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THE SIGNIFICANCE OF HEMATOLOGICAL AND INFLAMMATORY BIOMARKERS IN DETERMINING THE SEVERITY OF ODONTOGENIC INFECTIONS: A NARRATIVE REVIEW

УЛОГАТА НА ХЕМАТОЛОШКИТЕ И ИНФЛАМАТОРНИ БИОМАРКЕРИ ВО ДЕТЕРМИНИРАЊЕ НА ТЕЖИНАТА НА ОДОНТОГЕНИТЕ ИНФЕКЦИИ

Cena N.[1], Popovik Monevska D.[2], Bozovik Dvojakovska S.[2], Koneski F.[2]*

[1]Department of Maxillofacial Surgery, Faculty of Dental Medicine, Ss. Cyril and Methodius University in Skopje, School for Third Cycle, North Macedonia, [2]University Clinic for Maxillofacial Surgery in Skopje, Ss. Cyril and Methodius University in Skopje, North Macedonia, [1]*Correspondence Author

Abstract

Introduction: Odontogenic infections can lead to a variety of complications, with cellulitis being one of the most potentially serious infection. This condition involves a rapid and widespread inflammation of the subcutaneous tissues, characterized by an acute and diffuse nature. It occurs when the infection spreads through the spaces between cells, affecting surrounding tissues and the entire connective tissue layer due to dental issues. **Aim:** In our study, we critically analyzed the results of most recent papers, all of them focusing on biological and inflammatory biomarkers in odontogenic infection. In routine clinical practice for managing cervicofacial infections and phlegmons, which can be life-threatening, the use of blood biomarkers and indices is essential. These tools aid in identifying patients with severe infections who may benefit from more intensive conservative and surgical treatments. This targeted approach is crucial for preventing complications and avoiding the progression to sepsis. **Results:** Although many studies emphasize the advantages of dental care and antibiotic treatment, the life-threatening nature of cervicofacial infections and phlegmons calls for a more careful and strategic treatment approach. Effectively managing these complex conditions requires comprehensive assessments and customized management plans. **Conclusion:** Utilizing blood biomarkers and indices will aid in identifying patients with severe infections who may benefit from aggressive conservative and surgical interventions, ultimately helping prevent complications and sepsis. **Keywords:** CRP, NLR, WBC, Odontogenic infections, Biomarkers

Апстракт

Вовед: Одонтогените инфекции можат да предизвикаат сериозни компликации, целулитис на главата и вратот како најчеста компликација. Целулитисот се развива со прогресија на инфекцијата дифузно и фрудрујантно во длабоките простори на главата и вратот. **Литература:** Во рутинската клиничка пракса при третман на цервикофацијалните инфекции , кои можат да бидат животозагрозувачки, употребата на крвните биомаркери е од есенцијално значење. Со помош на овие биомаркери може да се идентификираат пациентите со тешки инфекции и лоша прогноза и истите да се третираат со поагресивен конзервативен и хируршки пристап. Брзата и таргетирана терапија може да ја спречи прогресијата на инфекцијата и евентуални компликации како сепса. **Заклучок:** Многу студии укажуваат дека и покрај сеопфатната дентална превенција и терапија сепак мал дел од одонтогените инфекции можат да предизвикаат животозагрозувачки состојби. Ефективно менаџирање на денталните инфекции предпоставува индивидуални планови за третман , затоа ни се потребни крвните биомаркери за навремено препознавање на тешките одонтогени инфекции и превземање на соодветни терапеутски протоколи. **Клучни зборови:** CRP, NLR, WBC, Одонтогени инфекции, Биомаркери.

Introduction

Odontogenic infections can lead to a variety of complications, with cellulitis being one of the most potentially serious infection. This condition involves a rapid and widespread inflammation of the subcutaneous tissues, characterized by an acute and diffuse nature. It occurs when the infection spreads through the spaces between the cells, affecting surrounding tissues and the entire connective tissue layer due to dental issues[1,2].

