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Original Article

Studying the Prevalence and Causes of Maxillofacial Dental Infections in Patients Referred to the Maxillofacial Surgery Department

Triantafillos Loutroukis[1], Ekaterini Loutrouki[1], Jolanta Klukowska-Rötzler[1], Sabine Koba[2], Fabian Schlittler[2], Benoit Schaller[2], Aristomenis K. Exadaktylos[1], Michael Doulberis[1,3], David S. Srivastava[1], Silvana Papoutsi[4], John Patrik M. Burkhard[2]*

[1] Department of Emergency Medicine, Inselspital, University Hospital Bern, University of Bern, CH-3010 Bern, Switzerland.
[2] Department of Cranio-Maxillofacial Surgery, Inselspital, University Hospital Bern, University of Bern, CH-3010 Bern, Switzerland.
[3] Division of Gastroenterology and Hepatology, Medical University Department, Kantonsspital Aarau, CH-5001 Aarau, Switzerland.
[4] Department of Visceral Surgery and Medicine, Inselspital, University Hospital Bern, University of Bern, CH-3010 Bern, Switzerland.

***E-mail** ✉ s0471919@me.com

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ABSTRACT

Maxillofacial space infections are one of the most common types of head and neck infections, which are of great importance in terms of both aesthetics and proximity to sensitive areas of the body. This study aimed to investigate the etiology and epidemiology of maxillofacial space infections in patients referred to the maxillofacial surgery department. During this cross-sectional study, the medical records of patients who had been referred to the hospital due to jaw abscess were reviewed. The items studied included gender, age, tooth causing the infection, type of abscess, symptoms of the disease, systemic problems, smoking and alcohol consumption, type of antibiotic prescribed, type of anesthesia, surgical method, length of hospitalization, and postoperative complications. SPSS V23 software was used in data analysis. In this study, 209 people, including 86 women (41.1%) and 123 men (58.9%), with a mean age of 35.45 ± 14.19 years, participated. The most frequent cause of infection was the lower third molar with 56 cases (26.8%), the most common infected space was the submandibular with 108 cases (51.7%), and the most frequent symptoms of abscesses were swelling with 179 cases (85.6%). The most common complication was Ludwig's angina, and the most frequent antibiotic prescribed was clindamycin in 151 cases. According to the results of this study, maxillofacial abscesses can cause irreversible complications for patients. Patients whose pterygomandibular and submandibular spaces were infected were hospitalized for a longer period compared to others.

Keywords: Dental, Maxillofacial dental infections, Patients, Maxillofacial surgery

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Introduction

Maxillofacial space infections are one of the most common types of head and neck infections, which are of great importance in terms of both aesthetics and proximity to sensitive areas of the body [1-3]. Given the proximity of these spaces to vital structures of the human body such as the respiratory system and mediastinum, if the infection progresses, the patient

may experience complications such as septicemia, airway obstruction, cavernous sinus thrombosis, necrosis of facial tissues, mediastinal infection, pneumonia, septic shock, pericarditis, and brain abscess, which are potentially fatal and require hospital care, antibiotic treatment, and surgery [1, 4-6].

Some infections in this area have a dental-maxillofacial origin, while others are related to more distant organs and parts, and some are related to skin infections [7-9]. According to studies, odontogenic infections such as periapical and periodontal infections are among the most important causes of maxillofacial space infections. The management of these types of infections, especially those originating from odontogenic sources, is challenging for surgeons. The symptoms of maxillofacial space infection are evident due to the proximity of muscles, ligaments, and nerves, which rapidly impair the function of the affected area, resulting in pain and trismus [6, 10-12].

The success of treating maxillofacial infection depends on various factors such as the number of spaces involved, the rate of progression of the infection, the anatomical features of the affected area, the type of causative microorganism, the status of the immune system, and the skill of the dentist. Unfortunately, the easy availability and indiscriminate use of antibiotics have led to an increase in microbial resistance. On the other hand, infectious pathogens are constantly changing and evolving, making the treatment of infectious diseases increasingly complex [10, 13].

