

Management of Necrotizing Periodontal Diseases at Different Stages: A Case Series

Mert KUTSAL^{1*}  Demet EFE²  Sema BECERİK³ 

¹ Res. Ass., Ege University, Faculty of Dentistry, Department of Periodontology, Izmir, Türkiye, mert.kutsal@ege.edu.tr

² Res. Ass., Ege University, Faculty of Dentistry, Department of Periodontology, Izmir, Türkiye, demet.efe@ege.edu.tr

³ Prof., Ege University, Faculty of Dentistry, Department of Periodontology, Izmir, Türkiye, semacinar@yahoo.com

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ABSTRACT

Necrotizing periodontal diseases (NPD) are acute diseases of bacterial dental plaque origin and they are divided into four categories based on the affected tissues: Necrotizing gingivitis, necrotizing periodontitis, necrotizing stomatitis and noma. According to studies, these diseases are rarely seen in the practice of industrialized countries (0.19% to 0.5%) when it does occur, it tends to affect young individuals more frequently in accordance with its etiological factors. The disease presents specific clinical features such as necrotic papillae resembling punched-out lesions, severe pain and the formation of pseudomembrane. Diagnosis is typically based on clinical findings. The development of the disease is influenced by host response and along with predisposing factors such as systemic conditions, HIV infection and stress. The treatment of the disease consists of the acute phase treatment and the supportive/maintenance phase treatment. Between these two main stages, there are stages for controlling the predisposing factors and correcting the sequelae resulting from the disease. In this case series, we have reported on the clinical examination, diagnosis, treatment, and follow-up of three patients referred to the Department of Periodontology Ege University Faculty of Dentistry, diagnosed with Necrotizing Periodontal Diseases (NPD). The changes in terms of social and oral care habits during the 3-6 months post-treatment period and maintenance phase were also documented.

Farklı Seviyelerdeki Nekrotizan Periodontal Hastalıkların Yönetimi: Olgu Serisi

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ÖZET

Nekrotizan periodontal hastalıklar (NPH) bakteri plağı kökenli akut seyirli hastalıklardır ve etkilediği dokulara göre dört gruba ayrılırlar: Nekrotizan gingivitis, nekrotizan periodontitis, nekrotizan stomatitis, noma. Yapılan çalışmalara göre, bu hastalıklar sanayileşmiş ülkelerin pratiğinde nadiren görülür (0,19% ile 0,5%) ancak görüldüğü zaman, etyolojik faktörlerine uygun olarak genç bireyleri daha sık etkiler. Hastalığın zımba deliği görünümü nekrotik papillalar, şiddetli ağrı, psödömembran formasyonu gibi spesifik klinik bulguları mevcuttur ve tanı klinik bulgular doğrultusunda alınmaktadır. Hastalığın gelişiminde konak cevabı ve sistemik durum, HIV enfeksiyonu, stres gibi hazırlayıcı faktörler etkili olmakla birlikte tedavisi birbirini takip eden aşamalardan oluşmaktadır. Bunlar sırasıyla akut faz tedavisi ve destekleyici/idame fazı tedavisidir. Bu iki ana aşama arasında ise hazırlayıcı faktörlerin kontrolü ve hastalık sonucu oluşan sekellerin düzeltilmesi aşamaları yer almaktadır. Bu olgu serimizde Ege Üniversitesi Diş Hekimliği Fakültesi Periodontoloji Anabilim Dalına yönlendirilen ve NPH teşhisi konulan 3 hastanın klinik muayene, tanı, tedavi ve tedavi sonrası 3-6 aylık takibi ve idame dönemindeki sosyal ve ağız bakımı alışkanlıkları açısından ne tür değişikliklerin olduğu aktarılmıştır.