Understanding the similarities in anatomy, pathophysiology, and pharmacokinetics between pediatric and adult

patients is essential. In children, odontogenic cellulitis in the head and neck is often associated with various microbes, predominantly aerobic bacteria. In contrast, adults are more commonly affected by infections caused by non-resident bacteria, such as staphylococci and streptococci.

These infections typically occur due to the bacteria that are usually found in the oral cavity.

Clinical signs such as dysphagia, dyspnea, restricted tongue movement, and oropharyngeal edema serve as crucial indicators of infection severity, prompting attention from deontologists and oral and maxillofacial surgeons.

The growing prevalence of underlying conditions such as alcoholism, immunodeficiency, and chronic diabetes may contribute to the trend of increasingly severe infections, compounded by rising antibiotic resistance.

Delays in diagnosis, frequently managed with various antibiotics or anti-inflammatory medications, may not effectively resolve the underlying illness and often serve only as a symptom relief.

Odontogenic infections are the most frequent source of bacterial infections in the maxillofacial region, but they rarely advance to sepsis. Nonetheless, the risk of progression to sepsis cannot be ruled out in cases of moderate or severe infections that involve the fascial spaces[6-10].

Diagnostic laboratory tests are important adjuncts for evaluating the severity of a patient's inflammatory and infectious conditions. Commonly used markers include white blood cell count (WBC), C-reactive protein (CRP), and procalcitonin (PCT). Additionally, presepsin (PSEP) is gaining recognition as a valuable indicator in this context[6,11,12].

Other examples of inflammatory bi omarkers in odontogenic infections are PLT, LYMPH and NEU. Among the various acute phase proteins, C-reactive protein (CRP) is recognized as the most dynamic member of the pentraxin protein family. Its primary biological function lies in its ability to identify pathogens and damaged host cells, facilitating their elimination by activating the complement system and recruiting phagocytic cells. The WBC count assesses the total number of white blood cells in the blood and is a non-specific measure. A count above 10,000 leukocytes/mm^3 may indicate leukocytosis, which can be caused by various health issues like inflammation, bacterial infections, tissue injury, or cancer. Furthermore, WBC levels can naturally increase after exercise or meals. Neutrophil counts rise with the severity of inflammatory conditions, while lymphocyte counts, which indicate immune function, generally decline as inflammation worsens. Therefore, the neutrophil-to-lymphocyte ratio (NLR) is regarded as a more accurate indicator of inflammation than the overall leukocyte count. Evaluating these parameters can be beneficial for diagnosing odontogenic cellulitis and guiding treatment decisions[1].

Inflammatory markers obtained from blood tests are often used to predict the severity of odontogenic infections. Key markers measured in clinical practice include C-reactive protein (CRP), white blood cell count (WBC), and its components (neutrophils, lymphocytes, monocytes). However, relying solely on these values has limitations in accurately determining infection severity, highlighting the need for alternative assessments. Recently, a new inflammatory prognostic score known as the Systemic Immune-Inflammation Index (SII) has been developed to enhance the evaluation of patients' biomarkers[3,5].

To address this issue, the Symptom Severity score (SS) was created to help physicians accurately assess the risk of infection and identify potential complications during patient admission[3,4].

Some studies suggested that PCT and PSEP levels were significant predictors of sepsis, with higher values indicating an increased likelihood of the condition. Despite progress in diagnosis and treatment, mortality and morbidity remain significant concerns. One particularly rare and fatal complication is necrotizing soft tissue infection (NSTI). It is vital to stay alert, as NSTIs can be difficult to differentiate from cellulitis in their early stages, making the use of specific parameters crucial for prompt detection. Inflammatory markers from blood tests are often used as objective evaluation parameters, with C-reactive protein (CRP), white blood cell count (WBC), and its components (neutrophils, lymphocytes, monocytes) as common references. However, these values alone do not give a complete picture of disease severity. Leukocyte levels respond quickly to infections, whereas CRP levels rise more slowly, typically peaking around 48 hours after inflammation or infection begins.

