

# Management of Necrotizing Fasciitis at Head and Neck Region due to Odontogenic Infection

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**Abstract:** ***Introduction:** Necrotizing fasciitis of odontogenic origin affecting the head and neck region is a rare but serious clinical condition, which, if diagnosed late, can lead to a fatal outcome. The early diagnosis of necrotizing fasciitis can be difficult. Delay in diagnosis leads to increase in the area of necrosis with a resulting increase in cosmetic deformity and lifethreatening complication. **Methods:** A retrospective audit of all patients admitted to the Department of Oral and Maxillofacial Surgery, Hasan Sadikin Hospital from Januari 2016-April 2019 with necrotizing fasciitis at head and neck region due to odontogenic infection. Patient demographics were recorded and treatment details were collected and analysed. **Results:** There was 12 patients with confirmed odontogenic necrotizing fasciitis. origin, treated in the Hasan Sadikin Hospital during January 2016-April 2019. In the majority of cases, the disease evolved without the presence of malnutrition condition (66,67%). From the appearance of the first symptoms until the presentation for treatment, a time interval of 3-16 days elapsed. During this time period, all of the patients received surgical treatment and antibiotic treatment. Mandibular molars were the most frequent starting point of the disease, and the submandibular space was the first affected by the disease (66,67%). Bacteriological exam showed that facultatively aerobic/anaerobic G+ bacteria were the most frequently identified (55.56%). **Conclusion:** The odontogenic lesions of the lower molars, complicated by submandibular space infections, are the most frequent starting point of odontogenic necrotizing fasciitis. Early Surgical treatment and antibiotic therapy play an important role in successful treatment.*

**Keyword:** necrotizing fasciitis, odontogenic infection

## 1. Introduction

Necrotizing fasciitis rarely involves the head and neck region and pose a difficult challenge for oral maxillofacial surgeon.<sup>1,2</sup> It commonly described in the extremities, abdominal wall, and perineum and characterized by progressive necrosis of the fascia and subcutaneous tissue.<sup>1-3</sup> Odontogenic necrotizing infection characterized by rapidly progressive bacterial infection along multiple fascial tissue planes, leading to vascular compromise, thrombosis, or rupture, along with necrosis of adipose, integumentary, muscular, and subcutaneous and cutaneous tissues.<sup>2,3</sup> Necrotizing fasciitis of the head and neck region is rare (accounting for 10% of cases), but can result in significant morbidity and mortality.<sup>1</sup> Infection can occur in healthy or chronically ill patients and after minor trauma or surgery.<sup>1,3</sup> The delay in diagnosis might happen because of its rarity and its benign initial presentation.<sup>2</sup> The delay in diagnosis may have significant morbidity and mortality because of septic shock, disseminated intravascular coagulation, and organ failure. The reported death rates have been as high as 40%.<sup>2</sup>

A multitude of aerobic and anaerobic bacterial species with a synergistic action are incriminated in the development of necrotizing fasciitis.<sup>2-5</sup> At the same time, an important role in the occurrence of this disease is attributed to the background on which it evolves, the most frequently incriminated disorders being diabetes, obesity, immune deficiencies, chronic alcoholism, or hepatic deficit.<sup>2,3</sup> The literature reports the infection of the partially erupted third mandibular molar as the main starting point of odontogenic necrotizing fasciitis. From this level, the bacterial flora initially affects the submandibular space and subsequently extends to the

fascial system, with the development of necrotizing fasciitis.<sup>4,5</sup>

We aimed to study the clinical presentation and radiological, microbiological, diagnosis, management, and surgical outcome of patients who had CNF and who were treated in, Department of Oral and Maxillofacial Surgery, Hasan Sadikin Hospital from January, 2016 until April 2019.

## 2. Methods

For this research, we collected data patients whose hospitalized and treated for necrotizing fasciitis of the head and neck in the Department of Oral and Maxillofacial Surgery, Hasan Sadikin Hospital during January 2016-April 2019. There were twelve patients in the period of this research had necrotizing fasciitis. Data on each case were obtained through the study of the clinical observation records and of the paraclinical investigation results.

