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Case Report

Clinical Parameters and CRP Levels in Generalized Aggressive Periodontitis Patient: A Case Report

Hatice Balcı Yüce[1], Fatma Uçan Yarkaç[1], Feyza Tulu[1]

[1] Gaziosmanpasa University, Faculty of Dentistry, Department of Periodontology, Tokat, Turkey.

Abstract

Aim: Generalised aggressive periodontitis (G-AGP) is the most severe and destructive form of periodontitis. It usually starts at the age of 30 years, and it is difficult to recover tissue health through periodontal treatment alone. This investigation was conducted to evaluate the effect of full-mouth ozone treatment on clinical parameters and blood C-reactive protein (CRP) levels in a patient with G-AGP.

Methodology: A 23-year-old male patient was diagnosed with G-AGP. Clinical attachment level (CAL), plaque index (PI), gingival index (GI), bleeding on probing (BoP) and blood CRP levels were recorded. Full-mouth scaling and root planing and ozone application were performed.

Results: Baseline mean full-mouth PI, GI scores and CAL were 3.0, 2.0 and 5.2 mm, respectively. About 42% of the sites showed a CAL of 4-6 mm, while 26% of the sites showed a CAL of ≥7 mm. BoP was detected in 72% of the sites. Fifteen teeth had a CAL of ≥6 mm. After treatment, both the PI and the GI scores were 1.0, the CAL was 4-6 mm in 19% of the sites and ≥7 mm in 16% of the sites and BoP was observed in 12% of the sites. Six teeth had a CAL of ≥6 mm. Baseline CRP level was 9 mg/L and increased to 34 mg/L during the treatment and then decreased to 2 mg/L after 4 weeks.

Conclusions: Within the limitations of this case report, it could be suggested that monitoring CRP levels and subgingival ozone application might be beneficial in treating G-AGP.

Keywords: Aggressive periodontitis, ozone therapy, C-reactive protein

Correspondence:
Dr. Fatma UÇAN YARKAÇ
Gaziosmanpasa University, Faculty of Dentistry, Department of Periodontology, Tokat, TURKEY.
E-mail:fatma_ucan413@hotmail.com

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Introduction

Periodontal disease is a chronic inflammatory and infectious disease of the periodontium primarily caused by dental plaque. There are two forms of the disease, namely chronic periodontitis (CP) and aggressive periodontitis (AGP) (1). In both forms, bacterial accumulation initiates an inflammatory process and host-bacterial interactions determine the disease course. In AGP, a bacterial component of dental plaque and the response to these bacteria are different from CP, resulting in a slower disease course (1). The treatment protocols of these diseases are also different. CP generally responds well to conventional

periodontal treatment, whereas AGP requires additional applications such as antibacterial agents (2).

AGP has two clinical classifications; one is a localised form and the other is a generalised form, both of which have similar characteristics such as a non-contributing medical history, severe destruction and involvement of Aggregatibacter actinomycetemcomitans (A.a) (3). However, generalised AGP (G-AGP) causes more rapid attachment loss, bone destruction and tooth loss. G-AGP usually affects people below the age of 30 years and differs from localised AGP (L-AGP) according to the familial disease history and the number of affected teeth (4). L-AGP primarily affects the central incisors and the first molars, whereas G-AGP affects at least six other teeth other than the central incisors and the first molars. Although the treatment protocols of L-AGP and G-AGP are similar, the prognosis of G-AGP is poorer than L-AGP (5).

The most important goal of treatment of AGP is to eliminate or reduce subgingival microorganisms, regenerate lost tissues and preserve periodontal health (6–8). Non-surgical periodontal treatment is considered to be the gold standard for the maintenance of periodontal health by the elimination of bacterial plaque. However, non-surgical treatment alone cannot eliminate all periodontopathogens and improve periodontal health in G-AGP (9). To increase treatment success, several applications (chlorhexidine, ozonized water, polyvinylpyrrolidone iodine complex etc.) such as a subgingival application of gaseous ozone and irrigation with antiseptics have been recommended in the literature (10, 11).

Ozone is a gaseous mixture consisting of 0.05%-5% pure ozone and 95%-99.95% oxygen, which is applied to achieve medical goals. Application of ozone has some advantages such as disinfection, antibacterial efficacy and improvement of periodontal wound healing (12, 13). Early diagnosis of G-AGP might help in preventing the disease development and/or in taking precautions. As G-AGP is an inflammatory disease, detecting systemic and/or local infection and inflammatory markers might be beneficial in the early diagnosis. C-reactive protein (CRP) is the most common marker of infection that is produced in reaction to numerous forms of injuries such as periodontitis, diabetes, trauma, cardiovascular diseases and other infections (14, 15). Therefore, the aim of the present study was to evaluate the efficacy of CRP as a diagnostic marker and the effect of subgingival ozone application on periodontal healing in a patient with G-AGP.

