

Various Treatment Modalities in Aggressive Periodontitis

Abstract

This is a case report of an 18-year-old female diagnosed with localized aggressive periodontitis. Following basic scaling and root planing, flap surgery was performed in all the four quadrants using various regenerative materials. A follow-up of 2½ years shows improvement in clinical and radiographic parameters, with no recurrence of the disease process.

Keywords: *Aggressive periodontitis, azithromycin gel, citric acid-nano hydroxyapatite composite graft, perioglas, regeneration*

Introduction

Aggressive periodontitis comprises a group of rare, often severe, rapidly progressive forms of periodontitis, often characterized by an early age of clinical manifestation and a distinctive tendency for cases to aggregate in families.^[1] The age of onset, rapid rate of disease progression, nature and composition of subgingival microflora, alteration of host immune response, and familial aggregation can distinguish it from chronic periodontitis.^[2] It can be classified into (a) localized aggressive periodontitis and (b) generalized aggressive periodontitis.^[3]

Localized aggressive periodontitis shows a circumpubertal onset, involving the molar/incisor with interproximal attachment loss on at least two permanent teeth (one of which is the first molar) and involving no more than two teeth other than first molars and incisors, along with a robust serum antibody response to the infecting agents.^[4]

Generalized aggressive periodontitis mostly affects people under 30 years of age, but older age group might also be affected causing generalized interproximal attachment loss affecting at least three permanent teeth other than first molars and incisors with pronounced episodic nature of the destruction of attachment and alveolar bone and poor serum antibody response to infecting agents.^[4]

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Early detection is critically important in the treatment of aggressive periodontitis.^[2] Treatment options for teeth with deep periodontal pockets and bone loss may be nonsurgical or surgical. Nonsurgical periodontal therapy alone, although effective in the treatment of chronic periodontitis, seems less effective in patients with aggressive periodontitis.^[5] Over the years, various studies have demonstrated the efficacy of antibiotics, such as tetracycline, amoxicillin, metronidazole, and combinations of these, used systemically as adjuncts to scaling and root planing as well as local drug delivery systems.^[6] Surgery may be purely resective, regenerative, or a combination of these approaches.^[2]

This case report explores various treatment modalities in an aggressive periodontitis case.

Case Report

An 18-year-old female presented to the outpatient department with a chief complaint of pain in the lower left back tooth region. She gave a past history of pain 6 months ago with recurrent swelling at the lower left back tooth region. On the day of examination, there was moderate, intermittent pain in the same region, which was sudden in onset. No aggravating or relieving factors were present.

Clinical examination showed fair plaque and oral hygiene scores, mild gingivitis, and 0.10% bleeding score. Deep periodontal pockets in relation to first molars of all

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quadrants and furcation involvement with the same tooth of second, third, and fourth quadrants were noted.

Radiographic examination revealed the presence of arc-shaped bone defect in the first molar region of all quadrants extending from the distal of second premolar to mesial of second molar.

Based on the above clinical and radiographic findings, the case was provisionally diagnosed as localized aggressive periodontitis.

The treatment carried out was as follows: initially, nonsurgical Phase I therapy comprising of scaling and root planing along with oral antimicrobial therapy (doxycycline 100 mg, two tablets stat on 1st day; once daily for the next 13 days) was carried out.

For teeth exhibiting very deep intrabony defects, vitality test was performed using an electric pulp tester. In this case, premolars and molars of third and fourth quadrants were found to be vital and, hence, no endodontic treatment was performed, and periodontal flap surgery was carried on.

For the first quadrant, conventional flap was raised from mesial of first premolar to distal of first molar, debridement was done, and a bony ledge was noted on the buccal aspect. After osteoplasty, flap was adapted and sutured using interrupted sutures [Figure 1a-c].

In the second quadrant, after flap reflection and meticulous debridement, Grade II furcation involvement was noted in relation to the first molar. A mixture of azithromycin gel (0.5%) and perioglas bone graft (Nova Bone Products, LLC, USA) was placed in the defect, and the flap was sutured back [Figure 2a-c].

In the third quadrant, conventional flap was raised from mesial of first molar to distal of second molar, and debridement was done. Arc-shaped bone loss was noted in premolar and molar regions (three-wall defect). Perioglas was placed in the defect, and interrupted sutures were placed [Figure 3a-c].

For the fourth quadrant, three-wall defect was noted in relation to first molar (distally) after flap reflection and debridement. A mixture of azithromycin gel and perioglas was placed in the defect, and flap was sutured [Figure 4a-c].

After 1 year follow-up, there was no recurrence of the disease process anywhere else except in relation to first molar in second quadrant, where there was a persistent sinus opening. The patient complained of recurrent swelling in the same area which subsided after taking antibiotics and recurred again periodically. Hence, resurgery was planned for this area.