The presence of clinical appearance confirmed necrotizing fasciitis due to odontogenic origin of infection. The following were analysed in the patients included in the study: general data (age, sex, environment of origin), data related to the starting point of necrotizing fasciitis, radiological, bacterial flora involved, treatment received until the presentation to the specialized service (presence of previous treatment, type of treatment, characteristics of antibacterial therapy received), data related to the clinical manifestations of the disorder until the presentation for specialized treatment. In parallel, the background on which the disorder developed (presence of systemic disorders, their degree of compensation) was evaluated.



**Figure 1:** (A), (B): Clinical appearance of necrotizing fasciitis at submandible extended to submental and neck region, (C), (D): Skull AP Lateral x-ray

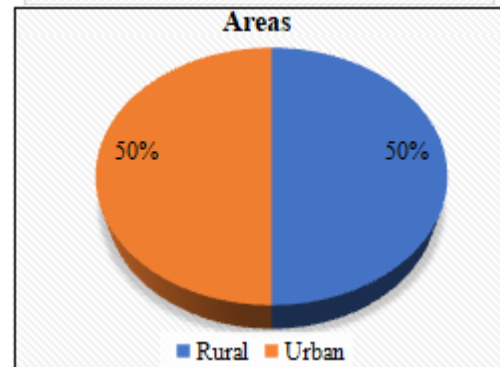
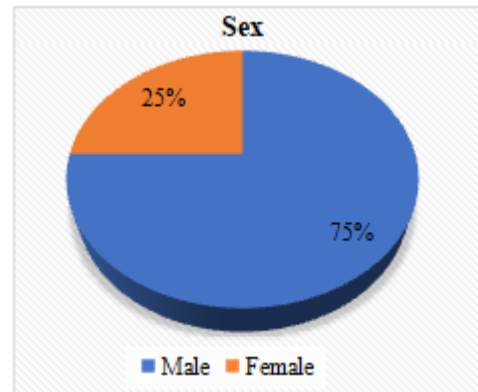


**Figure 2 (a):** Necrotizing debridement treatment at neck region, b. POD III

3. Results

Table 1: Demographic Patients

Age (years)	Sex	Treatment	Length of stay (days)	Outcome
63	F	Insisidrainase + necrotomi debridement + teeth extraction	5	Survive
22	M	Insisidrainase + necrotomi debridement + teeth extraction	16	Survive
51	M	Insisidrainase + necrotomi debridement + teeth extraction	12	Survive
13	M	Insisidrainase + necrotomi debridement + teeth extraction	12	Survive
48	M	Insisidrainase + necrotomi debridement + teeth extraction	10	Survive
67	M	Insisidrainase + necrotomi debridement + teeth extraction	7	Survive
49	F	Insisidrainase + necrotomi debridement + teeth extraction	5	Survive
29	F	Insisidrainase + necrotomi debridement + teeth extraction	7	Survive
63	M	Insisidrainase + necrotomi debridement + teeth extraction	9	Survive
60	M	Insisidrainase + necrotomi debridement + teeth extraction	14	Survive
70	M	Insisidrainase + necrotomi debridement + teeth extraction	3	Died
37	M	Insisidrainase + necrotomi debridement + teeth extraction	5	Survive



Criteria were met by a number of 12 patients, 9 males and 3 females. The male sex was the most frequently affected by this disorder (75%), but without a significant difference compared to the female sex. The age of the patients included in the study ranged between 13 and 70 years, with a mean of 47.67 years and a maximum incidence in the third decade of life. The distribution of patients depending on their environment of origin was balanced between rural areas (6 patients) and urban areas (6 patients).

The group of teeth that was the most frequent starting point of necrotizing fasciitis was represented by mandibular molars, of which the most frequent starting point was the left mandibular molar, 33.33% of the cases, followed by the right mandibular molar, 25% of the cases. The first area affected by the septic process was the submandibular space in the case of 66.67% of the patients, followed by the cheek region in 25% of the cases and the sublingual gland space in 8.33% of the cases.

