



## CASE REPORT

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# Comprehensive periodontal treatment in generalized stage IV, grade C periodontitis: a clinical case report

Tratamento periodontal abrangente em periodontite generalizada estágio IV, grau C: relato de caso clínico

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## ABSTRACT

Generalized stage IV, grade C periodontitis results in rapid bone destruction in the periodontium and can lead to early tooth loss. Scaling and root planing (SRP) complemented by systemic antibiotics, access surgery, regenerative techniques and implant placement are among the treatments used for patients with this condition. The aim of this article is to report a comprehensive periodontal treatment in a 23-year-old male who was referred to the periodontology department due to complaints of tooth mobility and gum infections diagnosed with generalized stage IV, grade C periodontitis according to the clinical, systemic, and family history features observed. Thorough non-surgical periodontal treatment consisting of scaling and root planing was provided, followed by a series of regenerative periodontal surgeries including guided tissue regeneration (GTR) and guided bone regeneration (GBR) to manage advanced bone defects. Six months after periodontal therapy, all implants were inserted using a one-stage approach and six months later, they were restored with porcelain fused to metal crowns. During the one and two-year follow-ups, the teeth and implants did not show any signs of instability, attachment loss or bone loss. This case report shows that within the limitations of this study a successful outcome can be achieved with an early diagnosis and treatment involving elimination of infectious microorganisms and meticulous long-term maintenance combined with regenerative techniques and implant placement to restore the masticatory function and improve the quality of life for the patient. However further investigation and clinical studies are required to confirm these results.

## KEYWORDS

Stage IV grade C periodontitis; Aggressive periodontitis; Dental implants; Maintenance; Regeneration.

## RESUMO

A periodontite generalizada estágio IV, grau C resulta em rápida destruição óssea do periodonto, podendo levar à perda dentária precoce. Raspagem e aplainamento radicular (SRP) complementada com antibióticos sistêmicos, acessos cirúrgicos, técnicas regenerativas e colocação de implantes estão entre os tratamentos usados para essa condição. O objetivo deste artigo é relatar o tratamento periodontal abrangente de um paciente de 23 anos, que foi encaminhado ao departamento de periodontia com queixas de mobilidade dentária e infecções gengivais, diagnosticado com periodontite generalizada estágio IV, grau C de acordo com as características clínicas, sistêmicas e de histórico familiar observadas. O tratamento periodontal não cirúrgico completo de raspagem e aplainamento radicular foi realizado, seguido por cirurgias periodontais regenerativas, incluindo regeneração tecidual guiada (GTR) e regeneração óssea guiada (GBR) para tratar defeitos ósseos avançados. Seis meses após a terapia periodontal, todos os implantes foram inseridos através de abordagem de estágio único e, seis meses depois, foram restaurados com porcelana fundida às coroas de metal. Durante os acompanhamentos de um e dois anos, os dentes e implantes não mostraram quaisquer sinais de instabilidade, perda de inserção ou perda óssea. Este relato mostra que, dentro das limitações deste estudo, um resultado bem-sucedido pode ser alcançado a partir de diagnóstico precoce e tratamento envolvendo a eliminação de microrganismos e manutenção meticulosa à longo prazo, combinada com técnicas regenerativas e colocação de implantes para restaurar a função mastigatória e melhorar a qualidade de vida do paciente. No entanto, mais investigações e estudos clínicos são necessários para confirmar esses resultados.

## PALAVRAS-CHAVE

Periodontite Agressiva; Implantes Dentários; Manutenção; Periodontite; Regeneração.

## INTRODUCTION

Aggressive periodontitis used to be defined as a specific type of periodontitis with rapid attachment loss and bone destruction inconsistent with the amount of microbial deposits present in an otherwise healthy individual with familial aggregation pattern [1], but according to the new (2018) classification system developed jointly by the American Academy of Periodontology (AAP) and the European Federation of Periodontology (EFP) there is currently insufficient evidence to consider aggressive and chronic periodontitis as two pathophysiologically distinct diseases [2].