Poor economic status, illiteracy, poor hygiene, and lack of awareness in developing countries also play an important role in the incidence of maxillofacial infections [1, 14]. Many studies have been conducted to investigate the risk factors for fatal complications of maxillofacial infection, but the results have been mixed. Even if the epidemiology of maxillofacial space infection is more or less similar in different societies, it is still necessary for each country to have its epidemiological information to plan more accurately for the prevention and treatment of such infections. For this reason, this study was conducted to determine the prevalence, causes, and epidemiology of odontogenic maxillofacial space infection in patients referred to the maxillofacial surgery department.

Materials and Methods

In this observational study, patients who had been referred to the maxillofacial surgery department due to jaw abscess were included in the study. If any defect was observed in the file, the patient was excluded from the study.

The patient's medical records were reviewed from the archive. First, background variables including age and gender were recorded in the relevant checklist. The variables of this study included the patient's systemic status, smoking and tobacco use, alcohol consumption, prescribed antibiotics, infectious agents, space involved in the infection, and the involved jaw. Other variables including type of anesthesia, surgical technique (intraoral or extraoral), need for tracheostomy, life-threatening side effects, length of hospital stay, and treatment outcome were also examined.

It should be noted that the involved upper and deep spaces of the maxillofacial region were divided as follows: infraorbital, infratemporal, buccal, pterygomandibular, temporal, sublingual, submaxillary, submental, submandibular, and canine [6, 12, 15-17].

All the information extracted in this study was done by one researcher. All data were analyzed using SPSS V. 23 software. Fisher's exact, Kruskal-Wallis, and U-Mann-Whitney tests were used to analyze the data. In all tests, a significance level of 0.05 was considered.

Results and Discussion

In this study, 209 subjects, including 86 women (41.1%) and 123 men (58.9%), with a mean age of 35.45±14.19 years and an age range of 8 to 72 years, participated. 34 subjects (16.3%) had underlying problems. In addition, three subjects (1.4%) of the subjects were taking corticosteroids, 58 subjects (27.8%) were smoking cigarettes and 26 subjects (12.4%) were drinking alcohol.

As can be seen in **Table 1**, the highest frequency of infection was related to the lower third molar with 56 cases (26.8%), followed by the lower first and second molars with 55 cases (26.3%). The highest and lowest frequency of the space involved in infection was related to the submandibular with 108 cases (51.7%) and the temporal with 1 case (0.5%), respectively. 73 cases (34.9%) of the abscesses were in the maxilla and the rest in the mandible. The highest frequency of abscess-related symptoms was swelling with 179 cases (85.6%) and the lowest frequency was dyspnea with 16 cases (7.7%). The average length of stay was approximately 2 days (exactly 1.97 days) and the minimum and maximum lengths of stay were 1 and 10 days.

Table 1. Frequency distribution of infectious agents, type of abscess, and jaw involved

Variable		N (%)
Infectious agent	Lower premolar	20 (9.6%)
	Upper premolar	5 (2.4%)
	Lower anterior	5 (2.4%)
	Upper canine	17 (8.1%)
	Upper molar	27 (12.9%)
	Lower molar	55 (26.3%)
	Upper third molar	24 (11.5%)
	Lower third molar	56 (26.8%)
Type of abscess	Infraorbital	6 (2.9%)
	Infratemporal	4 (1.9%)
	Buccal	39 (18.7%)
	Pterygomandibular	10 (4.8%)
	Temporal	1 (0.5%)
	Sublingual	13 (6.2%)
	Submaxillary	7 (3.3%)
	Submental	5 (2.5%)
	Submandibular	108 (51.7%)
	Canine	16 (7.7%)
Involved jaw	Upper	73 (34.9%)
	Lower	136 (65.1%)