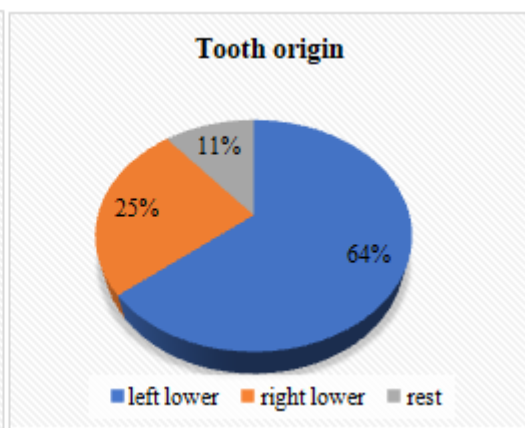
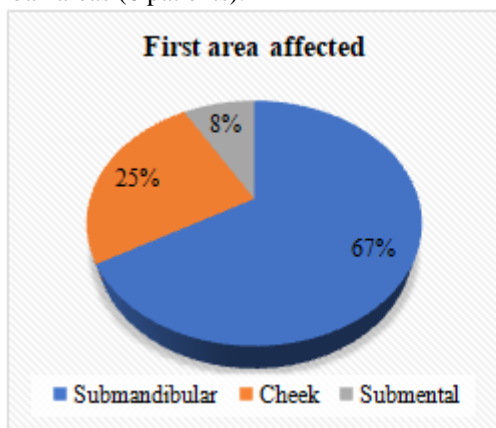
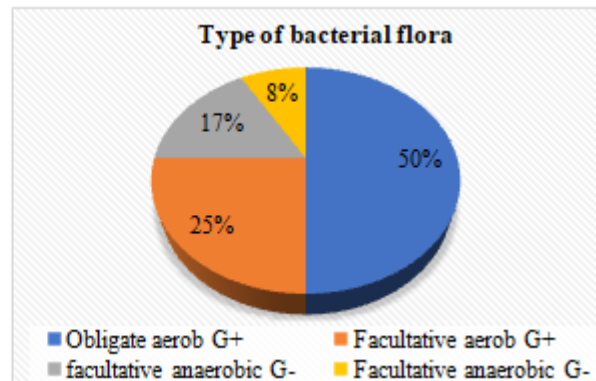
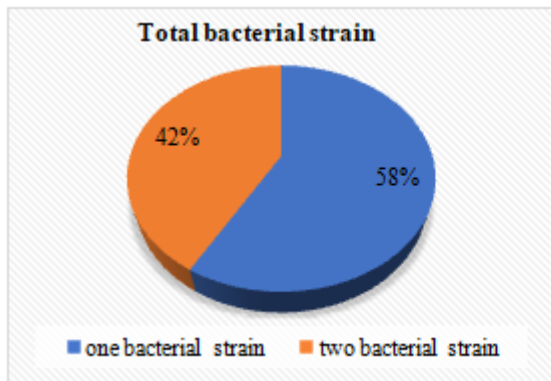


Table 2: Bacterial Flora

Bacterial flora	Facultatively aerobic G+	Obligate aerobic G-	facultatively anaerobic & obligataerob G-	facultatively anaerobic G- & G+	Facultatively anerobic G+	n
Enterobacter cloacae+Pseudomonas aeruginosa	0	0	2	0	0	2
Staphylococcus haemolyticus	0	0	0	0	2	2
Streptococcus agalactiae	2	0	0	0	0	2
Streptococcus sanguis+ Staphylococcus epidermidis	2	0	0	0	0	2
Klebsiella pneumonia+Providentia stuartii	0	0	0	1	0	1
Pseudomonas aeruginosa	0	2	0	0	0	2

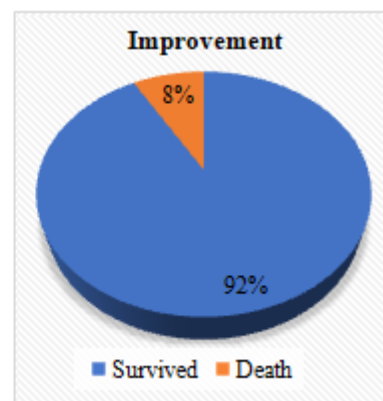
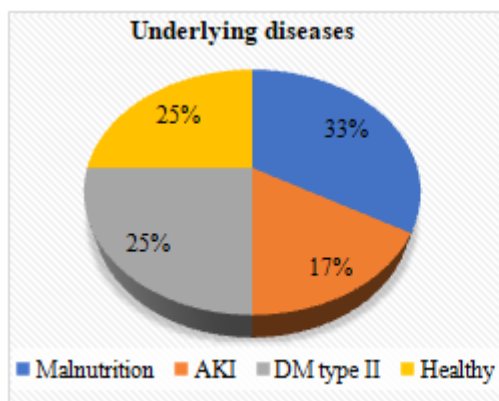
From the septic focus, biological samples were taken and bacteriological examination was performed in all of the patients. One bacterial strain was identified in 58.33% of the patients, two bacterial strains were identified in 41.67% of the patients. Facultatively aerobic/anaerobic G+ bacteria were the most frequently identified (58.33%) followed by