However according to the article by Fine et al.[3] there are some features that are unique to aggressive periodontitis. For example it has been reported that polymorphonuclears and macrophages show a level of hyperactivity, antibody responsiveness can be elevated either at a peripheral or local level, specific subpopulations of bacteria are prevalent in specific populations and a particularly thin biofilm composed of Gram negative bacteria have been reported on root surfaces of these patients but it is premature to point to pathophysiologic differences between these two entities until these data are ascertained in larger, more diverse, better-defined and controlled populations.

The new classification system defines periodontitis based on a staging and grading framework. While stages I to IV are defined based on the severity and complexity of management, grades A to C evidence the disease progression rate in three categories: slow, moderate, and rapid. Depending on disease distribution and extent, periodontitis can be categorized into a localized (< 30% of teeth involved), generalized or molar/incisor pattern [4].

The worst periodontal condition is evident in patients with generalized stage III–IV, grade C periodontitis. In these situations, significantly rapid progressive damage to the attachment apparatus, which can lead (especially in stage IV) to tooth loss and occlusion impairment, is observed [4].

Based on the new classification, our patient is diagnosed with generalized stage IV, grade C periodontitis. Stage IV periodontitis is defined by interdental attachment loss at site of greatest loss being 5 mm or more; extending to middle or apical third of the root and tooth loss due to periodontitis involving 5 teeth or more and grade C periodontitis is defined by rapid rate of progression (more than 2 mm of attachment loss over 5 years or more than 1% bone loss/age) and destruction exceeding expectation, given biofilm deposits [2].

A vast array of treatment modalities is available which can be employed in the treatment of generalized stage IV, grade C periodontitis with varying success rates, but a definite guideline for the management is yet to be formulated [5].

The initial phase of periodontal treatment consists of scaling and root planing (SRP) complemented with systemic antibiotics which has been shown to provide an additional clinical effect that is beneficial to the patient compared with SRP alone. Among the antibiotic treatments described, metronidazole and metronidazole with amoxicillin provided the most beneficial outcomes [6-8].

For these patients, surgery may be indicated to cease disease progression and regenerate lost tissues. Both access surgery and regenerative techniques have shown good results in these patients [9].

Implant therapy in partially edentulous patients has proven to be a predictable procedure with high implant survival rate. Even though the short-term implant prognosis for patients with aggressive periodontitis is acceptable, the long-term prognosis is still unclear [5, 10-12].

Many clinicians recommend regular assessments of periodontal parameters during and after treatment to determine treatment needs and to prevent the recurrence and progression of periodontal disease [13,14].

Some previous case reports showed that by elimination of infectious microorganisms and meticulous long term maintenance, an implant-

supported prosthesis can be a definitive and viable treatment option where esthetics and functional aspects have to be catered for the patient. If necessary, considering an advanced periodontal treatment plan can exclude the option of tooth extraction or prosthetic replacement for the patient [15-17].

This paper presents a case report describing the periodontal and implant rehabilitation of a patient with generalized stage IV, grade C periodontitis.

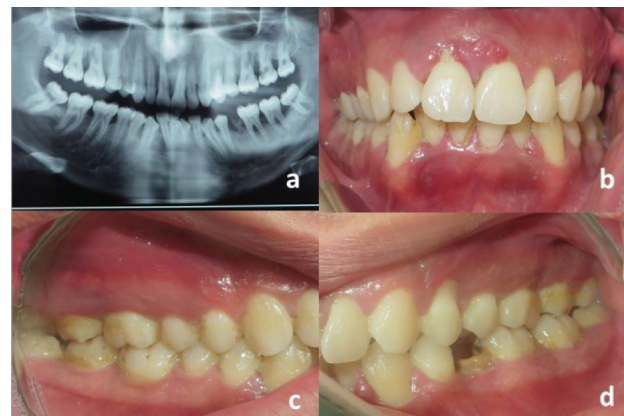
## CASE REPORT

A 23-year-old male was referred to the periodontology department complaining of tooth mobility and gum infections. The patient was otherwise healthy without any relevant medical history. A family history of similar complaints and early tooth loss was reported by the patient in his parents.

Blood tests including complete blood count (CBC), fasting blood sugar (FBS), haemoglobin A1C or glycated haemoglobin test (HbA1C), 2-Hour Post-Prandial Blood Glucose Test (2hpp) and casual non fasting blood glucose test were assessed and the results were within the normal ranges. Extra oral examination did not show any abnormalities. The O'Leary Plaque index [18] was 85% revealing poor oral hygiene status and more than 70% of the sites showed bleeding on probing (BOP). The patient had periodontal treatment history consisting of scaling and root planning performed two years earlier.