Infections originating from teeth or jaw in the head and neck region can lead to serious, sometimes fatal complications, such as airway obstruction, large abscesses, necrotizing fasciitis, purulent meningitis, cerebral abscesses, mediastinal infections, sepsis, and septic shock. Anesthesia options included general anesthesia with endotracheal intubation or local anesthesia with premedication, depending on the severity of the case. However, managing respiratory difficulties and complications with intubation remains a significant challenge in cases of head and neck odontogenic infections. Factors like trismus (jaw muscle spasms) and anatomical variations complicate the procedure even further. Some authors reported a case series where all patients were treated with incision and drainage under local anesthesia and analgosedation, with no need for advanced respiratory management. In contrast, other authors suggest that most patients required only a short hospital stay, with the majority being discharged within 5 days. This shorter hospitalization may reflect the advantages of early diagnosis and prompt intervention, leading to faster recovery and reduced complications[13].

The primary treatment for odontogenic infections consists of incision and drainage of the abscess, along with removal of the infection source in the oral cavity, when necessary. However, the optimal sequence of these surgical procedures is still a subject of debate[13,19].

Prompt identification and effective management are crucial for ensuring a swift recovery, shortening hospital stays, and minimizing the risk of serious systemic complications. Regular monitoring of vital signs, such as body temperature and blood pressure, along with inflammatory markers like leukocytosis, C-reactive protein (CRP) levels, and possibly procalcitonin levels, is essential. Systemic treatment typically includes empirical antibiotic therapy guided by the antibiogram. During abscess drainage, samples are collected for microbiological analysis in order to identify the microbial species, to assess their sensitivity to various antibiotics, and to determine the minimum inhibitory concentration (MIC). Understanding the MIC is vital for planning an effective drug dosage[13,20,21, 22,23].

Researchers are examining the effectiveness of inflammatory biomarkers from routine blood tests to assess infection severity, prognosis, and potential complications, much like they do with other treatment methods.

This review seeks to provide a comprehensive analysis of the scientific evidence regarding the effectiveness of hematological and inflammatory biomarkers in assessing the severity of odontogenic infections. We searched key data bases (PubMed, Google Scholar, Research Gate, MDPI, and Science Direct). Search terms concerning odontogenic infections, hematological biomarkers, and inflammatory biomarkers were combined. The reference lists of identified articles, available in English, were then utilized to locate additional relevant references.

Aim

The purpose of our study was to analyze 10 scientific papers from 2018-2024 year, all of them focusing on biological and inflammatory biomarkers in odontogenic infection.

In our study, we critically analyzed the results of these most recent papers and pointed out the important findings. (Table 1)

Results

Role of hematological and inflammatory biomarkers in odontogenic infections.

Severe odontogenic infections can be unpredictable in their progression, necessitating thorough clinical assessment along with specific laboratory tests to achieve an accurate conclusive diagnosis.

Inflammatory biomarkers are substances in the body that indicate inflammation, which can occur due to various conditions such as infections, autoimmune diseases, or chronic diseases. In routine clinical practice, the use of blood biomarkers and indices is essentialfor managing cervicofacial infections and phlegmons, which can be life-threatening. These tools aid in identifying patients with severe infections who may benefit from more intensive conservative and surgical treatments. This targeted approach is crucial for preventing complications and avoiding progression to sepsis.

Marius et al. performed regression analysis of the relationship between the Severity Score (SS) of odontogenic infections and the SII index values and they found a strong correlation (r=0.6314) with a p-value that is less than 0.05. This indicates a statistically significant association between the Symptom Severity score of odontogenic infections and the SII index values. The overall mean SII index for the entire cohort was 1303, while the mean values for severity groups were 696.3 in Group A and 2312.4 in Group B (p-value<0.001). Similarly, SS scores also showed a significant difference, with a mean of 6.1 in Group A and 13.6 in Group B (p-value < 0.001)[3].

