

ANALYSIS OF ETIOLOGY, RISK FACTORS AND TREATMENT OUTCOMES IN ORO MAXILLOFACIAL INFECTIONS

Maxillofacial Surgery

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ABSTRACT

Introduction: Maxillofacial abscess or cellulitis is an infection of the soft tissues of the oromaxillofacial region that arises from odontogenic or nonodontogenic causes.¹ Various laboratory markers for evaluation of patient include Total Leucocyte Count, Differential Leucocyte Count, Erythrocyte Sedimentation Rate, Pre-albumin, Procalcitonin and C-reactive protein (CRP). CRP and TLC are known to rise in an infectious process, rise in serum CRP concentration is seen up to 1000-fold within few hours of severe infections.² This study aimed to investigate the characteristics of patients with Oro-maxillofacial infections and to identify the etiologic factors, serum markers and treatment outcomes. **Methods:** This study was conducted on 15 patients who presented with Oro-maxillofacial infections from 20th September 2021- 22 March 2022. **Results:** Out of 15 patients 10 were Male and remaining were Female, Age Group Ranging from 20- 70 years. Mandible was more commonly involved when compared to maxilla; 5 patients had multiple spaces involvement where 3 patients required admission, 4 infections were of non-odontogenic source and 11 odontogenic source. The mean pre-op CRP Levels was 14mg/dL and Post-op CRP levels after 5 days was negative with mean pre-op WBC levels being 14,100 and mean post-op WBC levels after 5 days being 7800. Total of 9 I&Ds, 2 plate removals, 2 implant removals and 9 extractions were carried out in conjunction with I&D; CRP and WBC levels dropped after intervention. **Conclusion:** CRP and WBC levels were found to be a more consistent indicator for monitoring patients with oromaxillofacial infections and are a reliable indicator for infection progression.

KEYWORDS

CRP, Space infections, Oromaxillofacial infections

INTRODUCTION:

Maxillofacial abscess or cellulitis is an infection of the soft tissues of the face and neck area that arises from odontogenic or nonodontogenic causes.¹ Various laboratory markers have been used to predict the severity and course of infections, thereby avoiding further deterioration of patient's condition. These include Total Leucocyte Count, Differential Leucocyte Count, Erythrocyte Sedimentation Rate, Pre-albumin, Procalcitonin and C-reactive protein (CRP). Both CRP and TLC have been known to rise in an infectious process, rise in serum CRP concentration is seen up to 1000-fold within few hours of severe infections.² The purpose of this study was to investigate the characteristics of patients with maxillofacial infections and to identify the etiologic factors, serum markers and treatment outcomes.

The Objectives Of This Study Were To

- To assess etiology and risk factors
- To record the clinical characteristics of infections
- To record and analyse the involvement of primary and secondary spaces in Oro maxillofacial infections
- To assess relationship between CRP levels and WBC levels in cases presenting with Oro maxillofacial infections.
- To record treatment done and outcome of treatment done

MATERIALS AND METHODS

This study was conducted on 15 patients who reported to RRDCH presenting with Oro maxillofacial infections from 20th September 2021- 22 January 2022. The following clinical parameters were assessed: source of infection, location, number of spaces involved, CRP and WBC levels, treatment modality, route of administration of antibiotics and systemic conditions.

Statistical Procedures:

The following statistical procedures were carried out:

1. Data Compilation and presentation
2. Statistical Analysis

Inclusion Criteria:

- Individuals with Oro maxillofacial infections
- Patients treated for Oro maxillofacial infections in the OPD
- Patients admitted for Oro maxillofacial infections

Procedure:

A thorough medical and dental history, general and oral health status, assessment of the patient was done for eliciting the history of infection. The Odontogenic or Non Odontogenic source responsible for the infection was recorded. The sites and spaces affected were noted. Appropriate investigations were done including CRP and WBC levels preoperatively and postoperatively on the 3rd day or 5th day based on the severity of the infection. Culture and sensitivity testing was done and patient was treated with empirical antibiotics till the results are obtained. The modality of treatment done was recorded. The Route of administration of antibiotics and the duration of its course was recorded along with the duration of stay of the patient in the hospital if admitted or not.

RESULTS:

- Out of 15 patients 10 were Male (66.7%) and remaining were Female (33.3%), Age Group Ranging from 20- 70 years
- Mandible was observed to be more involved (73.3%) when compared to maxilla (26.6%)
- 5 patients had multiple spaces involved (33.3%)
- 3 patients required admission, 4 patients were diabetic and all received intravenous antibiotics and 12 treated on OPD basis.
- 4 infections were of non-odontogenic source (26.7%) and 11 odontogenic source (73.3%).
- In the admitted patients, mean pre op CRP Levels was 14mg/dL and the Post op CRP levels after 5 days was negative with the mean pre op WBC levels being 14.1k and mean post op WBC levels after 5 days being 7.8k.
- Total of 9 I&Ds, 2 plate removals, 2 implant removals and 9 extractions were carried out in conjunction with I&D; CRP and WBC levels (average 10.3k) dropped 3 days after intervention.