Materials and Methods

A 23-year-old systemically healthy male patient with complaints of gingival bleeding, gingival recession, tooth sensitivity and tooth mobility was referred to Gaziosmanpasa University Faculty of Dentistry. Medical history and oral and radiographic examinations revealed severe periodontal destruction in all teeth (Fig. 1).

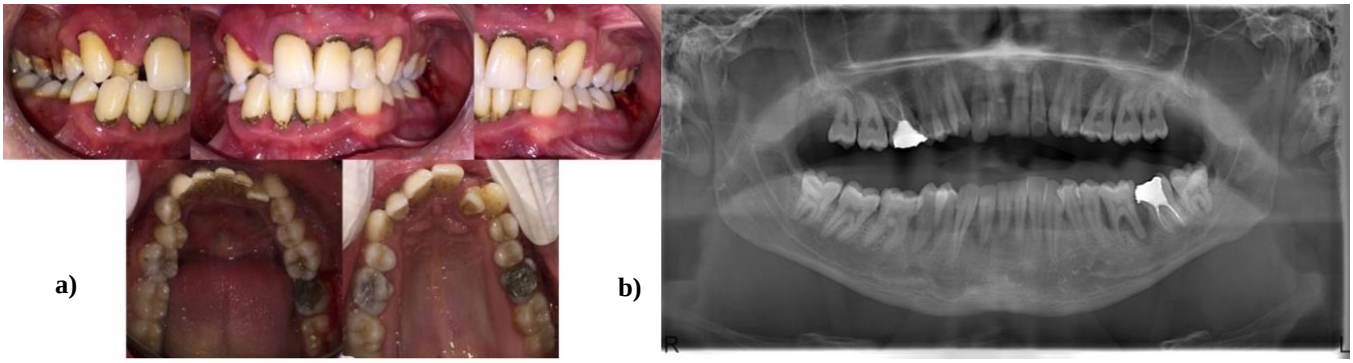

Figure 1. a) Clinical photographs, **b)** radiographical view of the case (baseline)

Full-mouth plaque index (PI) (16), gingival index (GI) (17), amount of gingival recession, bleeding on probing (BoP), clinical attachment level (CAL) and the number of teeth existing in the mouth were recorded. CAL was determined at six measurement sites of each tooth (mesiobuccal, buccal, distobuccal, mesiopalatal, palatal and distopalatal). The presence or absence of BoP was recorded per tooth, and the percentage of BoP was calculated by dividing the number of bleeding sites by the number of teeth (18). All periodontal measurements were performed using a Williams probe. At baseline, scaling and root planing (SRP) procedures were performed using ultrasonic instruments and Gracey curettes. Proper oral hygiene instructions were given, and ozone application was additionally performed a week after root planning.

A gaseous ozone generator was used for full-mouth ozone application (Ozonytron, MIO international Ozonytron GmbH, München, Germany) (Fig. 2). Ozone was applied individually for every single pocket in the periodontitis mode, which provides maximum access to deep pockets. The application was performed according to the manufacturer's instructions (35µg, 80sn PA/GI with periodontitis mode).

Figure 2. Full-mouth ozone application (Ozonytron, MIO international Ozonytron GmbH, München, Germany)

Venous blood samples, a total of six serum samples, were obtained as follows: at the first visit before the periodontal treatment, 1 day after scaling and root planning, 1 week after scaling and root planning, on the day of ozone application, 1 day after ozone application and 6 weeks after the initial periodontal treatment. The CRP levels in blood were determined by immunonephelometry with anti-CRP monoclonal antibodies, which allowed quantitative results (in milligrams per liter).

Results

Intraoral examination of the patient revealed severe attachment losses, pus formations and inflammation. After non-surgical periodontal therapy and ozone application, the periodontal status improved. Table 1 presents the results at the baseline and at the sixth week.

Mean full-mouth PI score was 3.0 at baseline and 1.0 after initial periodontal treatment. The patient was extremely motivated, and the plaque percentage levels were below 25%. Mean full-mouth GI score was 2.0 at baseline and 1.0 at the sixth week. Before treatment, 72% of the sites exhibited BoP, which decreased to 12% after treatment.

The mean full-mouth CAL was 5.2 mm. About 42% of the sites showed a CAL of 4–6 mm, while 26% of the sites showed a CAL of >7 mm. Fifteen teeth showed a CAL of ≥6 mm. After treatment, the mean full-mouth CAL was 2.075 ± 1.86 mm in the maxilla and 1.67 ± 1.4 mm in the mandible; 19% of the sites showed a CAL of 4–6 mm, and 16% of the sites showed a CAL of ≥7 mm; six teeth had a CAL of ≥6 mm (Table 1).