According to the reviews regarding the treatments performed, 25 patients (12%) underwent surgery under local anesthesia and 184 patients (88%) underwent surgery under general anesthesia in consultation with an anesthesiologist. 34.4% (72 cases) of the surgeries were extraoral, 58.9% (123 cases) were intraoral, and 6.7% (14 cases) were both intraoral and extraoral. 81.3% (170 cases) of the surgeries required intubation and 7.2% (15 cases) of the surgeries required tracheostomy. Fortunately, 191 (91.4%) of the surgeries had no side effects. 12 (5.7%) surgeries resulted in Ludwig's angina, 2 (1%) surgeries resulted in pneumonia, 1 (0.5%) had cavernous sinus thrombosis, and 3 (1.4%) had sepsis. Unfortunately, 3 (1.4%) surgeries resulted in death.

The highest number of surgeries was in the fall with 80 (38.3%) followed by the winter with 72 (34.4%) and the lowest number of surgeries was in the summer with 20 (9.6%) followed by the spring with 37 (17.7%).

Regarding the antibiotics prescribed, the highest frequency of antibiotics prescribed was clindamycin alone with 72.2% (151 cases), followed by clindamycin with metronidazole with 17.2% (36 cases), and then the most common antibiotics prescribed were clindamycin with imipenem with 11 cases (5.3%) and clindamycin with Tavanic with 6 cases (2.3%). In addition, the lowest frequency of antibiotics prescribed was penicillin with 2.4% (5 cases).

Table 2. The relationship between the type of abscess and the tooth causing the infection

Jaw	Type of Abscess	Infectious Agent				
		First and second premolars	Anterior	First and second molars	Third molars	Total
Upper	Infraorbital	3 (50.0%)	1 (17.0%)	2 (33.0%)	0 (0.0%)	6 (100.0%)
	Infratemporal	0 (0.0%)	0 (0.0%)	1 (25.0%)	3 (75.0%)	4 (100.0%)
	Buccal	1 (3.0%)	0 (0.0%)	21 (54.0%)	17 (44.0%)	39 (100.0%)
	Temporal	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (100.0%)	1 (100.0%)
	Submastric	1 (14.0%)	0 (0.0%)	3 (43.0%)	3 (43.0%)	7 (100.0%)
	Canine	0 (0.0%)	16 (100.0%)	0 (0.0%)	0 (0.0%)	16 (100.0%)
	Total	5 (7.0%)	17 (23.0%)	27 (37.0%)	24 (33.0%)	73 (100.0%)
Lower	Trigomandibular	4 (40.0%)	0 (0.0%)	4 (40.05)	2 (20.0%)	10 (100.0%)
	Sublingual	4 (31.0%)	0 (0.0%)	9 (69.0%)	0 (0.0%)	13 (100.0%)
	Submental	0 (0.0%)	5 (100.0%)	0 (0.0%)	0 (0.0%)	5 (100.0%)
	Submandibular	12 (11.0%)	0 (0.0%)	42 (39.0%)	54 (50.0%)	108 (100.0%)
	Total	20 (15.0%)	5 (4.0%)	55 (40.0%)	56 (41.0%)	136 (100.0%)

Table 2 shows the relationship between the type of space involved and the infectious agent in each jaw. According to this table, only swelling and fever were observed in the infratemporal, buccal, submandibular, and submental spaces. In pterygomandibular and submandibular abscesses, all symptoms (edinophagia, dysphagia, dyspnea, dysphonia, swelling, fever, and trismus) were observed **(Table 3)**.

