OVERVIEW OF ODONTOGENIC INFECTIONS THAT EXTENDED TO MAXILLOFACIAL SPACE IN ORAL AND MAXILLOFACIAL DEPARTMENT OF DR. HASAN SADIKIN HOSPITAL IN 2017 – 2019

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ABSTRACT Background: Odontogenic infection is an infection that originates from the teeth, which can extend to maxillofacial space. Severe odontogenic infection can lead to changes in general circumstances, so hospitalization is needed for optimal treatment. Method: This research is a retrospectively study by reviewing medical records of patients with diagnose of odontogenic infections that extend to maxillofacial space in Dr Hasan Sadikin Bandung from January 2017 to December 2019. Result: The result found that the average number of patients with maxillofacial infection was mostly in the adult age group and more men (57%) than women (43%). Based on the teeth involved, it was found that the infection was mostly caused by the right lower teeth region (48%). Based on the length of the complaint until the first examination, mostly for 3-7 days (53%) Conclusion: The incidence of odontogenic infections is still high, although there has been a decline in the last 3 years. Public awareness to check their dental and mouth health at RSHS was very low so that more patients come to RSHS after the complaints are more severe.

KEYWORDS Infection, odontogenic, abscess

Introduction

Odontogenic infection is an infection that is caused by bacteria of the teeth and spreads through the pulp, periodontal tissue, odontoma and cyst’s secondary infection, untreated tooth or radix, and pericoronar infections. Odontogenic infections (OIs) have been one of the most difficult diseases to treat in dentistry and have difficulty levels varies, from simple local infections to complex and life-threatening infections.1,2,3

Space involved odontogenic infection have more complication risks include low-grade fever and life-threatening conditions such as upper respiratory obstruction. National Oral Health Survey (NOHS) in 2006 showed that almost 50% population in Philippine were suffered from odontogenic infection with characteristics that included deep caries affecting pulp, oral ulcers, abscess through fistula tracts, and pain. Those were caused by less oral health educations and knowledge, as odontogenic infection percentage was increased.4 Patients have to be treated by the competent oral surgeon when signs of abscess present, with or without the spread of infection, to prevent any widespread abscess.1

The aim of this study was to discover the characteristics of OIs that spread into the spaces in the emergency room of RSUP Dr. Hasan Sadikin Bandung around 2017 – 2019. The result was expected to obtain odontogenic infection that spread to spaces
characteristics data in the emergency unit of RSUP Dr. Hasan Sadikin Bandung from 2017-2019.

**Literature review**

Facial spaces are potential spaces that exist between the fasciae and underlying organs and other tissue that can be penetrated or filled up by purulent exudates. These spaces are not presented in humans with a health condition but indeed in infected conditions. Some spaces have a neurovascular structure which is called compartments. The facial spaces that could be directly affected by odontogenic infection are called primary spaces, both in maxilla and mandible, and they include canine, infratemporal, buccal, submental, and sublingual spaces. Whereas the extended infection that runs over the primary spaces are called secondary spaces (Table 1).

Extracellular fluid transudation would escalate the hydrostatic pressure followed by exudation of inflammatory cells, preventing the blood supplies. This would happen when OIs exceed through the pulp to the apex of the tooth and periodontal ligament. The pathogenic bacteria that triggered autolytic inflammatory action would present in all infection stages. Not only distribute the inflammatory process with the antigen products, but these pathogens also directly cause bone destruction. Streptococcus are commonly found in the early stage of the infection. These bacteria destroy the tissue by integrating hyaluronidases and causing the damages of extracellular glycoprotein in connective tissue. This bacterial growth period gave a good flora for anaerobic odontogenic infections and made the response more acidic by processing the local oxygens and metabolic substances. This flora also produced anaerobic bacterial nutrients three days after clinical symptoms presented. Anaerobic bacteria such as *Prevotella dan Porphyromonas spp* produce collagenase enzymes that destruct collagen tissue as the largest connective tissue’s extracellular matrix protein.

This process could occur to mandibular spaces infections or subperiosteal palatal abscesses. Otherwise, when the periosteum has occurred, the musculus attachment around would directly spread the infection to the soft tissue (Figure 1).

*Figure 1* The potential course of odontogenic infection.

Through the inflammatory process and tissue destruction, one could discover the stages and pathways of odontogenic infection. The stages of infection could be a good reference to conceive the spread of untreated severe OIs to profound head and neck fascia. Medical treatments for OIs patients were undergone in the emergency department, based on Ols characteristics. There are many factors to be considered in treating OIs patients, such as medically compromised patients who have systemic disease, including hypertension, diabetic patients, or patients with organ damage or failure such as renal or heart disease.

**Material and Methods**

Secondary data of OIs patients who had the OIs spread into the spaces were used as the material of this study. The data were taken from medical records of OIs patients in the Oral and Maxillofacial Department of Hasan Sadikin Hospital for the past three years from January 2017 – December 2019. The target populations were medical records of patients diagnosed by Ols in the Oral and Maxillofacial Department of RSUP Dr. Hasan Sadikin Bandung. The accessible population of this study were medical records of patients diagnosed by Ols that spread to maxillofacial spaces in the Oral and Maxillofacial Department of RSUP Dr. Hasan Sadikin Bandung.