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*Corresponding Author: Mert Kutsal, mert.kutsal@ege.edu.tr



INTRODUCTION

Necrotizing periodontal diseases (NPD) are severe oral conditions characterized by destruction of periodontal tissues that can accompany systemic diseases. Depending on the tissues affected and the severity, the condition can vary from a situation that disrupts papillary architecture to Noma, which results in severe destruction.¹

Diseases classified as Necrotizing Ulcerative Gingivitis and Necrotizing Ulcerative Periodontitis in the 1999 classification were updated in the 2017 classification to include Necrotizing Gingivitis (NG), Necrotizing Periodontitis (NP), Necrotizing Stomatitis (NS) and Noma.^{2,3} Studies have shown that these diseases are different stages of the same condition, with common clinical findings and treatment methods.³

Necrotizing periodontal diseases are rarely seen, in studies conducted in industrialized countries, the prevalence of NPD ranged between 0,19% and 0,5%,^{4,5} they remain significant in countries that are still developing and are encountered in the clinical practice.

The diagnosis of NPD is primarily based on clinical findings.⁶ These clinical manifestations include necrosis at the apex of the interdental papilla (resembling a punched-out lesion), pain, bleeding gums, pseudomembrane formation, metallic taste and halitosis. Systemically, lymphadenopathy, general weakness and fever may also be observed.^{5,6,7}

At the core of NPD lies the dominance of bacterial strains responsible for the disease, triggering inflammatory processes, like other periodontal diseases leading to bacterial dysbiosis and responses in periodontal tissues.¹ Microbiological factors, host response/systemic condition and predisposing factors plays a role in the development of NPD. These predisposing

factors include conditions such as HIV/AIDS, malnutrition (especially in developing countries),⁸ psychological stress, inadequate sleep, poor oral hygiene, history of previous NPD, smoking and alcohol use, young age, racial characteristics and seasonal factors.^{9,10}

The treatment of NPD involves careful and regular implementation of several stages. These include the acute phase treatment and supportive/maintenance phase treatment, with the correction of predisposing factors and sequelae resulting from the disease between these two stages.¹⁰ Due to the nature of NPD (severe tissue destruction, acute course and pain), diagnosis and treatment should be carried out as quickly as possible and supportive methods should be employed if necessary.^{11,12} The two main goals of acute phase treatment are to halt the progression of the disease and tissue destruction and to reduce the patient's symptoms.¹³ Treatment involves gently removing superficial attachments, using mouthwash containing hydrogen peroxide and/or chlorhexidine, administering systemic antimicrobial therapy if necessary, providing oral hygiene education and recommending a soft brush. Once the acute condition is under control, the next stage involves controlling predisposing factors. This stage includes professional oral care procedures (scaling and root planing), regulating the patient's oral hygiene habits and correcting overhanging restorations.⁷ Factors such as smoking, emotional stress, inadequate sleep and other systemic conditions should be managed during this stage.¹⁰ The next stage involves correcting changes in morphology due to the disease. Flap surgeries, regenerative procedures, gingivectomy / gingivoplasty procedures are performed during this stage.⁷ The final stage in the treatment of NPD is the supportive / maintenance phase treatment, which involves ensuring the patient's compliance with oral hygiene practices and regular monitoring of

predisposing factors.⁷

CASE REPORT-1

A 22-year-old male patient was referred to our periodontology department in July 2023 with main complaints of gingival pain and bleeding during eating and toothbrushing. The patient was systemically healthy and smoking 20 cigarettes per day.

Upon clinical examination (taking systemic and dental anamnesis, detection of clinical findings, periodontal probing), bleeding spots, pseudomembrane formation and necrosis on the papilla's apex were observed and intraoral photographs of the patient were taken (Figure 1. a, b, c). The radiological examination and the determination of clinical attachment levels through periodontal probing (within tolerable limits due to patient's pain) revealed no alveolar bone loss (Figure 2). Panoramic radiographs alone are insufficient for accurate detection alveolar bone loss. However, in this case clinical examination does not reveal clinical attachment loss and panoramic radiographs are corroborated by clinical findings, no additional radiographic imaging is required.