Table 3. The relationship between abscess symptoms and the type of abscess

Abscess	Symptoms							
	Odynophagia	Dysphagia	Dyspnea	Dysphonia	Swelling	Fever	Trismus	Total
Infraorbital	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (100.0%)	0 (0.0%)	0 (0.0%)	5 (100.0%)
Infratemporal	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (66.7%)	2 (33.3%)	0 (0.0%)	6 (100.0%)
Buccal	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	36 (97.3%)	1 (2.7%)	0 (0.0%)	37 (100.0%)
Trigomandibular	10 (15.2%)	10 (15.2%)	7 (10.6%)	10 (15.2%)	10 (15.2%)	10 (15.2%)	9 (13.6%)	66 (100.0%)
Temporal	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (100.0%)	0 (0.0%)	0 (0.0%)	1 (100.0%)
Submastric	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	7 (53.8%)	6 (46.2%)	0 (0.0%)	13 (100.0%)
Submental	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (75.0%)	1 (25.0%)	0 (0.0%)	4 (100.0%)
Sub mandible	35 (11.6%)	36 (11.6%)	9 (3.0%)	46 (15.2%)	101 (33.3%)	23 (7.6%)	54 (17.8%)	303 (100.0%)
Kanin	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	12 (100.0%)	0 (0.0%)	0 (0.0%)	12 (100.0%)
Total	45 (10.1%)	45 (10.1%)	16 (3.6%)	56 (12.5%)	179 (40.0%)	43 (9.6%)	63 (14.1%)	447 (100.0%)

In the present study, it was found that only general anesthesia was used in the surgical treatment of infratemporal, pterygomandibular, temporal, submandibular, and submental space infections. In addition, only intraoral surgery was performed in infraorbital, buccal, sublingual, and submandibular space infections, only extraoral surgery was used in temporal abscesses, and both types of surgery were used only in trigomandibular and submandibular abscesses **(Table 4)**.

Table 4. Relationship between abscess type, anesthesia type, and surgery type

Abscess	Type of anesthesia		Type of surgery performed			Total
	General	Local	Extraoral	Intraoral	Both	
Infraorbital	4 (66.7%)	2 (33.3%)	0 (0.0%)	6 (100.0%)	0 (0.0%)	6 (100.0%)
Infratemporal	4 (100.0%)	0 (0.0%)	2 (50.0%)	2 (50.0%)	0 (0.0%)	4 (100.0%)
Buccal	32 (82.1%)	7 (17.9%)	0 (0.0%)	39 (100.0%)	0 (0.0%)	39 (100.0%)
Trigomandibular	10 (100.0%)	0 (0.0%)	0 (0.0%)	6 (60.0%)	4 (40.0%)	10 (100.0%)
Temporal	1 (100.0%)	0 (0.0%)	1 (100.0%)	0 (0.0%)	0 (0.0%)	1 (100.0%)
Sublingual	6 (46.2%)	7 (53.8%)	0 (0.0%)	13 (100.0%)	0 (0.0%)	13 (100.0%)
Submastric	7 (100.0%)	0 (0.0%)	0 (0.0%)	7 (100.0%)	0 (0.0%)	7 (100.0%)
Submental	5 (100.0%)	0 (0.0%)	4 (80.0%)	1 (20.0%)	0 (0.0%)	5 (100.0%)
Submandible	106 (98.1%)	2 (1.9%)	62 (57.4%)	36 (33.3%)	10 (9.3%)	108 (100.0%)
Canine	9 (56.3%)	7 (43.8%)	7 (18.8%)	13 (81.3%)	0 (0.0%)	16 (100.0%)
Total	184 (88.0%)	25 (12.0%)	72 (34.4%)	123 (58.9%)	14 (6.7%)	209 (100.0%)

In **Table 5**, the frequency of each intubation and tracheostomy is given separately by type of abscess. Tracheostomy was used only in trigomandibular and submandibular space infections. In addition, in most infraorbital, buccal, and submandibular abscesses and all infratemporal, temporal, submental, and submental abscesses, only intubation was used **(Table 5)**.

