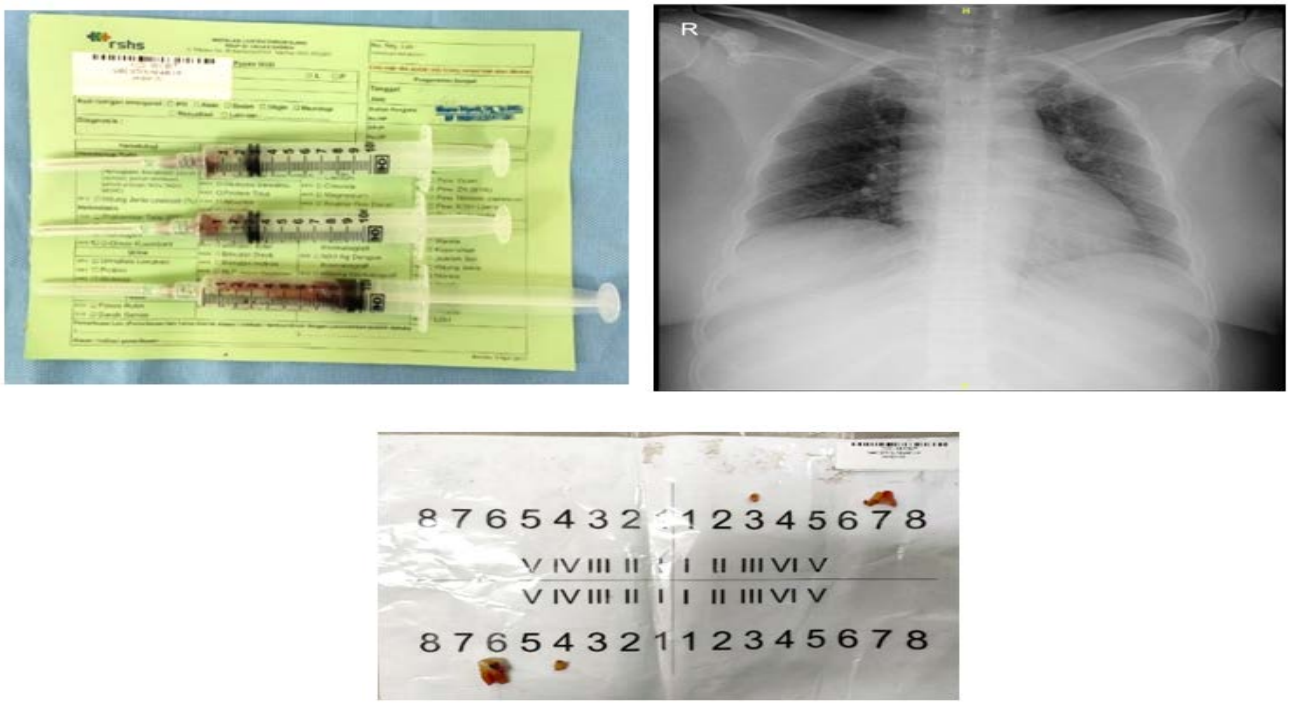
The principle of management of submandibular abscess is abscess drainage. However, patients with diabetes mellitus are prone to complications. Abscess drainage is an invasive procedure that triggers physical stress so that it can cause an increase in blood glucose levels.[15-16] This case report will discuss the emergency management of a submandibular abscess that extends to the buccal and submental spaces in a patient with uncontrolled diabetes mellitus.

Case Report

A 41-year-old female patient came to the Emergency Installation of Hasan Sadikin Hospital Bandung with complaints of swelling on the right cheek for seven days. The patient complained of pain in the lower right tooth 14 days before the swollen cheek. The swelling started in the right cheek area, but the patient did not seek treatment, then enlarged and spread to the right lower jaw and chin. The patient began to have difficulty opening his mouth two days ago. The patient went to the hospital in the Soekarno Hatta area, Bandung, but no action was taken, and she was referred to the Hasan Sadikin Hospital in Bandung. There was no information from the patient. Changes in voice, hoarseness (-), hot potato voice (-), stiff neck (-), and painful swallowing (-). The patient had a history of diabetes mellitus since eight years ago and hypertension since one year ago. The patient was taking four drugs (pioglitazone hydrochloride, acarbose, metformin HCl, and amlodipine).