Figure 1. a,b,c: Initial Intraoral Photographs

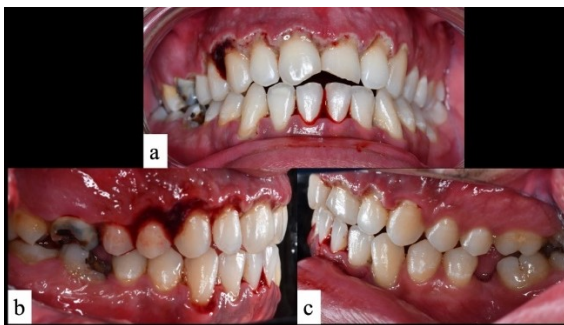


Figure 2: Panoramic Radiograph



Based on the anamnesis and clinical/radiological examinations, Necrotizing Gingivitis was diagnosed. The patient was informed about the treatment process and the informed consent was obtained.

During the first appointment, the patient underwent supragingival scaling with ultrasonic scaler to a tolerable level. At the end of the appointment, the patient was prescribed a mouthwash containing hydrogen peroxide to target the anaerobic flora responsible for the disease in the mouth (3% hydrogen peroxide diluted 1:1 in warm water) (Dermosept® Oxygenated Water, ALG, Istanbul) and an antibiotic (Flagyl® 500 mg tablet, Sanofi, Istanbul) due to systemic symptoms (fever, weakness) (to be taken 3 times a day). The patient was instructed to perform oral care with a soft toothbrush throughout the treatment period and advised to quit smoking.

During the patient's second appointment, which took place 2 days later, supragingival and subgingival calculus was removed. Following this appointment, the patient was advised to use a chlorhexidine-containing mouthwash (Kloroben®, Drog-san, Ankara) for a week instead of the hydrogen peroxide-containing mouthwash.

At the patient's third (one week after the second appointment) and fourth appointments (one week after the third appointment), a general assessment was conducted and the status of complaints was queried. The patient reported that initial complaints of pain and bleeding had completely ceased and he could comfortably perform eating and oral care activities.

At the end of the fourth appointment, the bleeding spots and pseudomembranes had completely disappeared, although the loss resulting from necrosis on the papilla's apex was still noticeable.

The acute phase treatment for the patient was completed and he transitioned to the supportive/maintenance phase. In addition, intraoral photographs of the patient were taken again (Figure 3. a, b, c).

Figure 3: Fourth Appointment Intraoral Photographs



A follow-up appointment was scheduled for the patient in January 2024, with a six-month interval. During the appointment, the patient reported the absence of any remaining symptoms, which were confirmed by the clinical examination. The patient was queried about potential contributing factors to the disease during the specified period and any alterations in their social and oral care practices since that time. These questions asked to the patient are intended to ensure the control of etiological factors addressed during treatment, as well as to assess the adequacy of oral care and behaviors established to manage the condition. The patient reported being extremely stressed due to school during that period and reported reducing cigarette consumption from 20 cigarettes per day to 5-6 cigarettes per day. The patient reported that he has modified his oral hygiene habits in accordance with the recommendations. Intraoral photographs were taken at this appointment (Figure 4. a, b, c). As seen in the photographs taken at the 6-month follow-up appointment, some recovery of the papillary losses associated with necrosis seen during the active phase of the disease had occurred. The missing mandibular left first molar and the mandibular right first molar and maxillary first molar with excessive material loss

of the patient were not evaluated during the acute treatment phase because there were no complaints from these teeth. After completing the acute treatment phase, necessary treatments for the missing mandibular left first molar and the mandibular right first molar with excessive material loss in the relevant sites were explained to the patient, and he was referred to the appropriate departments.

Figure 4: a,b,c: 6-Month Follow-up Photographs



CASE REPORT-2

A 22-year-old male patient was referred to our periodontology department in June 2023 with main complaints of bleeding gums, pain and difficulty when opening his mouth and chewing. The patient was systemically healthy and smoking 3-4 cigarettes per day.