Table 5. Relationship between abscess type and airway management method

Abscess	Tracheostomy		Intubation		Total
	No	Yes	No	Yes	
Infraorbital	6 (100.0%)	0 (0.0%)	2 (33.3%)	4 (66.7%)	6 (100.0%)
Infratemporal	4 (100.0%)	0 (0.0%)	0 (0.0%)	4 (100.0%)	4 (100.0%)
Buccal	39 (100.0%)	0 (0.0%)	7 (17.9%)	32 (82.1%)	39 (100.0%)
Trigomandibular	4 (40.0%)	6 (60.0%)	6 (60.0%)	4 (40.0%)	10 (100.0%)
Temporal	1 (100.0%)	0 (0.0%)	0 (0.0%)	1 (100.0%)	1 (100.0%)
Sublingual	13 (100.0%)	0 (0.0%)	7 (53.8%)	6 (46.2%)	13 (100.0%)
Submaxillary	7 (100.0%)	0 (0.0%)	0 (0.0%)	7 (100.0%)	7 (100.0%)

Submental	5 (100.0%)	0 (0.0%)	0 (0.0%)	5 (100.0%)	5 (100.0%)
Submandibular	99 (91.7%)	9 (8.3%)	10 (9.3%)	98 (907.7%)	108 (100.0%)
Canine	16 (100.0%)	0 (0.0%)	7 (43.8%)	9 (56.3%)	16 (100.0%)
Total	194 (92.8%)	15 (7.2%)	39 (18.7%)	170 (81.3%)	209 (100.0%)

The average length of stay in patients with systemic problems was significantly longer than in others ($P < 0.001$). The average length of stay in patients with underlying kidney transplants or diabetes was significantly longer than in pregnant patients ($P < 0.001$). In addition, the length of stay in patients with trigomandibular and submandibular abscesses was significantly longer than in others ($P < 0.001$). Significantly, the length of stay in patients who had only clindamycin or only penicillin was significantly shorter than in patients who had a combination of antibiotics ($P < 0.001$) **(Table 6)**.

Table 6. Comparison between length of stay based on the presence and type of systemic problem, type of abscess, and type of antibiotic prescribed

Variable		N	Hospitalization time (Mean ± SD)	Hospitalization time (Minimum-Maximum)	Result of Kruskal-Wallis test
Systemic problem	No	175	1.43 ± 1.201^{a}	1-8	$Z = 8.94$ $P< 0.001$
	Yes	34	4.76 ± 2.51^{b}	1-10	
Type of systemic problem	Pregnancy	5	1.40 ± 0.89^{a}	1-3	$X^2 = 11.63$ $P = 0.020$
	Heart transplant	1	$4.00^{a,b}$	4-4	
	Kidney transplant	2	6.00 ± 1.41^{b}	5-7	
	Diabetes	25	5.36 ± 2.36^{b}	2-10	
	Mental retardation	1	$5.00^{a,b}$	5-5	
Type of abscess	Infraorbital	6	1.00^{a}	1-1	$X^2 = 62.97$ $P< 0.001$
	Infratemporal	4	$2.25 \pm 1.89^{a,b}$	1-5	
	Buccal	39	1.31 ± 0.86^{a}	1-5	
	Trigomandibular	10	6.60 ± 1.96^{b}	3-9	
	Temporal	1	$2.00^{a,b}$	2-2	
	Sublingual	13	1.46 ± 0.88^{a}	1-3	
	Submastric	7	4.14 ± 1.68^{b}	1-6	
	Submental	5	1.20 ± 0.45^{a}	1-2	
	Submandible	108	1.93 ± 1.89^{a}	1-10	
	Canine	16	1.00^{a}	1-1	
Type of antibiotic prescribed	Penicillin	5	1.40 ± 0.89^{a}	1-3	$X^2 = 164.78$ $P< 0.001$
	Clindamycin	151	1.10 ± 0.41^{a}	1-4	
	Clindamycin + Imipenem	11	7.36 ± 1.75^{b}	4-10	
	Clindamycin + Tavanic	6	6.67 ± 1.86^{b}	3-8	
	Clindamycin + Metronidazole	36	3.28 ± 1.41^{b}	1-7	

^{a,b} Lowercase letters above the means indicate significant differences between times.