obligate aerobic G–bacteria (33.33%), and the association of facultatively anaerobic and obligate aerobic G–bacteria (16.67%) and the association facultatively anaerobic/aerobic G- and G+ were discovered in 8.33% of the cases. (table 2)



In the majority of the patients, the disease evolved with the presence of malnutrition condition (33%), diabetic (25%), acute kidney injury (17%) and the rest patient was no systemic disorders. From the onset of the disorder to the presentation of patients for specialized treatment, a time period varying between 3 and 16 days elapsed, with a mean of 9 days. Most of the patient (91.6%) have significant

improvement when they leave the hospital, but one patient died (8.33%) because of delayed in seeking treatment. During this time interval, all of the patients received two kinds of antibiotic treatment for aerob and an aerobacteria, corticosteroid, and analgesic. The route of administration of the drugs was intravenous.



#### 4. Discussion

The results obtained in this study show the fact that necrotizing fasciitis affects individuals regardless of their age, sex or environment of origin. Thus, the highest incidence of odontogenic necrotizing fasciitis cases was found in the third decade of life, without statistical difference between the two sexes. This result is in accordance with the results obtained by other studies evaluating odontogenic soft tissue infections, which report the highest incidence in young adults, regardless of sex.<sup>5</sup> However, it is different from those of other studies evaluating cervicofacial necrotizing fasciitis, which report the highest incidence of this disorder in adults aged 40-50 years.<sup>2,6,7</sup> This difference can be explained by the fact that in this study, the disease occurs in the majority of the cases on an immunosuppressed condition due to malnutrition, diabetic and acute kidney injury.

The analysis of odontogenic infections made by other author's evidences that the main starting point for odontogenic necrotizing fasciitis is represented by mandibular molars.<sup>8,9</sup> A similar result was obtained in this study, which indicates mandibular molars as the most starting point of necrotizing fasciitis. The fact that the submandibular space is in close proximity to the mandibular molars can explain that this was first affected by the septic process, and from this level, the infection extended to the fascial level. That's why, early effective treatment of odontogenic submandibular infections is important in the prevention and treatment of necrotizing fasciitis.

The literature reports highly variable time periods for length of stay of the patient with necrotizing fasciitis.<sup>1,7</sup> Some authors report 3 days up to 14 days from the first patient came in to emergency department until the patient was discharged from the hospital.<sup>10</sup> It was not different from this study that a time period of care was varying between 3 and 16 days.



In this study, a single bacterial strain was identified as the most responsible bacterial factor for the development of necrotizing fasciitis. This is in contradiction with other studies that most frequently show the presence of multiple bacterial strains involved in the development of necrotizing fasciitis.<sup>9,11</sup> There are two possible explanations for these different results. Antibiotic treatment, administered prior to biological sample collection, might have eliminated the antibiotic sensitive bacterial flora, which allowed for the excessive development of a single bacterial strain.

*Streptococcus* strains were the most frequent species that found in culture bacterial in this study, it was different with other studies that were detected *staphylococcus aureus* strains as the dominant species.<sup>6,12,13</sup> The different result might be happen caused odontogenic necrotizing fasciitis cases start from relatively common odontogenic abscesses, it can be inferred that at a given moment, there is a significant change in the bacterial flora present in the septic focus.<sup>6,7</sup>

All of the patients had surgical treatment and antibiotics and finishing all the treatment except one patient (8,33%) that died on the day one in the hospital due to delayed for seeking the treatment.

## 5. Conclusion

Surgical treatment and antibiotic therapy play an important role in odontogenic necrotizing fasciitis. The combination of these two factors can be considered as important of successful treatment.

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