SYSTEMIC COMORBIDITIES IN PATIENTS WITH PRIMARY FASCIAL SPACE INFECTIONS OF ODONTOGENIC OROGIN: EXPERIENCE OF A TERTIARY CARE CENTER

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ABSTRACT

OBJECTIVES

To assess systemic immune-compromised comorbidities in patients presenting with odontogenic infections that extend to fascial spaces. This study was designed to investigate the incidence of immune-compromising systemic comorbidities among patient presenting with odontogenic infections.

METHODOLOGY

This cross-sectional study was performed at the Department of Maxillofacial Surgery, Hayatabad Medical Complex (HMC) Peshawar from October 2018 through April 2019. However, patients older than 10 years of age, presenting with fascial space infections other than odontogenic cause, secondary fascial space infections and patients with multiple organ failure were excluded. The odontogenic infections were categorized according to their anatomical location. The prevalence of comorbidities was also assessed.

RESULTS

A total of 145 patients were included, where the male to female ratio was 3.8:1, mean age ~ 56 ± 14.74 years (range: 12-80 years) and mean duration of the odontogenic infections was 5± 1.2 days. The submandibular space was the most frequent site involved in odontogenic infections with a frequency of 60 (41.4%), followed by buccal space with 44 (30.3%) patients & canine space with 31 (21.4%) patients. Of the 79 patients with comorbidities out of total 145 patients, diabetes mellitus was recorded in 60 patients. Other comorbidities included hypertension, renal and hepatic impairment.

CONCLUSION

Diabetes mellitus was the most common immune compromising comorbidity presented in patients with odontogenic infections extending in fascial spaces. Assessment of diabetes in routine dental practice is emphasized to avoid exacerbation of the odontogenic infections.

KEYWORDS: *Immune-Compromised, Systemic Comorbidities, Fascial Space Infections, Odontogenic Infections*

INTRODUCTION

There is convincing evidence that medical comorbidities lead to compromised immunity, poor wound healing and increased risk of infections.[1] Such comorbidities include diabetes, end stage renal disease, malignancy, human immunodeficiency virus (HIV) infection and hypertension. The exposure of patients with medical comorbidities to infection may result in significant morbidity.[2,3] Odontogenic infections involving fascial space is a common clinical condition. If odontogenic infections are left untreated, they may spread to other locations, intensify in the fascial spaces, and eventually result serious clinical pathologies. An infection originating from the dental pulp, periodontal tissues or bone may perforate the cortical plate and spread into the surrounding spaces created by the distention of tissues secondary to the infection.[4] The apparently minor odontogenic infections may exacerbate and lead to aggressive clinical conditions such as cellulitis and abscess formation. The presence of immune-compromising systemic comorbidities especially facilitates such progression of odontogenic infections. In severe forms, progression of the infection may lead to a life-threatening condition, for example air way obstruction. Such clinical conditions not only increase the complexity of treatment but also elevate the risk of severe side effects caused by the disease. It is thus of clinical importance to assess the presence of immune-compromising systemic comorbidities in patients presenting with odontogenic infections that extend to the fascial space. Previous studies have investigated the incidence and effect of immune-compromising systemic comorbidities on odontogenic infections and its treatment outcomes. To exemplify, the effect of systemic comorbidities on treatment outcomes for fascial space infections has been evaluated. The results showed that diabetes mellitus

was the most common immune-compromised comorbidity (seen in 15 out of 86 cases) in patients with odontogenic infections.[5] Moreover, other comorbidities in these patients with odontogenic infections included HIV, head and neck radiation, antiresorptive and corticosteroid. It was also revealed that the increased number of involved fascial spaces and length of hospital stay have a strong relationship ($P < 0.001$). Another study investigated 222 patients with odontogenic infection and found that diabetes and hypertension were present in 35.1% of patients in life-threatening conditions.[6] Comprehensive management of the odontogenic infection with concurrent steady control of diabetes and hypertension were advocated to avoid the occurrence of life-threatening complications. Such studies indicate that immune-compromising systemic comorbidities, particularly diabetes, is a significant risk factor to render patients presenting with odontogenic infection to life-threatening conditions. Although the study of immune-compromising systemic comorbidities in patients with odontogenic infections is clinically important, no such local data is available. To fill this gap, this study was designed to investigate the incidence of immune-compromising systemic comorbidities among patient presenting with odontogenic infections. This study may come up with local data that can be used for maintaining quality oral hygiene, adapting preventive measures and optimizing the underline conditions.