As a result of the clinical examination (taking systemic and dental anamnesis, detection of clinical findings, periodontal probing), white plaque formation on the buccal surfaces of the lower and upper teeth and redness in the papilla peaks were observed. The patient's mouth opening was limited due to pain, intraoral photographs were taken as much as possible (Figure 5. a,b). The radiological examination and the determination of clinical attachment levels through periodontal probing (within tolerable limits due to the patient's pain) revealed no alveolar bone loss. (Figure 6) Panoramic radiographs alone are insufficient for accurate detection alveolar bone loss. However, in this case clinical examination does not reveal clinical attachment loss and panoramic radiographs are corroborated by

clinical findings, no additional radiographic imaging is required.

Figure 5. a,b: Initial Intraoral Photographs



Figure 6: Panoramic Radiograph



Based on the anamnesis and clinical/radiological examinations, Necrotizing Gingivitis was diagnosed. The patient was informed about the treatment process and the informed consent was obtained.

During the first appointment, the removal of superficial attachments (dental plaque, supragingival calculus) could only be applied to a limited extent due to intense pain experienced by the patient. Given the absence of systemic symptoms, antimicrobial therapy was not initiated. Instead, the patient was instructed to use a mouthwash containing hydrogen peroxide to target the anaerobic flora responsible for the disease in the oral cavity (3% hydrogen peroxide diluted 1:1 in warm water) (Dermosept® Oxygenated Water, ALG, Istanbul). The patient was instructed to perform oral care with a soft toothbrush throughout the treatment period and advised to quit smoking. During this process, a blood test was requested to monitor the patient's general condition.

During the patient's second appointment, scheduled two days later, the results of the blood test were reviewed, revealing C-reactive Protein (CRP) levels above the normal range indicative of active inflammation (21,21 mg/L,

reference range 0-5 mg/L). Supragingival scaling was performed. Instead of hydrogen peroxide-containing mouthwash, the patient was instructed and prescribed to use a chlorhexidine-containing mouthwash (Kloroben®, Drogosan, Ankara) for one week. Additionally, at the end of the session, the patient was asked to undergo an ELISA test due to suspected viral illness.

At the patient's third appointment the initial high CRP levels had approached normal levels in the test conducted three days later (5,93 mg/L, reference range 0-5 mg/L). The ELISA test of the patient was negative.

After the third (one week after the second appointment) and fourth appointments (one week after the third appointment), all of the patient's complaints have disappeared and acute treatment phase has been terminated, transitioning to a supportive/maintenance phase. In the fourth appointment, intraoral photographs were taken from the patient (Figure 7). As seen in the captured image, the redness in the papilla's apex has disappeared, the membranes on the gingiva surfaces have disappeared.

Figure 7: Fourth Appointment Intraoral Photograph



The patient has been called for 7th-month follow-up appointment in January 2024. The patient's complaints had abated, with only minimal gum bleeding in the upper anterior region during brushing. Clinical observation indicated that the patient was in good health. The patient was queried about potential contributing factors to the disease during the specified period and any alterations in social and oral care practices since that time. These

questions asked to the patient are intended to ensure the control of etiological factors addressed during treatment, as well as the adequacy of oral care and behaviors established to manage the condition. The patient reported experiencing insomnia due to changes in social life during that period and having an irregular eating pattern. Furthermore, it was disclosed that the patient adheres to a regimen of regular oral hygiene and has managed to reduce his cigarette consumption to a maximum of three or four per day. At the end of the appointment, intraoral photograph was taken (Figure 8). The missing mandibular right first molar of the patient were not evaluated during the acute treatment phase because there were no complaints from this site. After completing the acute treatment phase, necessary treatments for the missing mandibular right first molar in the relevant site were explained to the patient, and he was referred to the appropriate departments.