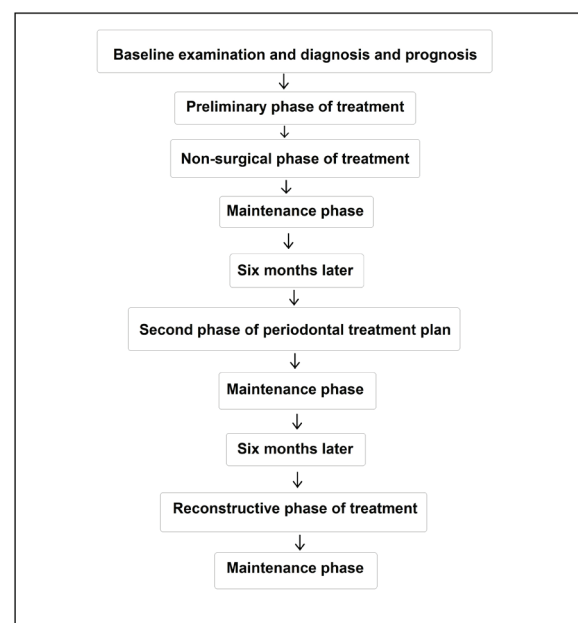
There was congenital missing of tooth # 20 (in universal numbering) and a carious deciduous second molar was observed in this site. The Gingiva had scalloped architecture and contour and was red with edematous consistency. It presented thickened or round margin and generalized positive BOP (Figure 1). Suppuration test was positive in teeth # 3, 8, 12, 14, 18 and 19. The patient presented grade I mobility in teeth # 3, 8, 14 and grade II mobility in teeth # 18 and 19 according to the Miller's classification [19] and based on Glickman's classification [20] furcation involvement was as follows: grade I in

buccal and lingual furcation of teeth #18 and 19 and mesial furcation of teeth # 2 and 15, grade II in all three furcations of teeth # 3 and 14, grade III in buccal and lingual furcations of teeth # 18 and 19 and periodontal pockets were observed around all teeth.



**Figure 1** - Clinical and radiographic presentation prior to treatment, a: Panoramic view, b: Frontal view, c: Right side, d: Left side.

According to these clinical features, the patient's systemic health and the family history, the definite diagnosis was generalized stage IV, grade C periodontitis. Therefore, the provisional overall prognosis was questionable (Figure 2).



**Figure 2** - Diagram showing the study layout.

### Preliminary phase of treatment

During the preliminary phase of treatment, the lower left carious deciduous second molar was extracted.

### Non-surgical phase of the treatment

In the non-surgical phase of the treatment, the patient showed motivation for achieving better plaque control. Modified Bass technique [21] was demonstrated to the patient who was also educated about the use of interdental brushes. Supra and subgingival scaling and root planing was performed. Immediately after SRP, systemic antibiotics were prescribed for a 10-day period (500 mg amoxicillin and 250 mg metronidazole every 8 hours). Four weeks later, in the recall visit, most sites showed reduction in probing depths, however many periodontal pockets were still present. The situation was assessed at the clinic every 3-4 weeks and when needed scaling and root planning was performed. Oral hygiene instructions were repeated for the patient and improvement in oral hygiene was observed in the following 6 months.

### Maintenance phase

After phase one of the treatment, the maintenance phase began during which O'Leary Plaque index had decreased to 20% and only 15% BOP was recorded.