DISCUSSION:

Flynn et al. reported caries as the most frequent dental disease leading to severe odontogenic infection (65%), followed by pericoronitis (22%) and periodontal disease (22%).³

In our study it was noted that the major source of infections was of Odontogenic origin (73.3%), out of which 9 were due to caries and 1

was due to periodontal disease. In concurrence with the literature 90% of the patients succumbed to infections due to carious teeth.³

Severe Odontogenic infections remain potentially life threatening events.⁴ Many laboratory markers have been used to predict the severity and course of infections, thereby avoiding the potential risk of patients slipping into further complications.

Normal values of TLC ranges from 4000-11,000 and the normal neutrophil count range from 48 to 72 % in healthy adult. As a part of the immune response, WBCs produce, transport and distribute antibodies and the number of WBC increases.⁵

C- reactive protein (CRP) is one of the most dynamic acute phase proteins in the pentraxin protein family. Its serum concentration can increase 1000- fold or more in response to various acute stimuli associated with infections and other type of tissue injuries.⁶ CRP can be measured in healthy persons' serum with a level of 0-3mg/L⁷

It is synthesized in the hepatocytes, and is one of the "acute phase proteins" in plasma. The primary signal for its synthesis is the production of interleukin-1 by macrophages at the site of tissue injury.⁸ After being synthesized in the liver, CRP levels rise within a few hours after onset of symptoms and peak at 24-48hrs.⁹

Similar to application of erythrocyte sedimentation rate (ESR) and white blood cell (WBC) counts, testing for CRP is most commonly performed to indicate the presence of acute inflammation and monitor the development of postoperative infections.¹⁰

CRP has a very short half life of 5-7 hours as compared to a life span of 5-6 days for leucocytes.¹¹ This short half life, rapid increase and decrease of CRP levels in acute inflammatory processes makes these levels a more sensitive indicator for infection than the erythrocyte sedimentation rate (ESR) or WBC count and hence can aid in ruling out active inflammatory processes and predict the prognosis of the patient as high CRP levels were found to be indicative of odontogenic infections that require intensive care.^{12,13,14}

In this study the CRP values drastically dropped and were negative after the 3rd postoperative day in mild infections treated in the OPD, 5th postoperative day in moderate and severe infections suggesting that CRP more accurately reflects the surgical insult than WBC/TLC. In response to acute infection or inflammation, the number of WBC's increase. The mean pre operative CRP levels and WBC in admitted patients was 14mg/dL and 14k respectively with the post op CRP levels and WBC being negative and 7.8k respectively when compared to milder infections both CRP and WBC counts were considerably higher in admitted patients.

Mandible was observed to be more involved (73.3%) when compared to maxilla (26.6%). According to Chow et al¹⁵ in the mandible the thinnest bone is found on the lingual aspect in the molar region leading to sublingual and submandibular space infections, explaining the frequency of the involvement of these spaces. In other studies the most frequent space involved was the buccal space^{10,16,17} or masticator space. The number of male patients (76.6%) presenting with infections was higher than females (33.3%) with most of the patients in the 56-65 year age group. This study also exhibited the fact that diabetic patients had worse outcomes including increased length of stay. These findings are in agreement with other studies of DM, that prevalence increases with age and male gender.^{18,19}

This study shows that the CRP and WBC levels were higher in patients with severe infections and also had a prognostic value when it came to their treatment. On comparison of the CRP and WBC, various studies support the fact that CRP is a better indicator of an infectious process because the CRP level rises faster than WBC in Odontogenic infections.

CONCLUSION:

This study identifies risk factors with early intervention for the removal of cause along with I&D, coupled with antibiotic administration and correlation between CRP & WBC count aided in the successful objective and subjective resolution of symptoms in our patients.

In conclusion CRP and WBC was found to be useful in detecting

infections in patients and eventually aided in establishing the prognosis of the patient with CRP being a more consistent indicator for monitoring patients with maxillofacial infections.