Table 1. Baseline and post-treatment buccal (B)-lingual (L) clinical attachment levels (CAL)

Baseline /Tooth mesial-midbuccal-distal measurement														
Maxilla	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**21**	**22**	**23**	**24**	**25**	**26**	**27**
CAL(B)mm	527	833	755	535	448	101114	538	557	10129	534	425		523	335
CAL(L)mm	536	527	724	323	359	1278	577	7912	589	523	225		524	435
Mandible	**47**	**46**	**45**	**44**	**43**	**42**	**41**	**31**	**32**	**33**	**34**	**35**	**36**	**37**
CAL(B)mm	424	323	51011	734	435	834	977	753	444	425	724	324	91010	523
CAL(L)mm	534	544	4910	535	335	6710	753	335	525	555	534	323	767	535

Post-treatment /Tooth mesial-midbuccal-distal measurement														
Maxilla	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**21**	**22**	**23**	**24**	**25**	**26**	**27**
CAL(B)mm	322	313	322	133	214	5108	523	535	564	333	322		322	323
CAL(L)mm	223	325	223	322	257	737	523	555	543	222	222		323	323
Mandible	**47**	**46**	**45**	**44**	**43**	**42**	**41**	**31**	**32**	**33**	**34**	**35**	**36**	**37**
CAL(B)mm	323	322	499	322	213	322	334	432	222	222	612	223	776	323
CAL(L)mm	332	323	475	322	223	334	453	112	222	354	534	312	755	333

In general, CRP levels range from 0 to 5 mg/L in healthy people, whereas the CRP level of our patient was 8.8 mg/L at baseline. This level increased to 16.9 mg/L on the first day after supragingival scaling but decreased to 7 mg/L after 1 week, which was the day before subgingival scaling and root planning. One day after subgingival treatment, the CRP level again increased to 32.4 mg/L, and after full-mouth ozone application, it again increased to 34.5 mg/L. During the follow-up period of 6 weeks, this level decreased to the normally accepted value (2 mg/L) (Fig. 3).