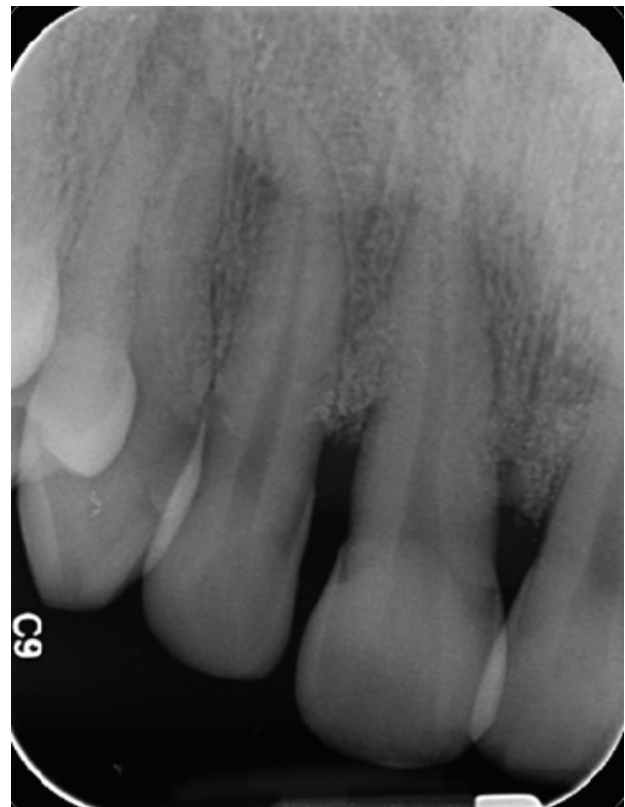
### Second phase of treatment (periodontal treatment plan)

Six months later, in the second phase of treatment, the periodontal therapy for different sextants was performed as described below:

In the upper right sextant, tooth # 3 was extracted and simultaneously, GBR was performed by using bovine bone substitute (Compact Bone B. ®, Dentegris International GmbH, Germany) and resorbable collagen membrane (SIC b-mem ®, invent Deutschland GmbH, Germany). Finally, the flap was sutured in a tension free manner using internal mattress

and single loop suture techniques. Tooth # 1 was also extracted.

In the upper anterior sextant, GTR was carried out for the intra bony defects around teeth # 7 and 8 with Enamel matrix derivatives (Emdogain®, Straumann, Switzerland), bovine bone substitute and resorbable collagen membrane. Simplified papilla preservation flap technique was used due to esthetic considerations in this site and an interdental space width  $\leq 2$  mm [22]. Then the area was sutured free of any tension with internal mattress and single loop suture techniques. One year later, clinical examination demonstrated pocket elimination in this site and significant bone fill was observed in the periapical radiographs obtained from the site using long cone paralleling technique with a film holder (XCP instruments, Rinn Corporation Elgin, Elgin, IL, USA)(Figure 3).



**Figure 3** - Periapical radiograph of the upper anterior sextant, One year after guided tissue regeneration (GTR).

In the upper left sextant, teeth # 12 and 14 were extracted and at same time, GBR by bovine bone substitute and resorbable collagen membrane was performed. Tension-free suturing was accomplished by using internal mattress and single loop suturing techniques. Two months before implant placement in this site, free gingival autograft obtained from the palatal tissue was used to increase the width and thickness of the keratinized tissue.

During the surgical phase of treatment, teeth # 32, 18 and 19 were extracted due to their hopeless prognosis and tooth # 15 received root canal therapy.

Following this phase, almost all periodontal pockets were eliminated. Then, roll brushing technique was demonstrated to the patient and he was reeducated about the use of interdental brushes.

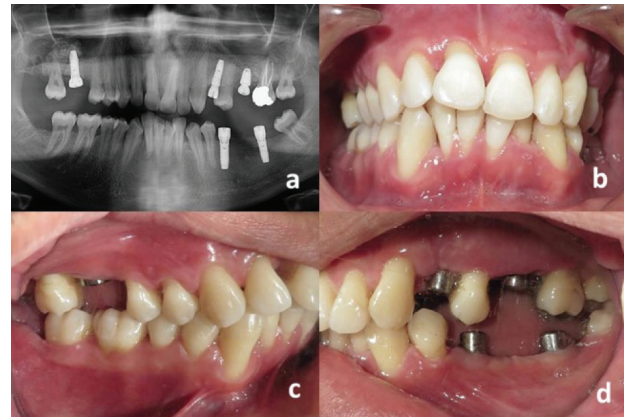
#### Second phase of treatment (implant treatment plan)

Six months after periodontal therapy, implant treatment was planned. The treatment plan for implant placement consisted of the following:

In the position of tooth # 3, due to the height of the remaining bone (5 mm), lateral sinus graft technique using bovine bone substitute and resorbable collagen membrane and simultaneous implant (Dentium, USA, Simple Line) placement was scheduled.

