

Flap surgery With Platelet-Rich Plasma and Bioactive Glass-A New Ray of Hope in Aggressive Periodontitis Treatment

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Abstract

Localized aggressive periodontitis is a distinct entity of periodontal disease and is characterized by deep vertical bony defects that typically affect the first molars and incisors of young patients. In the past, a variety of treatment strategies have been suggested and tried with some degree of success in treating aggressive periodontitis. Platelet-rich plasma and bone grafts when used individually have reported fairly good results in terms of periodontal regeneration. Also there is currently great interest concerning the use of platelet-rich plasma (PRP) in combination with bone grafts for predictably obtaining periodontal regeneration. We hereby present a case of localized aggressive periodontitis in a 27 year old female. Clinical and radiographic findings are discussed and treatment plan along with 9 months follow-up is also reported. In this case report, we suggest treatment of localized aggressive periodontitis defect with a combination of growth factor (Platelet rich plasma) and bone graft (Perioglass) which resulted in almost 60-70% bone gain post-surgically.

Therefore, in cases of localized aggressive periodontitis, treatment option of a combination of Platelet rich plasma (PRP-a well known source of growth factors) and bone grafts holds promise and can be considered.

Key words

PRP, Pocket Depth, Bone graft, Perioglass

INTRODUCTION

Periodontal diseases are inflammatory diseases with differing levels of periodontal attachment loss and bone destruction. One of the objectives of periodontal therapy is the morphological and functional regeneration of lost periodontal supporting tissues. Periodontal regeneration requires a sequence of biological events including cell adhesion, migration, proliferation and differentiation [1].

Localized aggressive periodontitis is a distinct entity of periodontal disease and is characterized by deep vertical bony defects that typically affect the first molars and incisors of young patients. Aggressive periodontitis has been defined using the following criteria: 1) age of onset, 2) distribution of lesions, 3) severity of destruction, 4) rate of progression, and 5) response to therapy. A positive family history has also been reported for aggressive periodontitis. Therapy is usually aimed at reducing the pathogenic microflora through scaling and root planing and the administration of systemic antibiotics. However, conservative periodontal therapy may result in reparative wound healing with limited regeneration of the lost tissues. Periodontal surgery combined with platelet-rich plasma and bioactive glass has been introduced as a method to promote regeneration of

the lost periodontium and has been studied extensively in the treatment of chronic periodontitis. This case report describes the treatment of a 27-year-old female patient displaying severe localized aggressive periodontitis with documented disease progression. After initial therapy consisting of scaling and root planing and systemic administration of tetracycline, the vertical defects were treated by access flap combined with application of platelet-rich plasma and bioactive glass. Clinical and radiographic findings are reported for up to 9 months after initial therapy, indicating good efficacy of the therapeutic strategy and stability of the treatment outcome.

CASE-HISTORY:

An apparently healthy 27 yr old female patient reported to the Department of Periodontics, D.A.P.M R.V.Dental College-Bangalore with the chief complaint of food lodgement in the upper right back tooth region since 2 years. Occasionally, bleeding occurred while brushing teeth. Patient also gave a family history of her mother losing all her teeth at an early age due to mobility of teeth.

On clinical examination, the oral hygiene status of the patient was found to be good with moderate

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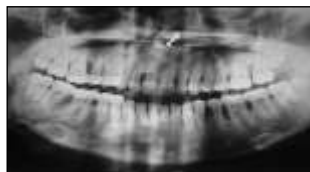
gingivitis (figure 1). Periodontal examination revealed periodontal



pockets in multiple areas with deep pockets (ranging 6-9mm) in first molars (figure 2) in all quadrants and upper central incisors.



Investigations carried out were (i) Routine haematological investigations which were found to be within the normal ranges. (ii) Radiographs- full mouth Intra-oral periapical radiographs and Orthopantomograph(OPG). OPG showed vertical bony defects in 16, 26, 34, 35, 36, 46, and 47 tooth region (figure 3).



(iii) Vitality test was done for 16 tooth which was found to be vital.

Based on the history, clinical and radiographic examinations, and the criteria given by Tonetti and Mombelli et al., a diagnosis of Localized aggressive periodontitis was reached upon.

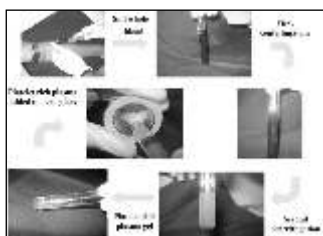
The treatment plan consisted of-

- I. Scaling and root planing.
- ii. Systemic administration of tetracycline hydrochloride 250mg four times daily for 14 days.
- iii. Patient was recalled 6 weeks after phase-I therapy and at re-evaluation, probing pocket depth was found to be deepest in 16 tooth region with measurement of 7mm. Thereby surgical intervention was deemed necessary and open flap debridement with regeneration using a combination of Platelet rich plasma (PRP) and Bone graft (BG)-Perioglass was planned in relation to 16 tooth region.