In a recent study by Eun-Sung Kang and Ja-Hoon Lee, WBC, CRP, and PCT levels have been used to assess the severity of infection and sepsis in patients with odontogenic infections. However, the findings of this study suggest that PSEP may also be significant in evaluating the severity of these infections and sepsis. When used alongside current testing methods, PSEP is anticipated to enhance the assessment of patient prognosis. Specifically, the odds ratios for PCT and PSEP were 14.75 and 31.17, respectively. This implies that for every 1-unit rise in PCT, the chance of sepsis increased by a factor of 14.75, while a 1-unit increase in PSEP boosted the sepsis risk by a factor of 31.17. These findings were statistically validated. On the other hand, no diagnostic test values showed a significant link to prolonged hospitalization (P<0.05). The correlation between CRP, PCT, PSEP levels, and hospital stay duration was moderate, with coefficients of 0.44, 0.55, and 0.50, respectively, all significant at P<0.05. PCT levels begin to rise around 4 hours post-infection, continuing to increase between 8 to 24 hours before peaking at 24 hours. In comparison, PSEP levels increase more rapidly, detectable within 2 hours and reaching their peak at 3 hours. The quick result turnaround time of PSEP, approximately 20 minutes, makes it a useful tool for early sepsis detection in emergency departments. While PCT demonstrated a strong area under the curve (AUC), higher average PSEP levels were particularly associated with patients who died from sepsis within 60 days of hospitalization[6].

In a study by Junya et Kusumoto et alfound out that hematologic and inflammatory parameters derived from

routine blood tests can be useful as supplementary diagnostic tools for the early identification of potentially fatal odontogenic infections. SII of ≥282, or SII of <282 when accompanied by CRP + NLR of ≥25, can help determine the need for contrast-enhanced computed tomography imaging. The study demonstrated that nearly all hematologic and inflammatory markers escalated as the severity of odontogenic infections increased. Both CRP combined with NLR (using a threshold of 27) and the LRINEC score (with a threshold of 6) proved to be reliable supplementary diagnostic tools for identifying NSTI. This suggests that blood tests can provide a near-complete assessment of the severity of odontogenic infections. Moreover, CRP + NLR and SII were found to be valuable adjuncts for guiding decisions on CECT imaging. To our knowledge, this is the first study to utilize hematologic and inflammatory markers-particularly SII and CRP - NLR-as indicators for evaluating the severity of bacterial infections in head and neck, including NSTI. This study suggests that SII and CRP + NLR could be valuable tools in the decision-making process for whether to perform CECT. High values of SII or CRP + NLR were observed in Groups I and II, which were linked to sepsis, large but superficial abscesses, and inflammation extending into deeper anatomical spaces. As a result, the combined use of CRP + NLR and SII was found to closely mirror the severity of the infection and the extent of the inflammation[24].

A review about basic science studies highlighted that using hematological and biochemical inflammatory markers can be utilized to evaluate not only the therapeutic efficacy of different treatment regimens for infections but also to gauge the severity of the infection and the patient's prognosis.

While hematological and biochemical inflammatory biomarkers are essential for evaluating prognosis and infection severity, can they alone provide sufficient clinical insight to establish the appropriate length of a patient's hospitalization?

Related to hospitalization length, in her retrospective study, Adrianna Słotwińska -Pawlaczyk et al. found that, in addition to CRP, NLR can be regarded as a significant prognostic marker for both the progression of infection and hospitalization duration, as it shows a strong correlation between the length of stay and overall clinical symptoms[1].

In a retrospective study by Horatiu Ureches et al. they found that, alongside other inflammatory markers, WBC and CRP should be utilized as biological parameters for predicting the duration of hospitalization in adult patients with maxillofacial infections, with WBC identified as the most sensitive indicator in these situations[25].

Kaur et al. suggested that firstly, measuring serum markers quantitatively can help assess the effectiveness of different treatment approaches for infections, and secondly, it can guide decisions about how long antibiotics should be used. In this study, preoperative levels of WBC count, CRP, and ESR showed a strong connection with the severity of infection, particularly regarding pain and the ability to open the mouth ($p<0.01$). Additionally, there was a highly significant correlation ($p<0.001$) between clinical factors reflecting infection severity—such as swelling, difficulty swallowing, trouble breathing, fever, hoarseness, and active pus discharge—and the three biochemical markers, both before surgery and on day 14 after surgery. The study also found that the average hospital stay was 2.16 days, with a significant association ($p<0.001$) between the length of stay and the levels of all three biochemical markers[26].