In the position of tooth # 14, considering the 7 mm height of the remaining bone, a trans-alveolar approach for sinus graft was performed simultaneously with the placement of an implant (Dentium, USA, Super Line) without using any bone replacement grafts.

In the position of tooth # 12, one implant (Dentium, USA, Super Line) was placed with its healing abutment and in the position of teeth # 18 and 20, two implants (Dentium, USA, Simple Line) were placed with their healing abutments (Figure 4).



**Figure 4** - Clinical and radiographic presentation after implant placement, a: Panoramic view, b: Frontal view, c: Right side, d: Left side.

#### Reconstructive phase of treatment

In the reconstructive phase of treatment, six months after implant insertion, all implants were restored with porcelain fused to metal crowns.

After the healing period, all periodontal pockets were eliminated and during the one and two-year follow-ups, the teeth and implants did not show any signs of instability, attachment loss or bone loss.

For the maintenance phase, follow-up sessions were scheduled every 1-2 months for the first year, and then every 3-4 months during the following years. In the recall visits, all BOP positive sites and all pockets with probing pocket depths (PPD) exceeding 4 mm were scaled and root planed.

#### DISCUSSION

This article presented periodontal treatment of a challenging case of generalized stage IV, grade C periodontitis via the elimination of periodontal infection, periodontal regeneration and implant placement.

Early diagnosis is paramount to successful management of this condition [5]. In other words, when treatment is delayed for any given reason, the consequences can lead to tooth loss

and complicate implant/prosthetic rehabilitation to restore function and esthetics [23].

In this case, the patient was referred when he was 23 years old and different sites had various severities (Moderate (3-4 mm) to severe (> 5 mm)) of attachment loss and bone loss.

Socket grafting can reduce dimensional changes after tooth extraction [24] thus providing a respite to place the dental implant in a more prosthetic driven position.

Concerning the extraction of teeth # 18 and 19, no surgical interventions such as socket preservation were required since the width and distance between the alveolar crest and the superior border of the inferior alveolar nerve canal were sufficient to place dental implants with acceptable length and primary stability so we decided to place dental implants six months after extraction.

Ramesh et al. [15], described the comprehensive rehabilitation of patients with generalized aggressive periodontitis using dental implants with the immediate placement protocol in the maxillary and mandibular anterior regions but we used early or late implant placement protocols depending on the region (posterior versus anterior). Early implant placement reduces total treatment time and enables the patient to receive the final restoration earlier but in the posterior region, reducing treatment time is not as necessary as the anterior sextant because of being a non-esthetic zone. Therefore by using the late implant placement protocol, sufficient time can be provided for healing before implant placement.

In our case, all implants were inserted using a one-stage approach reducing the number of surgeries and providing better esthetic and function for the implants. This approach also allows for simultaneous healing of both soft and hard tissues [25,26].

However in the study by Ramesh et al. [15], a two-stage approach was used in the anterior sextant to allow for temporary restoration during healing time before the delivery of the final restoration providing esthetic for the patient during treatment.

Kamil et al., reported successful outcome in a challenging case involving the aesthetic zone of a patient with aggressive periodontitis. A thorough non-surgical periodontal treatment (SRP) was provided, followed by a series of regenerative periodontal surgeries to manage advanced bone defects. A fixed retainer using twisted wire (177.8 mm; 3M Unitek, Loughborough, UK) was constructed palatally to splint the anterior teeth and stabilize the wound healing, however there are two main differences between our GTR strategy and the one presented by Kamil et al. [16]. In our case, due to minute tooth mobility (# 7 and 8), no splint was needed after GTR in the upper anterior sextant. Also, in our patient, less number of residual bony walls (one-wall or two-wall defects versus three-wall defects) were present around teeth, hence Enamel matrix derivative was used in addition to bovine bone substitute and resorbable collagen membrane for better periodontal regeneration. Both studies showed significant bone fill using periapical radiographs in the defects during follow up.

## CONCLUSION

This case report shows that within the limitations of this study a successful outcome can be achieved with an early diagnosis and treatment involving elimination of infectious microorganisms and meticulous long-term maintenance combined with regenerative techniques and implant placement to restore the masticatory function and improve the quality of life for the patient. However further investigation and clinical studies are required to confirm these results.

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