Infections of the maxillofacial spaces are rapidly increasing worldwide and can be considered a public health threat. The prevalence and etiology of these infections vary from country to country depending on socioeconomic and environmental conditions [6, 15, 17]. This retrospective cross-sectional study aimed to determine the prevalence, causes, and epidemiology of jaw abscesses in patients. During the three-year study period, 209 patients were admitted to the hospital with jaw abscesses, with the most common space involved being the submandibular space. The most common complications observed were Ludwig's angina, sepsis, pneumonia, and cavernous sinus thrombosis. Unfortunately, three of these patients died from the disease, but the rest were successfully treated. The etiology of all infections was odontogenic, and the most common involved tooth was the lower third molar.

In the present study, there were more males than females. Most studies have shown a male predominance. According to studies, women care more about their oral and dental health than men. On the other hand, smoking, which is one of the factors causing dental problems, is more common in men [1, 6, 9].

The average age of the patients in this study was 35.45 years. In the study by Katoumas *et al*. [17], the average age was 41.6 years. Igoumenakis *et al*. [18, 19] also

conducted two studies in 2014 and 2015, the results of which showed that the average age was 40.8 and 39.1 years. The average age of the participants in the study by Gams *et al*. [20] and Nadig and Taylor [21] was 38.9 and 36.17 years, respectively. In general, adults are more likely to suffer from maxillofacial infections than children. This has several reasons; including the prevalence of systemic diseases, drug abuse, and the use of medications that cause dry mouth is higher in adults. Another reason is the presence of wisdom teeth, which are less frequently cleaned due to difficult access. In addition to caries and pulp problems, they also have a high prevalence of pericoronitis. On the other hand, adults have been exposed to odontogenic infections for a longer period than children. Young people are more likely to have dental problems than older people because older people have fewer teeth than younger people [10, 15, 16, 22].

In this study, lower molars, especially third molars, were the most commonly affected teeth. Other studies have also reported mandibular molars as the most commonly affected teeth. In some studies, second molars and some third molars were the most common, which is due to inadequate hygiene of these teeth and the difficulty of restorative treatments in this area. It has been reported that odontogenic infections are the most common oral and facial infections that may spread to adjacent spaces and lead to multiple space involvement, which can become life-threatening situations [4, 6, 9, 10, 13].

In the present study, submandibular, buccal, and canine abscesses were the most common, respectively, and temporal abscesses were the least common. In other studies [1, 4, 15, 17, 23], submandibular abscesses were reported as the most common type of abscess. The reason for the higher prevalence of submandibular abscesses is that the infection of the mandibular molars, which are the most commonly infected teeth, often progresses to this space. The mandibular bone in the lingual region of these molars is thin and infection easily perforates it and reaches the submandibular space through the myelohyoid muscle [15, 17].

In this study, the most common symptom in patients was swelling (85.6). After that, trismus, dysphonia, odynophagia, dysphagia, fever, and dyspnea were the most common symptoms, respectively. In the study of Keswani and Venkateshwar [15], all patients had pain, swelling, and lymphadenopathy. In other studies, pain and swelling have been introduced as the most common symptoms of maxillofacial space infection [4, 6, 23]. Because these two symptoms are observed in all types of abscesses, trismus, odynophagia, dysphagia, and dyspnea are more observed in patients with severe infection of the mandibular spaces. Fever is observed in patients with severe infection. Severe trismus is one of the most prominent signs of masticatory space involvement, including the pterygomandibular, submandibular, and infratemporal spaces [4].

The present study showed that the first choice for antibiotic therapy in patients was clindamycin. 72.2% of patients were treated with clindamycin alone and had achieved remission. 17.2% of patients also received metronidazole in addition to clindamycin. Some studies support the use of clindamycin as an empirical antibiotic because it has sufficient activity against penicillin-resistant anaerobic microorganisms [1, 24]. Some studies have also reported an increase in the level of resistance to it. Some studies have stated that clindamycin is not as effective as amoxicillin in the treatment of anaerobic infections [3, 5, 6]. Mücke *et al*. [3] also reported amoxicillin as the most effective drug in the treatment of perimandibular abscesses. Zirk *et al*. [25] reported cephalosporins as an alternative treatment for severe odontogenic infections and moxifloxacin and co-trimoxazole as the best drugs in case of beta-lactam allergy. Moxifloxacin has been used successfully in the treatment of upper respiratory tract infections, sinusitis, and soft tissue infections.