Figure 1: The initial clinical picture of the patient before the procedure showed facial asymmetry and swelling of the cheeks right side and chin.

Figure 2: a. Intra-oral view of the patient before the procedure. b. Preoperative AP-Lateral STL radiograph.



Intra-oral examination revealed generalized hyperemic gingiva and swollen right buccal mucosa (Fig. 2a). On tooth 46, there was debris, calculus, caries, inflammation, and swelling around the teeth. Complete blood count and clinical chemistry showed an increase in serum creatinine (1.20 mg/dL) and a temporary increase in blood sugar levels (365 mg/dL). The COVID-19 antigen swab examination showed a reactive result, but the COVID-19 PCR-TCM swab got a negative result. Anteroposterior chest X-ray examination (Fig. 3) showed cardiomegaly without pulmonary congestion and no bronchopneumonia/pneumonia, and AP-Lateral STL (Fig. 2b) showed swelling and fluid buildup in the soft tissues of the right neck. When the patient came, a panoramic photo was not taken before the procedure. The patient was diagnosed with a right submandibular abscess that extends to the right submental and buccal cavities with non-vital teeth 44 and 46. The patient was also diagnosed with type II diabetes mellitus, stage I acute kidney injury, and hypertensive heart disease.

Figure 5: (a,b) Clinical picture of the patient 1 day after surgery, (c) Intra-oral view of the patient 1 day after surgery.

Figure 6: Panoramic view after the action.

Treatment performed was a through-and-through drainage incision in the right submandibular to submental; the drainage incision was opened, followed by the insertion of a Penrose drain (Fig. 5.a and b). Patients were extracted for teeth 23, 27, 44, and 46 (Fig. 4b). Teeth 47 and 48 caries were not extracted, because they would be treated by a dental conservator (Fig. 2a). After the

incision, a panoramic photo was taken the next day. From the panoramic photo, teeth 23, 27, 44, and 46 were not visible on the panoramic photo because they had been extracted during the incision (Fig. 2b). Tapping pus in the buccal, right submandibular, and submental regions was ±0.5cc, ±1.5cc, and ±1.0cc (Fig. 4a). Empirical antibiotics (ceftriaxone, metronidazole, ketorolac, and omeprazole) were administered before the results of the culture test, and sensitivity test came out.

Monitoring on the first day after surgery showed that the swelling had reduced, although it still looked rather large and still red compared to the other side (Fig. 5). Replacement of extra oral Penrose drains every three days and intra-oral every five days. Patients were given education about oral hygiene and gargled with povidone-iodine after every meal. The patient also practiced opening his mouth with an ice cream stick and continued antibiotic therapy.

Figure 6: Panoramic view after the action.

At the next control, the patient's condition showed improvement. At the latest follow-up, which was 1.5 years postoperatively, the patient's condition was normal, normal mouth opening entered three fingers, and the function of the oral teeth was normal; there were no complaints (Fig. 7).

Discussion

The patient, in this case, was diagnosed with a right submandibular abscess that extended to the right and submental buccal spaces. The causative teeth, in this case, were suspected to be necrotic teeth 44 and 46. The patient was also diagnosed with type II diabetes mellitus, stage I acute kidney injury and hypertensive heart disease. Clinical signs and symptoms of a submandibular abscess include swelling of the submandibular region, tenderness, and erythema, and may be accompanied by trismus, dysphagia, fever, and lymphadenopathy. The suspected causative tooth is usually caries or mobility with gingival swelling.[17] In addition to the history and physical examination, investigations are important to establish the diagnosis. Swelling and fluid in the soft tissues of the neck are seen on anteroposterior and lateral cervical X-rays. A chest X-ray shows a pneumothorax and pneumomediastinum if the patient has developed complications. Panoramic radiographs may show

abscesses in infected teeth. Blood tests can show leukocytosis, which indicates infection.[18-19]