In the study by Povan et al., patients were divided into two categories based on the complexity of their cases: Group 1, consisting of more complex cases with longer hospital stays, and Group 2, consisting of simpler cases with shorter stays various factors, such as patient demographics, pre-existing conditions, symptoms, vital signs, and lab results, were assessed across both groups. The findings showed a statistically significant inverse relationship between hospital stay duration and several important clinical factors, such as heart rate ($p = 0.028$), leukocytosis ($p=0.045$), neutrophilia ($p=0.033$), neutrophil-to-lymphocyte ratio ($p=0.041$), and CRP levels ($p = 0.003$)[27].

Ciprian et al. reported in their studies that patients were admitted and evaluated for hospitalization in accordance with the standards set by the Maxillofacial Department. Blood samples were collected from the ante cubital vein on Day 1 (admission) and again on the day prior to discharge. A routine blood test was performed immediately after blood collection to measure various biomarkers. The Systemic Inflammation Index (SII) was calculated using the following reference ranges for biomarkers: neutrophil counts (2.04–7.60 × 10^3/μL), platelet counts (150–410×10^3/μL), and lymphocyte counts (1.0–3.0×10^3/μL). The formula for calculating SII was:
SII=(neutrophil count×platelet count)/lymphocyte count
with results expressed as × 10^3/μL.For the Neutrophil-to-Lymphocyte Ratio (NLR), the following reference ranges were used: neutrophil counts (2.04–7.60 × 10^3/μL) and lymphocyte counts (1.0–3.0 × 10^3/μL). NLR was calculated by dividing the neutrophil count by the lymphocyte count. Normal NLR is between 1 and 2, while values greater than 3.0 or less than 0.7 in adults are considered abnormal. Additional blood parameters assessed upon admission included C-reactive protein (CRP) levels (0–9 mg/L), white blood cell (WBC) count (4.0–10.0 × 10^3/μL), and neutrophil, lymphocyte, and platelet counts (150.0–410.0 × 10^3/μL).All patients underwent identical

Table 1. Biochemical inflammatory and hematological parameters in odontogenic infections: are view of the most recentstudies

Authors	Study	Patients	Gender %	Results
Adrianna Słotwi ´ nska-Pawlaczyk 1 et al (2023)	Analysis of Clinical Symptoms and Biochemical Parameters in Odontogenic Cellulitis in Head and Neck Region in Children	85	40% Male 60% Female	Differences in biochemical test results in SS and CS were statistically significant ($p<0.05$). in the SS group, the mean values of biochemical parameters exceeded the clinical norm. A statistically significant positive relationship was found between CRP and extra oral swelling. The NLR correlates significantly with extra oral swelling and the length of hospitalization.
Horatiu Urechescu 1, et al. (2023)	Inflammatory Markers as Predictors for Prolonged Duration of Hospitalization in Maxillofacial Infections	108	61.11% Male 38.9 % Female	This study confirmed a positive linear correlation ($p<0.001$) between the predictors and the outcome variable.
Marius Pricop 1 et al. (2022)	The Predictive Value of Systemic Immune-Inflammation Index and Symptom Severity Score for Sepsis and Systemic Inflammatory Response Syndrome in Odontogenic Infections	108	61.1% Male 38.9% Female	The correlation between OI's SS and SII index values was positive and statistically significant ($r = 0.6314$). The total SII index mean was 1303, whereas the mean values by severity were 696.3 in Group A and 2312.4 in Group B. Group A's mean SS score was 6.1, while Group Bs was 13.6.
Eun-Sung Kang and Jae-Hoon Lee (2022)	Diagnostic value of presepsin in odontogenic infections	43	21 Female 22 Male	The results of this study showed a moderately positive correlation between CRP and PCT, CRP and PSEP, and CT and PSEP levels.
Ewa Zawislak et al. (2021)	Odontogenic Head and Neck Region Infections Requiring Hospitalization	85	31.8% Female 68.2% Male	The inflammatory markers varied with the location of the infection. The highest mean lymphocyte counts were observed in patients with infections in the PM (20.3×109/L) and M spaces (20.3×109/L). The highest mean CRP levels were found in infections of the neck phlegmon (245.8mg/dL). Patients with infections of the CF exhibited the lowest leukocyte (8.0×109/L) and CRP levels (36.9mg/dL).