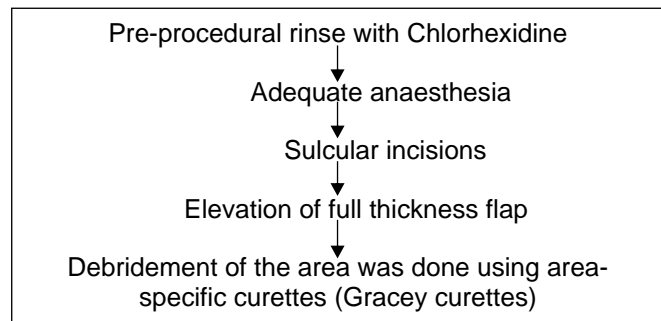
Surgical Procedure consisted of the following steps:

- a) Preparation of PRP
- b) Open flap debridement and
- c) Placement of PRP mixed with Perioglass.

Step-1: Preparation of PRP [8]. (Figure 4)



1. Briefly, 8 ml of blood was drawn by venipuncture of the antecubital vein. Blood was collected in a sterile tube containing an anticoagulant to avoid platelet activation and degranulation.
2. The first centrifugation is called “soft spin”, which allows blood separation into three layers, namely bottom-most RBC layer (55% of total volume), topmost acellular plasma layer called PPP (40% of total volume), and an intermediate PRP layer (5% of total volume) called the “buffy coat”.
3. Using a sterile syringe, the operator transferred PPP, PRP and some RBCs into another tube without an anticoagulant.
4. This tube underwent a second centrifugation, which was longer and faster than the first, called “hard spin”. This allows the platelets (PRP) to settle at the bottom of the tube with a very few RBCs, which explains the red tinge of the final PRP preparation. The acellular plasma, PPP (80% of the volume), is found at the top.
5. Most of the PPP is removed with a syringe and discarded, and the remaining PRP is shaken well and is ready for use.



6. This PRP is then mixed with Perioglass.

On exposure, a combination defect was found in relation to 16 tooth with 3walled defect apically and 2walled defect coronally (figure 5).



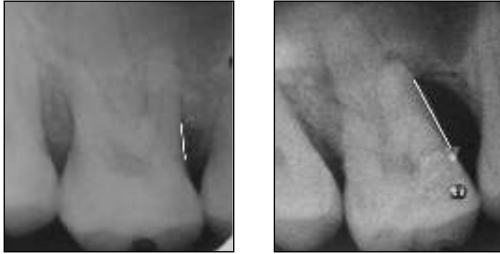
Step-3: PRP was mixed with perioglass and placed in the bony defect (figure 6).



Following placement of the PRP and Perioglass combination, the defect was closed with interrupted sutures and a periodontal dressing

was placed.

Following the surgery, patient was recalled once a month for 9 months. At 9 months recall visit, the probing pocket depth was reduced to 3 mm from a pre-operative measurement of 7 mm in the operated area. (figure 7, 8). Radiographically a defect fill of approximately 60-70% was achieved.



DISCUSSION

The use of polypeptide growth factors (PGFs) to regulate biological events affecting surgical outcome has recently attracted the attention of researchers [1, 2, 3]. Among all PGFs, platelet derived growth factor (PDGF) and transforming growth factor (TGF- β) have been studied most extensively. PDGF and TGF- β have been shown to promote cell growth, differentiation and periodontal regeneration [2, 3, 4]. Platelet derived growth factor (PDGF) and TGF- β are abundant in the alpha granules of platelets [5] and platelets are involved in the wound-healing process and represent a natural source of PGFs [3]. A convenient approach to obtain autologous PDGF and TGF- β is the use of platelet-rich plasma (PRP) that can be easily prepared from patient's own blood by centrifugation [6, 7]. It can be rationalized that by increasing local concentrations of PGFs with the application of PRP, the periodontal healing outcome would be enhanced.

The addition of PRP to bone grafts or guided tissue regeneration (GTR) has been shown to significantly enhance gain in clinical attachment when compared to the control groups of bone grafts, GTR or open flap debridement alone in intra-bony periodontal defects [9–14]. Only in one study including GTR in the control group, the clinical results failed to demonstrate the superiority of the combined approach with PRP. However, the authors found positive effects on the soft and hard tissue healing [15].

Despite the fact that pre-clinical and initial clinical data appear promising, it is not possible to draw definitive conclusions at this time. In this process, trials evaluating the efficacy of PRP in combination with different regenerative materials can still add valuable information for the clinician in decision making regarding effective and predictable treatment alternatives for periodontal regeneration especially in aggressive periodontitis patients which are difficult to manage clinically because of the destructive and progressive disease character seen in young individuals.

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