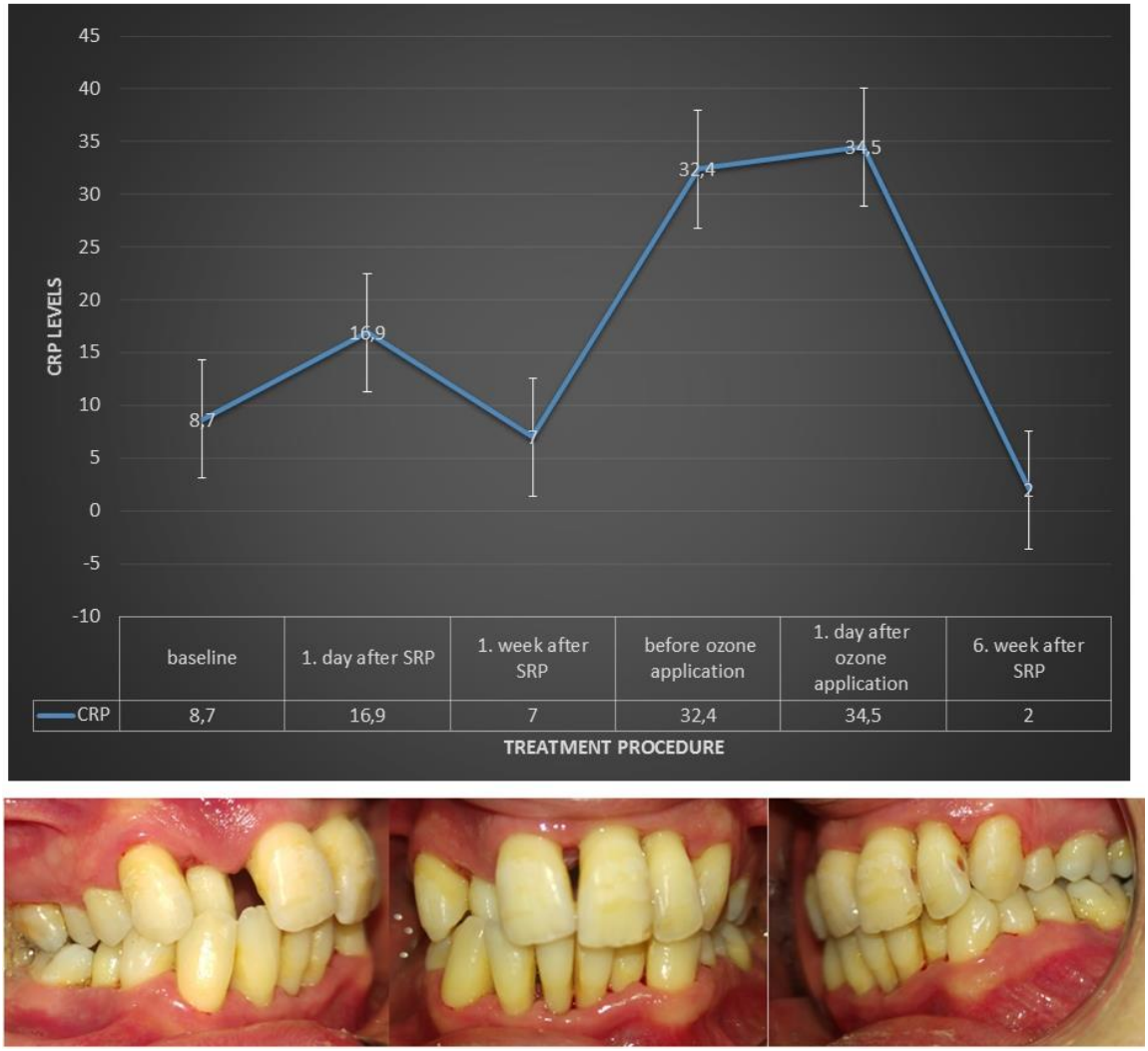

Figure 3. a) C-reactive protein levels in treatment procedure, **b)** Clinical photographs of the case (post-treatment)

Discussion

The treatment of AGP is a real challenge for clinicians. There are no established protocols and guidelines for an effective and complete treatment of the disease (5). The most accepted treatment measures consist of conventional mechanical non-surgical and surgical treatments with diverse adjunctive anti-infective therapies such as antibacterial irrigation agents and antibiotics (19). As Aggregatibacter actinomycetemcomitans could invade gingival tissues and is generally related to AGP lesions, systemic and/or local antibiotics are usually recommended along with conventional treatment. (19).

There are certain disadvantages of chemotherapeutic therapy, which include bacterial resistance, adverse systemic effects of systemic antibiotics, cost of local antibacterial agents and alteration in regular oral microbial components (20). Ozone application that does not cause side effects might help overcome the disadvantages of chemotherapeutic therapy. The use of periodontal ozone treatment as an alternative to standard disinfectants and antiseptics has gained popularity in recent years (11). Seidler et al. demonstrated that ozone improved the periodontal status of patients with gingival and periodontal abscesses. In addition to improving abscesses, ozone improved the gingival health in patients with gingivitis (21). Ozone was also shown to be effective as an irrigation agent compared with chlorhexidine in patients with CP (11).

In the context of AGP, Ramzy et al. reported that ozone significantly decreased the PI, GI, CAL and bacterial counts (10). In the present study, the effect of subgingival irrigation with gaseous ozone on G-AGP was evaluated, and the results showed that ozone

provided a significant improvement in periodontal health by decreasing CAL and reducing PI and GI scores (Fig. 3).

CRP is considered to be an independent predictor of coronary heart disease. Some studies have suggested that CRP levels reflect particular low-grade infections related to chronic diseases such as CHD and periodontitis (22). A CRP level exceeding 10 mg/L is generally regarded as an indicative threshold of significant inflammatory disease (23). A positive association between CRP and periodontitis was also found in an analysis of the third National Health and Nutrition Examination Survey, suggesting a potential mechanism to link periodontitis with an increased risk for atherosclerotic complication (24). In addition, Ebersole et al. showed that CRP levels were significantly higher (9 vs. 2 mg/L, respectively) in patients with moderate to severe CP (25).

Furthermore, periodontitis was shown to increase the levels of acute-phase reactants such as CRP due to the infectious characteristic of the disease (23). Based on this fact, it can be suggested that using antibacterial agents might decrease CRP levels in infectious diseases. Al Habashneh et al. showed that initial periodontal treatment with or without ozonised water irrigation decreased the PI, GI, BoP, CAL and high-sensitivity CRP levels in patients with CP (26). However, we could not observe the precise effects of treatment on the CRP levels in our study; instead, there was a great fluctuation.

Conclusions

Ozone is considered to be an effective antimicrobial agent, and based on the present findings, it can be suggested that ozone might be beneficial in treating diseases such as G-AGP. Within the limitations of this case report, it can be concluded that ozone application provided a significant improvement in clinical parameters, although the CRP levels were not affected. It is difficult to state that ozone application decreased the CRP levels in our patient with G-AGP, and hence, it is necessary to conduct long-term randomised clinical studies to observe the actual effect of ozone application on CRP levels.

Informed Consent: Written informed consent was obtained from the patient who participated in this study.

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