Authors	Study	**Patients**	Gender %	Results
Junya Kusumoto 1,2 et al. (2022)	Hematologic and inflammatory parameters for determining severity of odontogenic infections at admission	271	50.9% Male 49.1% Female	The decision tree analysis showed that the systemic immune-inflammation Index (SII) of ≥ 282 or < 282, but with a CRP + NLR of ≥ 25 suggests Group III + IV and the classification accuracy was 89.3%.
Amreen Kaur1 et al. (2018)	Correlation Between Clinical Course and Biochemical Analysis in Odontogenic Space Infections	50	40% Female 60% Male	There was a significant correlation between all the clinical parameters and biochemical markers preoperatively as well as on various postoperative days.
Ciprian Ioan Roi 1,2 et al (2023)	Impact of Treatment on Systemic Immune-Inflammatory Index and Other Inflammatory Markers in Odontogenic Cervicofacial Phlegmon Cases: A Retrospective Study	39	17 females (43.6%) 22 males (56.4%).	After the analysis of the clinical and preclinical aspects, in the case of all the patients included in the study, the causative odontogenic agent was the lower molars. The average calculated hospitalization period related to the included cases was 16.6 days (SD = 11.8). swelling and the length of hospitalization
Eduardo P. Pavan1, et al. (2020)	Changes in Vital Signs and Laboratory Tests in Patients with Odontogenic Infections Requiring Hospitalization	84	//////////////////	There was a positive and statistically significant correlation between the length of hospital stay and the variables of heart rate (p=0.028), leukocytosis (p=0.045), neutrophil (p=0.033), N/L ratio (p=0.041) and CRP level (p=0.003) .
Ovidiu Rosca 1 et al. (2023)	The Role of C-Reactive Protein and Neutrophil to Lymphocyte Ratio in Predicting the Severity of Odontogenic Infections in Adult Patients	108	Men 30 (55.6%) 36 (66.7%) Women 24 (44.4%) 18 (33.3%)	However, there was no significant difference in mortality rates. The SS and systemic immune inflammation index (SII) scores of Group B patients were substantially higher than Group A patients (13.6 vs. 6.1 for the SS score, p-value < 0.001), respectively, 2312.4 vs. 696.3 for the SII score (p-value < 0.001).

surgical procedures and were administered the same antibiotic treatments[28].

Rosca et al. concluded that the logistic regression analysis was to assess how biological markers predicted the severity of odontogenic infections (OI), as measured by the SS scale. The analysis revealed that patients with lower white blood cell (WBC) counts were 5.54 times more likely to have mild OI. Similarly, lower neutrophil counts (odds ratio [OR]=7.10), lymphocyte counts (OR=8.62), and Neutrophil-to-Lymphocyte Ratio (NLR) (OR=4.46, $p<0.001$) were all strongly associated with a reduced likelihood of severe infection. Low CRP levels were also linked to a 6.65 higher likelihood of having a mild OI, and the CRP-NLR combination was found to decrease the risk of severe infection by 7.28 times (95% CI=4.83–10.16). Receiver Operating Characteristic (ROC) analysis of CRP-NLR showed an Area under the Curve (AUC) of 0.889 ($p<0.001$), with high sensitivity (79.6%) and specificity (85.1%) for predicting mild OI at hospital admission. Additionally, NLR could be an effective predictor for non-surgical treatment in submandibular abscesses and as an indicator of less severe recovery in odontogenic infections. Multiple studies have suggested that NLR is inversely related to factors such as pus formation, hospital stay duration, and the need for antibiotics. Furthermore, NLR is unaffected by physiological and environmental factors, such as dehydration, physical activity, or blood sample processing, which could otherwise skew test results[29].