Figure 8: Seventh Month Intraoral Photograph



CASE REPORT-3

A 18-year-old male patient was referred to our periodontology department in May 2023 with main complaints of bleeding gums, pain and halitosis. The patient was systemically healthy and smoking 30 cigarettes per day.

As a result of the clinical examination (taking systemic and dental anamnesis, detection of clinical findings, periodontal probing) necrosis and ulceration of the interdental papilla's, bleeding and crater-like defects occurring in the upper anterior region and increase in pocket depth were detected. Intraoral photographs were taken from the

patient (Figure 9. a,b,c).

Figure 9. a,b,c: Initial Intraoral Photographs



A comparison was made between the panoramic radiograph taken in 2018 during the patient's previous visit to our department and the panoramic radiograph taken in May 2023. It was noticed that there was alveolar bone loss and increased pocket depth observed during periodontal probing in the upper jaw anterior region (Figure 10,11). In this case, a comparison of a radiograph taken five years prior with a current one demonstrated significant attachment loss. As this loss was substantiated by clinical examination, further radiographic imaging was thought unnecessary.

Figure 10: Panoramic Radiograph Dated 2018



Figure 11: Panoramic Radiograph Dated May 2023



Based on the anamnesis and clinical/radiological examinations, Necrotizing Periodontitis was diagnosed. The patient was

informed about the treatment process and the informed consent was obtained.

At the first appointment, limited supragingival scaling could be performed due to intense pain of the patient. Given the absence of systemic symptoms, antimicrobial therapy was not initiated. Instead, the patient was instructed to use a mouthwash containing hydrogen peroxide to target the anaerobic flora responsible for the disease in the oral cavity (3% hydrogen peroxide diluted 1:1 in warm water) (Dermostept® Oxygenated Water, ALG, Istanbul). The patient was instructed to perform oral care with a soft toothbrush throughout the treatment period and advised to quit smoking.

During the follow-up appointment two days later, it was observed that the complaints of the patient was decreased and non-surgical periodontal treatment was continued. Root planing procedures were performed in areas with attachment loss. Following this appointment, the patient was advised to use a chlorhexidine-containing mouthwash (Kloroben®, Drogosan, Ankara) for a week instead of the hydrogen peroxide-containing mouthwash.

After the third (one week after the second appointment) and fourth follow-up appointments (one week after the third appointment), the patient's complaints had completely disappeared and transitioned to the supportive/maintenance phase of treatment.

The patient was called for a follow-up appointment in August 2023 (3rd month). It was learned that the patient had no remaining complaints and felt motivated upon seeing the improvement in gum health, consequently paying close attention to oral hygiene. Clinically, improvements in the necrotic areas of the papilla's apex were observed. The patient was queried about potential contributing factors to the disease during the specified period and any alterations in social and oral care practices

since that time. These questions asked to the patient are intended to ensure the control of etiological factors addressed during treatment, as well as the adequacy of oral care and behaviors established to manage the condition. It was revealed that the patient experienced stress and pressure due to job searching during that period, reduced of daily cigarette consumption from 30 to 15 and adhered to oral care habits regularly. At the end of the session, intraoral photographs were taken from the patient (Figure 12. a,b,c).

Figure 12. a,b,c: Third Month Intraoral Photographs



DISCUSSION

In the management of necrotizing periodontal diseases, it is of the importance to exercise the utmost care in the detection, diagnosis and treatment of the condition. Necrotizing periodontal diseases begin with Necrotizing Gingivitis, which is limited to the soft tissue in its early stages and if not detected and treated in a timely and appropriate manner, they can progress to Noma, presenting as a severe condition. Hence, early detection and appropriate treatment are crucial.