The sample of this study was taken based on data and medical records. Age, gender, and diagnosis were recorded from medical records. The data were recorded in tabular form based on some factors, including gender, age, involved spaces, the length of the complaint until the first examination (Table 3). A retrospective descriptive-analytical study was made for this study. Secondary data was taken retrospectively from medical records by using OIs patients characteristics. This study was done in RSUP Dr. Hasan Sadikin Bandung, from November 2020 – Februari 2021.

**Results**

The data collection result showed the data for the past three years (2017-2019), there were 217 patients who diagnosed with an odontogenic abscess that spread to maxillofacial spaces in Oral and Maxillofacial Department RSUP Dr. Hasan Sadikin Bandung, and 215 patients were included after confirming the following inclusion criteria of this study. Odontogenic abscesses that spread to spaces were found more in males for 57% (123 patients) than females for 43% (92 patients), with the age range in the 20 – 60 yo for 72% (152 patients). Based on the number of spaces involved, 71% (152 patients) had more than 1 space. Meanwhile, as many as 29% (63 patients) had only 1 space involved, and the number was decreased over time. (Chart 1)

*Chart 1* Number of patients with odontogenic infection extended to maxillofacial space of Hasan Sadikin Hospital in 2017 - 2019

The most region that is the source of infection was the right lower teeth region, as many as 103 patients (48%), 80 patients...
Table 1 The facial spaces of odontogenic infection.5

|          | a. Primary spaces maxilla | b. Primary spaces mandible | c. Secondary spaces |
|----------|---------------------------|---------------------------|---------------------|
|          |                           |                           |                     |
|          | 1. Canine spaces          | 1. Submental spaces       | 1. Maseter spaces   |
|          | 2. Buccal spaces          | 2. Buccal spaces          | 2. Pterigomandibular spaces |
|          | 3. Infratemporal spaces   | 3. Submandible spaces     | 3. Temporal superfisial and deep spaces |
|          |                           | 4. Sublingual spaces      | 4. Lateral faringeal spaces |
|          |                           |                           | 5. Retrofaringeal spaces |
|          |                           |                           | 6. Prevertebra spaces |

Table 2 Stages of Infection.

| Characteristics      | Inoculation | Cellulitis          | Abscess                  |
|----------------------|-------------|---------------------|--------------------------|
| Duration             | 0 – 3 days  | 3 – 7 days          | >7 days                  |
| Pain                 | Mild – fair | Severe, generalized | Fair – severe, localized |
| Size                 | Small       | Large               | Small                    |
| Localization         | Diffuse borders | Diffuse borders | Well circumscribed       |
| Palpation            | Tender, sticky, mildly smooth | Hard, highly smooth | Fluctuate, smooth        |
| Color                | Normal      | Redness             | Redness around the area  |
| Skin quality         | Normal      | Thick               | Rounded and shiny        |
| Surface Temperature  | Low-grade febrile | Febrile              | High-grade febrile       |
| Functio laesa        | Minimum,not present | Severe              | Fair – severe           |
| Tissue fluid         | Present     | Serous,spotting pus | Pus                     |
| Malaise level        | Oedema      | Severe              | Fair – severe           |
| Severity             | Mild        | Severe              | Fair – severe           |
| Pericutaneous bacteria | Aerobic     | Mixed               | Anaerobic               |

Table 3 Overview of the sample study

| Variable            | n(%)       |           |
|---------------------|------------|-----------|
| Gender              |            |           |
| Male                | 123 (57%)  |           |
| Female              | 92 (43%)   |           |
| Age                 |            |           |
| <10 years           | 9 (4%)     |           |
| 11-19 years         | 24 (11%)   |           |
| 20-60 years         | 155 (72%)  |           |
| > 60 years          | 27 (13%)   |           |
| Spaces involved     |            |           |
| 1                   | 63 (29%)   |           |
| >1                  | 132 (71%)  |           |
| Treatment Procedure |            |           |
| Extraction          | 10 (5%)    |           |
| Extraction + Incision drainage | 205 (95%) |           |
| Duration of complaints until the first examination | | |
| 0-3 days            | 41 (19%)   |           |
| 4-7 days            | 114 (53%)  |           |
| > 7 days            | 60 (28%)   |           |

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(37%) were caused by the left lower teeth region, 18 patients (8%) were caused by the right upper teeth region, and 14 patients (7%) was caused by the left upper teeth region (Graphic 2). It was found that the treatment procedure performed incisions drainage was 95% (205 patients), and Extraction of teeth was 5% (10 patients). Research variables according to gender, age, source of infection, number of spaces involved, therapeutic procedure, and duration of complaints until the first examination are presented in the table (Table 3).

Chart 2 Source of infection of odontogenic infection extended to maxillofacial space of Hasan Sadikin Hospital in 2017 - 2019

Discussion
From the data collected, it can be seen that the level of awareness of patients to come to RSHS when complaints are still mild is very low. One of the variables in this study was the length of the patient’s complaint until the first examination associated with the stages of odontogenic infection. This study also showed that most of the patients came to RSHS after the number of spaces involved was more than one.

The treatment procedure performed shows that odontogenic infection had spread to the maxillofacial space, thus requiring more complex therapy. The amount of space involved is very important as a reference in planning treatment procedures. Treatment for odontogenic infections includes drug administration and surgery, namely tooth extraction and drainage incisions to remove toxic pus and decompression.

Conclusion
The incidence of odontogenic infections is still high, although there has been a decline in the last 3 years. Public awareness to check their dental and mouth health at RSHS is still very minimal so that more patients come to RSHS after the complaints are more severe.

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