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Correlation between Spatial Involvement and Systemic Disease with the Length of Hospital Stay in Odontogenic Maxillofacial Infection Patients

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Abstract: ***Background: Odontogenic infection is an infection that originates from the teeth, which can extend to maxillofacial space. Severe odontogenic infections can lead to changes in general circumstances so hospitalization is needed for optimal treatment. Purpose: The purpose of this study was to determine the correlation of spatial involvement and systemic disease with the length of hospital stay in odontogenic maxillofacial patients. Method: This research is a retrospective study by reviewing medical records of patients with a diagnosis of odontogenic infection that extends to maxillofacial space that is hospitalized in Dr. Hasan Sadikin Bandung from July 2015 to July 2017. The epidemiological data were processed with the Spearman correlation test to see affected space would affect the patient's length of hospitalization. Results: Correlation test results showed that the spatial involvement (p = 0.0072),systemic disease (p=0,0399) were the risk factors that affected the length of hospitalization. Conclusion: Spatial involvement and systemic disease are influenced the length of hospital stay***

Keywords: odontogenic infection, spatial, length of hospitalization, systemic disease, maxillofacial

1. Introduction

Odontogenic infection is an infection caused by spesific oral microorganisms which originates from tooth.[1] This infection is initiated by caries lesion, periodontal diseases, and pulpitis which then can extend widely through dental root to alveolar bone, deeper soft tissue, oral cavity, head and neck[2,3] Prompt use of antibiotics and surgical treatment can significantly decrease incidence of life threatening odontogenic infection which has spreaded to maxillofacial spatial area.[4,5]

In some patients with odontogenic maxillofacial infection, hospitalization can aid patients to receive proper and optimal treatment. Peterson suggested some criteria for hospitalization which include high fever above 38,3°C, dehydration, respiratory obstruction, endangerment of vital structure, moderate to severe infection, need of general anesthesia, and patient with severe systemic disease. Length of in-hospital stay for patients with odontogenic infection which has extended into maxillofacial spatial area can become longer commonly due to age variation, leucocytes counts, and choice of treatment which received by the patients while in hospital.[6,7] Other than that, a research conducted by Mirochnic et al at Israel showed that the higher patient's severity score, the longer patient would be hospitalized.[8]Research by Calis S.A et al (2015) at Ege University, Turkey also revealed that length of hospitalization in odontogenic infection patients with diabetes mellitus type II tend to be extended.[9]

The purpose of this study is to analyze correlation between spatial involvement and systemic disease with the length of in-hospital stay in odontogentic maxillofacial infection patients.

2. Research Method

Sample for this research is taken from odontogentic maxillofacial infection patients' medical record at Oral Surgery Department Dr Hasan Sadikin Hospital Bandung from July 2015 to July 2017.

All samples for this research are obtained from data collection and patients' medical record. Age, gender, and diagnosis are recorded from medical record as well. Data is presented in tables catagorized into systemic disease that found in medical record and affected space.This research is conducted retrospectively, secondary data is collected cross sectionally from patients' medical records. The applied research method is bivariant correlation test, aiming to analyze the relationship between the length of patients hospitalization stay with spatial involvement and systemic disease.Data analysis was conducted using spearman test with bivariant correlation test to compare how each variable risk correlated one to the other.

3. Results and Discussion

There were 112 data from patients medical records which met data criteria, and 68 patients among those were diagnosed with odontogentic infection which had spreaded into spatial area and had been hospitalized for more than 3 days, as presented in table 1 below.

Table 1: Length of in-hospital stay in odontogenic infection patients

Length of in-hospital stay	Number of patients	Percentage
1-3 Days	44	39.2%
>3 days	68	60.8%

Table 2: Distribution of Infected Spatial Area (n=112)

Infected Spatial Area	Number of Patients	Percentage
1 facial space	20	17,85 %
2 facial space	59	52,67%
3 facial space	29	25,91%
4 facial space	4	3,57 %

Data distribution based on severity score showed that 52,21% of affected patients involved 2 spatial areas as stated in Table 2. Among 112 patients, 42 of them (37,5%) had another systemic disease as stated in Table 3.

Table 3: The Distribution of Systemic Disease

Number of patients	Present of systemic disease	Percentage
112	42	37,5%

Table 4: Bivariant analysis; risk factor that influence length of in-hospital stay

	variabel	*Rs*	*t.counts*	*p-value*	*Sign*	*correlation*
Length	*Space*	.231	2.49	0.0072	Sign	5.32
	Systemic disease	.166	1.77	0,0399	sign	2.76

Spatial involvement shows a significant number related to the length of stay as shown in Table 4. In this study, the relationship between spatial and length of stay is p = 0.0072 when compared to p-value of <0.05.

The degree of severity based on spatial anatomic location is seen from the extent to which this infection threatens the airway or other vital structures such as the heart and mediastinum or important parts of the head.[10] The buccal, infraorbita, vestibule and subperiosteal spaces can be categorized as low severity because the infections that occur here do not threaten the airway and important structures. If the infection is blocking airway access due to swelling or trismus, it can be categorized as moderate severity. This swelling or trismus, for example, occurs in spaces involving masticatory muscles, submaseter space, pterygoid mandibular space and temporomandibular space and perimandibular space such as submandibular, submental and sublingual. High severity is swelling that can directly damage or inhibit the airway or threaten important structures, such as swelling that occurs in lateral pharyngeal spasia, retro pharyngeal, danger space, and mediastinum. In 1999 Flynn et al divided this degree of severity into numerical numbers from 1 to 4. [11]

The results of this study indicate that the spatial involvment is related to the increase in length of stay. This is in accordance with a research conducted by Mirochnic et al in Israel, stating that the higher severity scores of patients, the longer the patient's stay time.[8]Flynn et al also mentioned that the severity score significantly affected the length of stay.[12]

As for the relationship between systemic diseases and length of stay, the results were also significant with p = 0.0399 when compared with p-value of <0.05. This is in accordance with research conducted by Rao et al who stated that diabetic patients have a greater risk of infection, high rates of complications and death and can increase the risk of patients being hospitalized for longer time.[13]

Infections that occur in patients with diabetes mellitus can be severe and difficult to heal. The immunoglobulin response appears normal although there is a disruption in complement activity. In patients with uncontrolled blood sugar, granulocyte adherence, chemotaxis, phagocytosis and bacterial activity will occur. Hyperglycemia that can interfere with phagocytic function has a range of values between 198-270 mg/dL. The administration of insulin will affect the function of granulocytes. T lymphocyte dysfunction also occurs in patients with uncontrolled diabetes mellitus, which allows infection by cellular pathogens. Cellular immune function is also altered due to the administration of insulin.The relationship between diabetes mellitus and immunodeficiency is that serum glucose is very important for the management of infections in patients with surgical procedures. Patients with serum glucose levels above 220 mg / dL postoperatively have a 2.7 times risk of infection compared to patients whose serum glucose levels are below 220 mg / dL. Therefore it is very important to keep glucose levels stable in the blood after surgery. This is why the length of stay in patients with systemic diseases, in this case diabetes mellitus, becomes longer than patients without systemic disease.[14]

4. Conclusions

1) The spatial involvement has a significant correlation with the length of stay of patients with odontogenic infections which extends to maxillofacial space.
2) Systemic disease is the next factor that has a significant effect on increasing the length of stay of patients with odontogenic infections which extends to maxillofacial space at Dr. Hasan Sadikin Hospital Bandung

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