According to Bhagania *et al*. [26], clindamycin alone or in combination with penicillin and metronidazole are two effective drug regimens for severe odontogenic infections. According to the new guidelines, the first recommended antibiotic in the treatment of maxillofacial dental infections is not penicillin. Given the bacterial resistance to penicillin, treatment with clindamycin resulted in shorter hospital stays and reduced treatment costs with higher success rates.

In the present study, it was found that intraoral surgery was used more frequently for surgical treatment of patients. In some studies, intraoral surgery was reported as the most commonly used method due to the lack of damage to large blood vessels, short recovery time, lack of scar formation, and cosmetic problems after surgery [27, 28]. In some studies, the extraoral method was reported as the most common method, due to its ease of drainage and the absence of complications such as fistula formation, vestibular flattening, mental nerve damage, and eating problems [5, 7, 12].

In the present study, Ludwig's angina was the most common complication, two of which resulted in death. Tracheostomy was performed instead of intubation for patients with Ludwig's angina. It is worth noting that drainage of maxillofacial abscesses under general anesthesia requires special considerations of airway maintenance to prevent aspiration [26].

In a 2013 study, Kassam *et al*. [29] recommended avoiding intubation for patients with Ludwig's angina and performing tracheostomy for them. They believe that intubation for these patients may cause bleeding, laryngeal spasms, airway edema, tissue rupture, and pus aspiration.

In the present study, the length of hospitalization was 1-10 days. The results of this study showed that the length of hospitalization was significantly related to systemic conditions, type of abscess, and type of antibiotic used. Peters *et al*. [30] reported systemic problems and the site of infection as factors determining the length of hospitalization. Rastenienė *et al*. [9] reported the need for antibiotic modification and the use of combination antibiotics as factors increasing the length of hospitalization. The length of hospitalization was significantly shorter in patients who used clindamycin alone or penicillin alone than in patients who used a combination of antibiotics. This could be due to the more extensive involvement and infection in these cases, which used multiple antibiotic treatments, and may not be related to the type of antibiotic. In the present study, among patients with systemic problems, patients with diabetes had a longer average length of hospitalization than other patients. A study by Zheng *et al*. [22] showed that the length of hospitalization in diabetic patients is longer than in non-diabetic patients. One of the reasons for this is that diabetic patients have a higher average age than the rest of the population. On the other hand, in some patients with odontogenic infections, dysphagia and inability to eat make it difficult to control blood sugar. In the study by Zirk *et al*. [25], the longest length of hospitalization was reported for patients with pterygomandibular, buccal, and submandibular abscesses.

The epidemiology of odontogenic infections depends on the region, population density, socioeconomic conditions, government policies, and the time of study. Although regulatory bodies can reduce the incidence of infectious diseases and their complications by enacting laws appropriate to the conditions of the community, another important point is the role of the dentist and his management style in reducing the problems caused by odontogenic infections. A patient who can be easily treated may suffer dangerous complications and even lose his life due to improper management by the treating dentist [6].

Conclusion

This study aimed to investigate the etiology and epidemiology of maxillofacial space infections in patients referred to the maxillofacial surgery department. In the present study, among patients with maxillofacial dental infections, the most common space involved was the submandibular space and the most common complication was Ludwig's angina. All infections were odontogenic and the most common causative tooth was the lower third molar. The presence of underlying disease as well as infection of the trigomandibular and submandibular spaces caused a longer length of hospitalization. According to the results of this study, maxillofacial abscesses can cause irreversible complications for patients. Patients whose pterygomandibular and submandibular spaces were infected were hospitalized for a longer period compared to others.

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