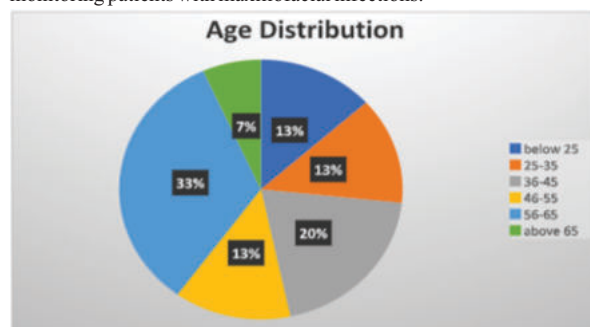


Figure 1: Age distribution of the study population

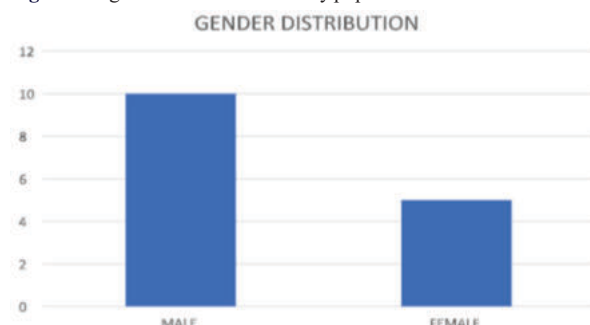


Figure 2: Gender distribution of sample population

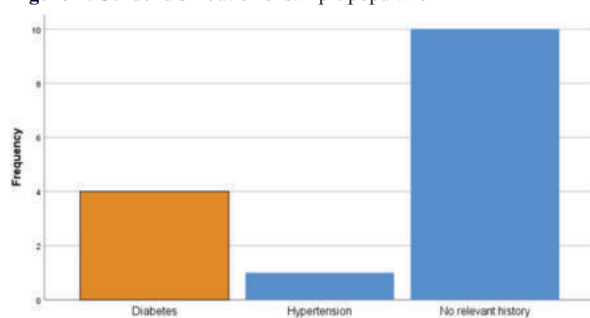


Figure 3: Medical status of the study population

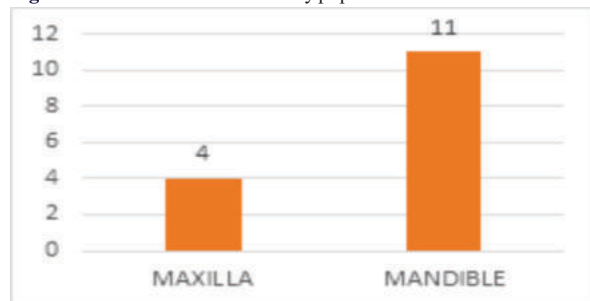


Figure 4: Jaws involved

	Frequency	Percent
OPD	12	80.0
Admitted	3	20.0
Total	15	100.0

Figure 5: Length of hospital stay of sample population

No of spaces involved	Frequency (N)	Percent (%)
1	10	66.7
2	3	20.0
3	2	13.3
Total	15	100.0

Figure 6: Number of spaces involved in sample population

Frequency (N)	Minimum mouth opening	Maximum mouth opening	Range	MEAN $\pm$ SD
15	15 mm	35 mm	20	28.33 $\pm$ 7.71

Figure 7: Mouth opening values of sample population

	Frequency (N)	Percent (%)
Plate removal	1	6.7
Extraction + plate removal	1	6.7
Implant removal	2	13.3
Extractions	2	13.3
Extraction + intra oral Incision and drainage	4	26.7
Extraction + extra oral Incision and drainage	5	33.3
Total	15	100.0

Figure 8: Treatment done for sample population

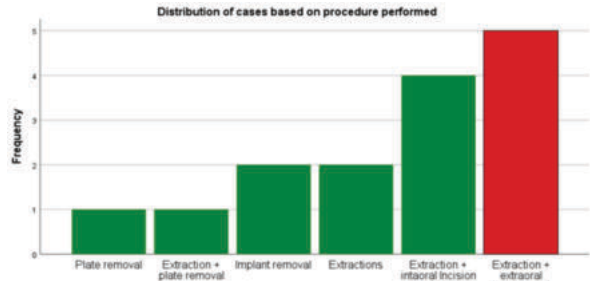


Figure 9: CRP values recorded in the sample population

	Frequency (N)	Range	Minimum CRP	Maximum CRP	Mean CRP	Std. Deviation
CRP pre-op	15	18	6mg/dL	24mg/dL	9.47mg/dL	4.764
CRP post-op	15	negative	negative	negative	negative	-

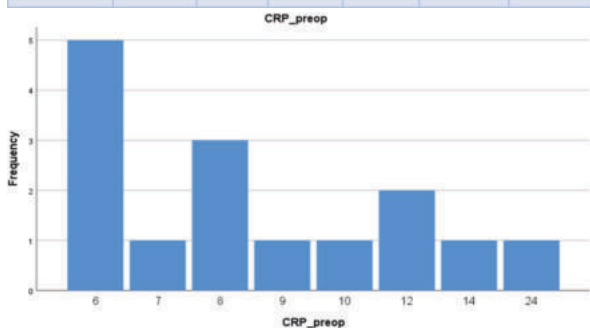


Figure 10: WBC levels in sample population

	N	Range	Minimum WBC count	Maximum WBC count	Mean WBC count	Std. Deviation
WBC level pre-op	15	8200	6800	15000	10364.67	2677.128
WBC level post-op	15	5000	4000	9000	6137.33	1494.387



Figure 11: Pre op pictures of case diagnosed with Right Buccal and Infraorbital space infection



Figure 12: Post op pictures following Extraction of 16 and intraoral Incision and drainage

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