The most common cause of submandibular abscess was dental infection (46.9%). In this patient, the submandibular abscess originated from necrotic teeth 44 and 46. Dental caries can cause necrosis of the dental pulp so that bacteria infect the periapical. The dental infection spreads through the periapical foramen of the tooth and around it in a continuous and hematogenic manner. The roots of the second and third molars lie in the mylohyoid line of the mandible. Infection of the tooth will spread continuously to the submandibular area.[12-13]

The sublingual space is the space located lateral to the muscles of the tongue, including the hyoglossus, genioglossus, and geniohyoid muscles. The sublingual space is connected to the submandibular space posterior to the mylohyoid muscle. This space is the gap between the genioglossus and hyoglossus muscles.[20] The posterior border of the submandibular space is open so that submandibular infection can spread through the inferolateral, medial, and digastric areas and hyoid bone. The abscess exits to the buccal and submandibular spaces.[12,13] If there is an infection in the submandibular gland, the infection can spread to the contralateral and sublingual spaces. The infection spreads to the epiglottis, parapharyngeal spaces, and peritonsillar areas, along with the passage of the sublingual artery.[20]

Infection of the epiglottis causes laryngeal edema. Infection that spreads to the parapharyngeal and posterior peritonsillar spaces can cause airway obstruction. Deep neck space infection can spread to the clavicle and mediastinum, causing mediastinitis.[20] This complication is a top priority for early treatment because it can be life-threatening. In this patient, there was no change in voice, hoarseness, or painful swallowing. The patient was conscious/components, cooperative, had normal vital signs (respiratory rate, oxygen saturation), and had a thorax examination within normal limits. There were no signs of airway obstruction or mediastinitis. The patient has been given injections of antibiotics ceftriaxone, metronidazole, ketorolac, and omeprazole. Drainage incision on the right buccal to submandibular and submental spaces and installation of a Penrose drain. Ideally, the results of culture and sensitivity tests determine the bacteria causing the infection and the type of antibiotic. However, the results of culture and sensitivity tests take a long time, so it is necessary to give empirical therapy in the form of antibiotics for aerobic and anaerobic bacteria. Abscess drainage incision is performed at the most volatile point, and dissection is performed using hemostat clamps until an abscess cavity is found. After the abscess is removed, a drain is placed.[21]

Periodontal infection is the 6th most common infection in patients with diabetes mellitus.[22] Uncontrolled hyperglycemia conditions cause deficiency of the C4 component so that polymorphonuclear cells are deficient and the cytokine response is reduced. The hyperglycemic environment also blocks antimicrobial function by inhibiting glucose-6-phosphate dehydrogenase (G6PD) and increasing polymorphonuclear cell apoptosis. In addition, microangiopathy and endothelial dysfunction may occur. Periodontitis causes insulin resistance, so glycemic control decreases. In contrast, poor glycemic control is associated with an increased incidence of gingivitis and periodontitis.[22] This is because, in abscess patients, microangiopathy stimulates the growth of anaerobic bacteria due to a lack of

oxygen supply to peripheral tissues and a decrease in the availability of antimicrobials at the site of inflammation. Therefore, in addition to the management of submandibular abscess, precise and consistent blood glucose regulation is required. Patient education about the importance of medication adherence and glycemic maintenance is the main principle of diabetes mellitus treatment.[23]

Conclusion

A submandibular abscess that has spread to several maxillofacial spaces is an emergency that requires surgical and pharmacological management to prevent the spread of infection that can lead to death. Maintenance of glycemic control is also necessary to prevent delayed healing of infection.