METHODOLOGY

This cross-sectional study was performed at the Department of Maxillofacial Surgery, Hayatabad Medical Complex (HMC) Peshawar from October 2018 through April, 2019. The study was approved by the Research and Ethics Committee of HMC, Peshawar (Ref. No. 935/HEC/B&PSC/2022). Patients fulfilling the inclusion criteria of the study were briefed in their native language on the study protocol, followed by their informed written consent. For a consecutive sampling of the patients, WHO calculator was used with frequency of canine space infection ~ 6.45% at 95% confident level and 4% margin of error.[7] With these parameters, the calculated sample size was 145. Male and female patients older than 10 years of age with fascial space infection of odontogenic origin were included in this study. However, patients presenting with fascial space infections other than odontogenic cause, secondary fascial space infections and patients with multiple organs failure were excluded. The odontogenic infection and their extension to the facial spaces was characterized clinically and radiologically. The classic clinical presentation of the infection included trismus, fever, dysphagia, pain and swelling. Radiographic confirmation was carried out with an orthopantomogram. The distribution of facial spaces involved by the odontogenic infection was categorized according to their anatomical location: submandibular, buccal, canine, submental and sublingual. Any comorbidities were assessed with detailed history, clinical work-up (in the form of laboratory investigations) and inter departmental consultations. Statistics were analyzed by using SPSS version 20. Standard deviation & Mean were calculated for numerical variables such as age of the patient. Frequencies and percentages were calculated for categorical variables such as fascial spaces, comorbidities and patient's gender. Stratification was performed with respect to gender and age of the patents. Post-stratification chi- square test was used to evaluate effect modifiers. P value ≤ 0.05 was regarded statistically significant.

RESULTS

The mean duration of the odontogenic infections was 5± 1.2 days. The gender distribution of the patients showed a male-to-female ratio of 3.8:1 (115 versus 30; 79.3% versus 20.7%). The age of the patients ranged from 12 to 80 years, with a mean age of 56 ± 14.74 years. The age distribution of patients has been presented in Figure 1. The number of patients with age group 10-40 was 53 (36.55%), while the 46(31.72%) patients each were recorded in 41-60- and 61-80-years age groups.

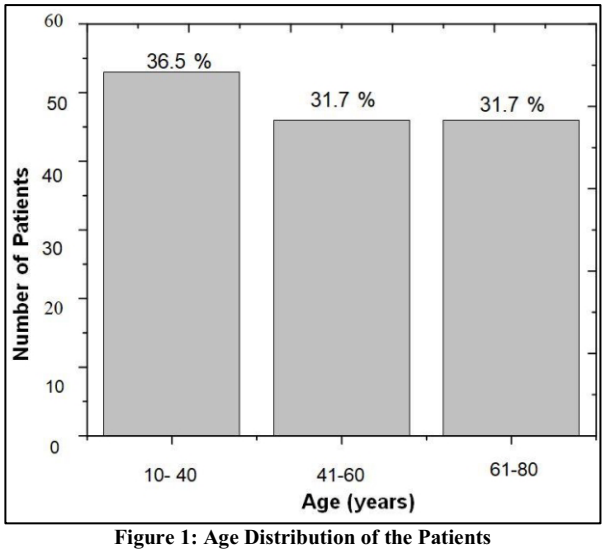

Figure 1: Age Distribution of the Patients

Table 1 presents the data of odontogenic infections and its involvement of different fascial sites: these data are also stratified for both genders. The submandibular space was the most frequent site involved by the odontogenic infections with a frequency of 60 (41.4%),

followed by buccal space with 44 (30.3%) patients and canine space with 31 (21.4%) patients. The least involved facial sites were sublingual and submental spaces where an extension of the infection was recorded in 03 (2.1%) and 07 (4.8%) patients, respectively. The above trends of facial space involvement by odontogenic infections were observed in both genders (Table 1).

Table 1: Gender-Wise Distribution of Fascial Spaces Involved by the Odontogenic Infections

Fascial SpacesInvolved	Gender		Total
	Male	Female	
Submandibular Space	46	14	60
Buccal Space	35	09	44
Canine Space	25	06	31
Submental Space	06	01	07
Sub Lingual Space	03	0	03

Table 2 presents the data for age-wise distribution of fascial spaces involved by the odontogenic infections. Although there are differences in frequency of the facial spaces involved by the infection for each of the three age groups of the patients, such differences were not statistically significant ($p > 0.05$). Specifically, the submandibular and canine spaces were more frequently involved in younger patients (age ~ 10-40 years), while it was observed that the infection extended more often to the buccal spaces in older patients (age ~ 61-80 years).

Table 2: Age-Wise Distribution of Fascial Spaces Involved by the Z Odontogenic Infections

Fascial SpacesInvolved	Age (Years)		
	10- 40	41- 60	61- 80
Submandibular Space	23	17	20
Buccal Space	13	13	18
Canine Space	10	13	08
Submental Space	06	01	0
Sub Lingual Space	01	02	0

The immune-compromising systemic comorbidities in the patients presenting with odontogenic infection were also assessed; the results of this investigation are shown in Figure 2. It was revealed that 79/145 (54.5 %) patients presented with comorbidities. The most frequently recorded immune-compromising comorbidity was diabetes mellitus, which was seen in 60 (75.9%) patients. Moreover, hypertension was noted in 06 (7.5%), renal impairment in 05 (6.32%), pregnancy in 03 (3.7%) and hepatic impairment in 03 (3.7%) patients. Radiotherapy and leukemia each were recorded of 01 (1.2%) patients.