In this area, conventional flap was raised, and after debridement, Grade II furcation defect was noted in relation to first molar (buccal aspect). Citric acid-hydroxyapatite composite bone graft along with

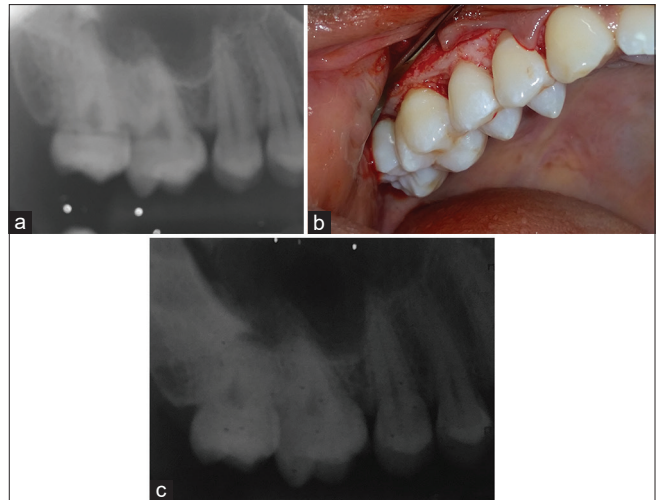


Figure 1: (a) Baseline, (b) Visualization of defect, (c) Follow-up-2.5 years

periocol Guided Tissue Regeneration membrane (GTR) was placed on the buccal aspect. Flaps were approximated using interrupted sutures. Oral antimicrobial therapy with doxycycline 100 mg, two tablets stat on 1st day; once daily for the next 13 days, was administered [Figure 2d-f].

The patient has been kept on frequent follow-ups for 2½ years. There has been significant reduction in overall probing depth with no recurrence of periodontal destruction in any of the areas.

Discussion

Conventional therapy for aggressive periodontitis consists of patient education, oral hygiene improvement, scaling and root planing, periodontal flap surgery, and frequent recall maintenance. One of the major factors affecting the treatment outcome is early diagnosis of the disease – the earlier the disease is diagnosed, more conservative the therapy and the more predictable is the outcome.^[2] However, the success rate of conventional therapy alone has been limited and unpredictable. Hence, there is a continuous quest for new treatment options which might change the prognosis of the disease.

This is a case report of a localized aggressive periodontitis case, where various treatment options were carried out. For the first and third quadrants, flap surgery was carried out, which was followed by prescription of oral antibiotics (azithromycin – once daily for 3 days), whereas for the second and fourth quadrants, a composite graft consisting of indigenously prepared azithromycin gel and perioglas was placed during flap surgery, and no oral antibiotics were prescribed. After 1 year of follow-up, recurrence of the disease was noted in the second quadrant which was treated with composite graft. Resurgery was carried out, and a newer composite graft consisting of citric acid and hydroxyapatite was placed at the defect site.

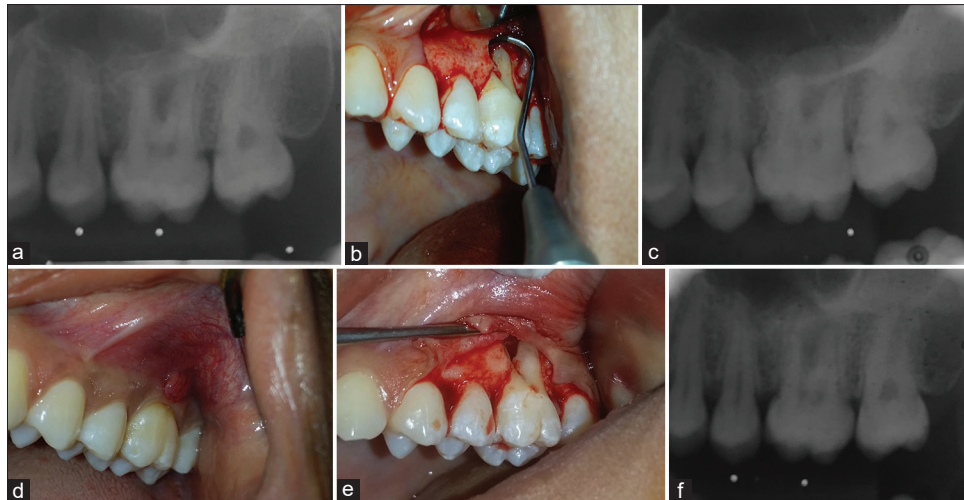


Figure 2: (a) Baseline, (b) Visualization of defect, (c) Follow-up-1.5 years, (d) Clinical appearance at 1.5 years, (e) Visualization of defect at resurgery, (f) Follow-up-2.5 years