In their research, Junya Kusumoto et al. found that most blood and inflammatory markers decreased as the severity of odontogenic infections improved; neither CRP+NLR (cut-off of 27) nor LRINEC score (cut-off of 6) serves as a reliable additional diagnostic tool for NSTI[25].

The Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score is recommended as an additional diagnostic tool for identifying necrotizing soft tissue infections (NSTIs). At the same time, a new predictive marker, the systemic immune-inflammation index (SII), has been recently introduced, although its application in infectious diseases is still not fully clarified.

Discussion

Despite good access to dental services, effective antibiotic treatments, and positive socioeconomic factors, infections originating from dental issues are still the most common reason for admissions in maxillofacial surgery units. Analyzing different research studies suggests that regular blood tests assessing inflammatory markers are crucial for quick diagnosis of severe bacterial infections in the head and neck area.

Based on recent studies, we can conclude that inflammatory markers narrate numerous advantages for their usage.

According to them, quantitative determination of serum markers can be used for determining therapeutic efficacy of different treatment regimens of infections and the duration of antibiotic usage. In addition, the length of hospitalization plays a vital role in the prognostic assessment of odontogenic infections. Although some authors reach different conclusions in prior studies regarding hospitalization length, they all agree that NLR, CRP, and WBC are the most dependable indicators for evaluating this duration[1,6,26,27,28].

When the infection spreads to the cellular-adipose tissue of the head and neck, it becomes odontogenic cellulitis. Most of the cases are acute localized forms without signs of severity, and are rapidly resolved through appropriate medical and surgical treatment. However, the infection can disseminate deeply along the fascial planes, becoming life-threatening and causing extensive morbidity. In the maxilla, it is common to observe extension into the canine, buccal, and masticator spaces. Although maxillary odontogenic infections rarely pose a threat to the airway, they do have the potential to cause serious but exceptional complications, such as orbital abscess, cavernous sinus thrombosis, and cerebral abscess. In the mandible, the thin lingual cortex in the posterior molar region allows for the rapid spread of the infection in the fascial planes and can lead to airway obstruction and, ultimately, to mediastinitis. Even today, mortality and morbidity are not negligible, despite the progress made in diagnosis and treatment of the disease[13,31,33,34].

While many previous studies have indicated that markers such as CRP, white blood cell count (WBC), and its components (neutrophils, lymphocytes, monocytes) are commonly used to assess inflammation and are believed to be effective in identifying maxillofacial infections. Several authors are focused on the Systemic Immune-Inflammation Index (SII) as a potential predictor of the severity of odontogenic infections (OI). The SII, a relatively novel inflammatory marker, is calculated using the absolute counts of neutrophils, platelets, and lymphocytes in the bloodstream[3,13,24,29].

Conclusions

In conclusion, the use of CRP, ESR, and WBC count together offers a dependable method for assessing the progression of odontogenic infections. By quantitatively measuring these serum markers, clinicians can better determine the effectiveness of various treatment approaches and more accurately decide on the duration of antibiotic therapy.

Among these three biomarkers, CRP showed the earliest increase at the time of initial presentation, followed by a swift decline in its levels after surgery.

Based on literature review and the authors' analysis, minor dental problems are increasingly viewed as less significant. Enhanced access to dental care and antibiotic treatments has shifted the focus away from odontogenic infections in the head and neck region in many studies.

However, hematologic and inflammatory markers from routine blood tests remain important as additional diagnostic tools for early identification of potentially life-threatening odontogenic infections. Although many studies emphasize the advantages of dental care and antibiotic treatment, the life-threatening nature of cervicofacial infections and phlegmons calls for a more careful and strategic treatment approach.

Effectively managing these complex conditions requires comprehensive assessments and customized management plans. Utilizing blood biomarkers and indices will aid in identifying the patients with severe infections who may benefit from aggressive conservative and surgical interventions, ultimately helping to prevent-complications and sepsis.

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