Reference

1. Litha Y., Gazali M., Lopo C., et al. Submandibular Abscess. Jurnal Medical Profession (MedPro). 2019;1(2):144-50.
2. Arayapisit T., Vorakulpipat C., Srimaneekarn N., et al. Anatomical Variations of the Anterior Belly of the Digastric Muscle in Thai Cadavers: A Cross-Sectional Study. J Int Soc Prev Community Dent. 2022;12(2):171-7.
3. Brito TP., Hazboun IM., Fernandes FL., et al. Deep Neck Abscesses: Study of 101 Cases. Brazilian Journal of Otorhinolaryngology. 2017;83(3):341-8.
4. Balaji SM., Balaji PP. Textbook of Oral & Maxillofacial Surgery. 3rd edition. New Delhi: Elsevier India; 2018.
5. Rijal S., Romdhoni AC. Bacteria Pattern, Results of Antibiotic Sensitivity Test and Complications of Deep Neck Abscess Patients in dr. Soetomo General Hospital. Biomoleculat and Health Science Journal. 2018;01(02):124-30.
6. Hesly I., Lumintang N., Limpeleh H. Profil Abses Submandibula di Bagian Bedah RS Prof. Dr. R. D. Kando Manado Periode Juni 2009 Sampai Juli 2012. E-Clinic. 2014;2(1).
7. Singla H., Kalra B., Kaur A., et al. Submandibular Space Infection-A Threatening Plethora. IJOHD. 2022;8(3):269-73.
8. Ortiz R., Espinoza V. Odontogenic Infection. Review of the Pathogenesis, Diagnosis, Complications and Treatment. Res Rep Oral Maxillofac Surg. 2021;5(2). Available from: https://www.clinmedjournals.org/articles/iaoms/research-reports-in-oral-and-maxillofacial-surgery-rroms-5-055.php?jid=iaoms
9. Hansen BW., Ryndin S., Mullen KM. Infections of Deep Neck Spaces. Seminars in Ultrasound, CT and MRI. 2020;41(1):74-84.
10. Jyoti R., Das A., Manickam J., et al. Unilateral Marginal Mandibular Nerve Palsy in a Case of Submandibular Space Abscess – A Rare Case Report With Review of Literature. Global Journal of Medical Research : J Dentistry and Otolaryngology. 2015;15(4):9-13.
11. Velhonoja J., Lääveri M., Soukka T., et al. Deep Neck Space Infections: An Upward Trend and Changing Characteristics. Eur Arch Otorhinolaryngol. 2020;277(3):863-72.
12. Ogle OE. Odontogenic Infections. Dental Clinics of North America. 2017;61(2):235-52.

13. World Health Organization (WHO). Classification of Diabetes Mellitus. WHO. 2019;6–24.
14. Endang S., Lucky R., Seto A. Emergency Treatment of Severe Odontogenic Infection Extending to the Four Maxillofacial Spaces: Case Report. International Journal of Medical and Biomedical Studies. Volume 6, Issue 01; January: 2022; Page No. 82-8
15. Dogra P., Jialal I. Diabetic Perioperative Management. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022. Available from: http://www.ncbi.nlm.nih.gov/ books/NBK540965/
16. Sanders JL., Houck RC. Dental Abscess. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022. Available from: http://www.ncbi.nlm.nih.gov/books/NBK493149/
17. Koch BL. Diagnostic Imaging Head and Neck. S.l.: Elseiver - Health Science; 2021.
18. Septikasari R., Riawan L., Sylvyana M. Management of Left Submandibular Abscess Duet to Sialolith: A Case Report. International Journal of Medical Reviews and Case Reports. 2020;4(9):65-8.
19. Subudhi SK., Padhiary SK., Pathak HM., et al. A Case Report of a Submental and Submandibular Space Infection. Indian Journal of Forensic Medicine & Toxicology. 2020;14(4):8787-90.
20. Hasmi FRR., Tajrin A., Ramadhanty N. Surgical Treatment for Odontogenic Submandibular Space Infection: Case Report. Makassar Dent J. 2019;8(2):87-90.
21. Polak D., Shapira L. An Update on The Evidence for Pathogenic Mechanisms That May Link Periodontitis and Diabetes. J Clin Periodontol. 2018;45(2):150-66.
22. Shizuma T., Fukui S., Todoroki K. A Case of Back Abscess and Diabetic Ketoacidosis in a Patient with Type 2 Diabetes Mellitus. Diabetes CaseRep.2016;1:106.doi:10.4172/2572-5629. 100010Endang S., Lira M., Asri A. Correlation between Spatial Involvement and Systemic Disease with the Length of Hospital Stay in Odontogenic Maxillofacial Infection Patients. International Journal of Science and Research (IJSR). 2018. Volume 7 Issue 11, November 2018.