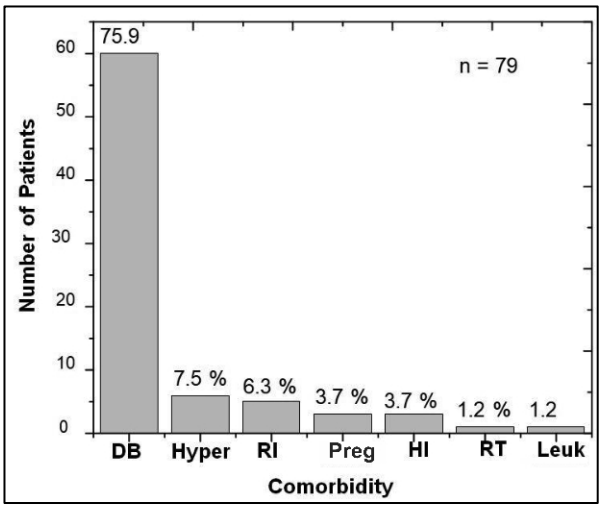

Figure 2: Summary of Immune-Compromising Systemic Comorbidities in the Patients Presenting with Odontogenic Infection

DISCUSSION

Odontogenic infections typically arise from tooth and surrounding structures and can rapidly spread to other facial spaces, due to their anatomical linkage. This spread of odontogenic infections is further accelerated in the presence of comorbidities. In this perspective, this study was designed to investigate the spreading patterns of odontogenic infection into the facial spaces and the prevalence of immune-compromising systematic comorbidities in patients presented to a tertiary care center. Such as study was important as it has been reported that the spreading pattern of odontogenic infection varies among patients of different populations.[8] The results of this study showed that the submandibular space is the predominant site of spread from odontogenic infection; this finding may indicate that the submandibular space may be the initial site of spread. These findings are consistent with the results obtained by previous studies.[9,10] In a study of 107 patients, multiple space infections were noted in 50 cases. Submandibular space involvement was recorded in 82% of these patients.[9] The gender-based assessment of the spreading patterns of odontogenic infection into the facial spaces illustrated male-patient predominance. Similar observations have been reported in other populations. For example, sociodemographic characteristics of maxillofacial space infection patients from China reported a male-to-female patient ratio of 1.44:1 (127 males versus 87 females)[11]. Likewise, other studies have reported similar trends.[12] Moreover, the correlation of age and site of facial space involvement by odontogenic infection was evaluated statistically and found not significant (p value > 0.05 in all cases).

Although incidence of odontogenic infections seems to have declined likely due to improved dental health care facilities, better dental education and availability of effective antibiotics, challenges in treating patients suffering from immune-compromising comorbidities still exists in clinics, particularly in resource scares environments.[13] It is speculated that the prevalence of comorbidities impairs the patient's defense mechanism, allowing a rapid spread of these infections. In addition, the patients with comorbidities are highly vulnerable to fungal and bacterial infections.[14] In this study, diabetes mellitus was the most persistent systemic comorbidity in patients with odontogenic infections. Specifically, diabetes mellitus was found in 60 (75.9%) patients. Other less common comorbidities noted were hypertension and renal impairment. A similar study of 70 patients having odontogenic infection from Pakistan reported 78.6% cases having the comorbidity of diabetes.[15] Studies have also shown that deep neck infections and facial cellulitis caused by odontogenic infections are more common in patients with diabetes.[16] Moreover, a meta-analysis has demonstrated that the risk of diabetic patients suffering from odontogenic infections is double as compared to non-diabetic patients.[17] It is being reported that diabetes mellitus leads to sustained hyperglycemia and metabolic syndrome, which promote infection recurrence.[18]

LIMITATIONS

The article's conclusions may be limited by the sample size and selection bias of the study. If the study included a small number of patients or recruited participants from a specific demographic or geographical region, the findings may not be representative of the broader population.

CONCLUSIONS

This study concluded that diabetes mellitus is the most common immune-compromised comorbidity presented in patients with odontogenic infections extending in fascial spaces. Although treatment of odontogenic infections is typically not a great challenge, patients with complicated courses of the such as concurrent prevalence of diabetes mellitus tends to compromise immune response. It is suggested that assessment of diabetes in general dental practice should be emphasized to avoid exacerbating of the odontogenic infections in to life treating conditions.

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CONTRIBUTORS

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6. ***Anum Wajid*** - *Data Acquisition*
7. ***Jawad Ullah Khattak*** - *Data Acquisition*