Although necrotizing periodontal diseases primarily originate from bacterial dysbiosis.¹ Immunassays and polymerase chain reaction studies have identified the involvement of spirochetes in the disease.^{14,15,6} In addition to spirochetes, *Prevotella intermedia*, *Treponema*, *Selenomonas*, and *Fusobacterium* species have also been detected.¹⁷ Many of the pathogens implicated in the disease are opportunistic pathogens commonly found in healthy

individuals, underscoring the importance of the balance between oral flora and host susceptibility/response.¹

Evaluating them solely from a microbiological perspective would be incorrect. In addition to microbiological factors, the host response/systemic condition and various predisposing factors play a significant role in the development of the disease.^{9,10} It is essential for clinicians to recognize these predisposing factors and intervene accordingly whenever possible. It was found that all patients in this case series were in emotionally stressful periods (such as job searching, education, social relationships, etc.) when they were affected by the disease. Among the predisposing factors, HIV/AIDS^{9,10} was investigated in our second patient through the requested ELISA test, but no supportive results were found. Smoking,^{9,10} another predisposing factor, was observed in all three cases and efforts were made to motivate the patients to quit smoking. Patients were motivated to quit smoking by emphasizing that smoking is a significant factor in the development of this disease and that the disease is likely to recur if they continue to smoke.

In the treatment of NPDs, staged therapy and careful implementation are of utmost importance. In this case series, the treatment of the disease in all three patients has been applied according to the stages mentioned in the current literature.¹⁰ In the first stage, known as acute phase treatment, the progression of the disease and tissue destruction were aimed to be stopped and the patient's symptoms were controlled.¹³ According to the current literature, the purpose of using metronidazole-containing antibiotics in the acute phase of treatment is to effectively target anaerobic bacteria in the fusospirocetal complex that cause the development of necrotizing periodontal disease. In cases where the use of metronidazole is inappropriate, the use of amoxicillin-containing antibiotics has also been reported to be appropriate.^{1,18} Depending on the patient's systemic symptoms,

supplementation with antimicrobials may be necessary.¹⁹ Among the patients we reported in this case series, systemic antimicrobial therapy was only used in one case (Case 1). However, the treatments applied to all three patients were successful. This indicates that antimicrobials may not be indicated for every patient in the treatment of dysbiosis and eradication of the anaerobic environment, which are the main goals of treatment. After effectively implementing acute phase treatment, the subsequent stages of controlling predisposing conditions, correcting sequelae resulting from the disease and applying maintenance / supportive phase treatments are crucial.⁷ As recommended in the current literature, the maintenance phase was initiated in the treatment of all 3 patients; the aim of this phase is to keep the disease, risk factors and the oral hygiene under control.¹ During this stage, necessary recommendations for disease control have been reiterated at each appointment of follow ups, and the recommended practices for patients have been verified (oral care habits, quit smoking). These patients were informed that their condition could recur if not properly controlled and that they would be scheduled for follow-up appointments to prevent recurrence. Specific recommendations have been provided for the missing teeth and/or excessive material loss in the first and second patient, who has been referred to the relevant departments accordingly. Following 3-6 months of long-term follow-up, it has been observed in all three patients discussed in this case series that treatment has been successful. Symptoms experienced during the acute phase have resolved, indicating compliance with recommendations.

CONCLUSION

Necrotizing periodontal diseases (NPDs), named according to the tissues they affect, are encountered in today's clinical practice in our country. NPDs can be prevented from

progressing to advanced tissue loss with early clinical diagnosis based on disease-specific clinical findings and effective treatment planning. In this case series, after the diagnostic process of these three patients at different stages of the disease, treatment planning and implementation were carried out according to the literature. As a result, all of the cases have been managed effectively according to treatments outlined in the literature and it was observed that periodontal health was maintained during the 3-6 month period in this case series. Advanced studies describing the management of more severe stages of necrotizing periodontal diseases and longer-term patient follow-up could contribute to the literature in the coming period.

Ethical Approval

An ethics statement was not required for this study type and no human or animal subjects or materials were used.

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Conflict of Interest

The authors deny any conflicts of interest related to this study.

Author Contributions

Design: MK, DE, SB Data collection and processing: MK, DE, Analysis and interpretation: MK, SB Literature review: MK, SB, Writing: MK, DE, SB.

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