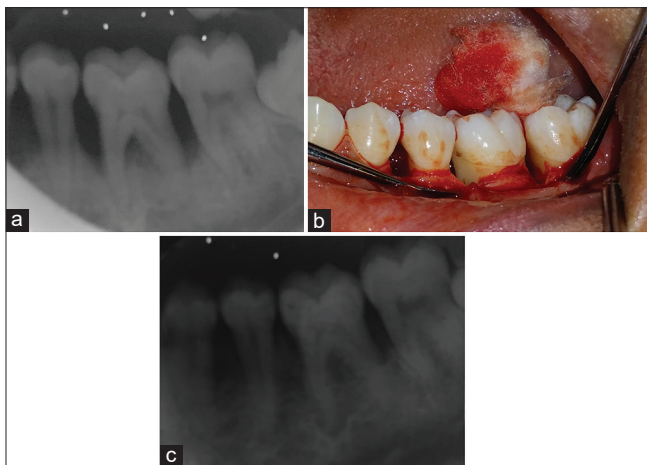


Figure 3: (a) Baseline, (b) Visualization of defect, (c) Follow-up-2.5 years



Figure 4: (a) Baseline, (b) Visualization of defect, (c) Follow-up-2.5 years

One of the major concerns while treating aggressive periodontitis is achieving a microorganism-free defect site, which can be achieved by adjunctive use of antibiotics.

However, the use of oral antibiotics is not free from side effects, which can include gastrointestinal disorders and even antibiotic resistance.^[7]

In order to avoid such conditions, oral antibiotics has been used alternatively with antibiotic (azithromycin) gel that has been mixed with bone graft and placed directly at the defect site during flap surgery. This is based on the concept of local drug delivery, which was pioneered by Goodson *et al.*, with the aim of achieving a high concentration of an antibiotic directly at the site of periodontal infection to inhibit the target pathogens, with minimal side effects and lesser reliance on patient's compliance for taking medication.^[8]

Azithromycin has enhanced macrolide potency and a wide antimicrobial spectrum with *in vitro* activity against aerobic and anaerobic Gram-negative microorganisms. *In vitro* studies have demonstrated its efficacy against *Aggregatibacter actinomycetemcomitans* and *Porphyromonas gingivalis*.^[9] The gel serves as a vehicle to retain the azithromycin and perioglas at the defect site by preventing its scatter and also releases the drug in a sustained manner, preventing recolonization of the site.

Inspite of local and systemic antimicrobial therapy, there was recurrence of the disease in the second quadrant. This can be considered as a period of exacerbation, which is a characteristic feature of this disease.^[2] This was treated by a resurgery with the placement of indigenously prepared citric acid-hydroxyapatite composite graft and periocol GTR. Citric acid is known to enhance new bone formation. Tran *et al.* developed a mechanically strong and biocompatible citrate-based polymer blends, which showed successful regeneration in rat calvarias.^[10] Similarly, Sun *et al.* showed regeneration in rat calvarias using citric acid-based hydroxyapatite composite scaffold with two different polymers.^[11] Studies by Hu *et al.* and Davies *et al.* have shown that citrate molecules are strongly studied to

the apatite nanocrystal surface and form bridges between mineral platelets regulating bone mineral crystallinity, which adds to the overall strength of bone.^[12,13] It, however, does not have any antimicrobial effect of its own, thus, requiring adjunctive use of oral antimicrobials. An *in vivo* study by Dayashankar CP *et al.* showed significant improvement in clinical and radiographic parameters in the treatment of periodontal intrabony defects using indigenously prepared citric acid-nano hydroxyapatite composite graft in chronic periodontitis patients.^[14]

Citric acid-nano hydroxyapatite composite graft was indigenously prepared at the polymer science department in the engineering college of our university. Poly (1,8-octanediol-co-citric acid) (POC) was prepared by mixing equimolar amounts of citric acid and 1,8-octanediol and melting it under a flow of nitrogen gas by stirring at 160°C–165°C, followed by stirring at 140°C. The POC prepolymer was mixed with various amounts of nano-hydroxyapatite (N-HA) particles to obtain composites of 65 wt.% N-HA by weight. This POC–N-HA mixture was stirred to form a uniform mass and then gamma sterilized at 25–27 KGy.

Azithromycin gel was prepared at the pharmaceuticals department in the pharmacy college of our university. A weighed amount of pluronic F-127 was gradually added to cold water under magnetic stirring up to a final concentration of 22% and 24% (w/v) and refrigerated overnight at 5°C. Azithromycin dihydrate was dissolved in 0.1 N HCl and then added to preformed gel. After pH adjustment and addition of benzalkonium chloride as preservative, the gel was packed in glass vials and gamma sterilized at a dose of 2 kGy for 20 min.

The resolution of infection was assessed clinically with decreasing pocket depth and radiographically by increase in radiodensity at the defect site. However, the true nature of regeneration can be revealed only by histological analysis which is not possible due to ethical reasons or using three-dimensional radiographs, which has not been taken for this case.

Conclusion

Aggressive periodontitis shows periods of exacerbation and regression. It requires complex integrated therapeutic approach consisting of both nonsurgical and surgical therapies. Hence, in this case, we have utilized various therapeutic modalities combined with systemic and/or local antimicrobial application, with successful outcomes over a period of 2½ years.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and

other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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