Clinical & Radiographic Evaluation of Applying Atorvastatin 1.2% Bio Adhesive with Plasma Rich in Growth Factor (PRGF) for Treatment of Mandibular Class II Furcation Defects: Randomized Clinical Trial

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KEY WORDS  
Furcation involvement;  
Plasma rich in growth factors;  
Atorvastatin 1.2%;

ABSTRACT  
Statement of the Problem: Molar teeth with furcation involvement are one of the most common problems in patients with periodontal disease. Regeneration methods are of the most controversial treatment strategies for these lesions. The purpose of this study was to determine the effect of plasma rich in growth factors (PRGF) with 1.2% Atorvastatin (ATV) in the treatment of furcation involvement of mandibular molars.

Materials and Method: The present randomized clinical trial was conducted on 15 patients with moderate periodontitis and class II furcation involvements; 24 defects were located in four groups of six, including debridement, ATV1.2%, PRGF, PRGF & ATV1.2%. The parameters of vertical probing depth (VPD), vertical clinical attachment level (VCAL), gingival index (GI), horizontal probing depth (HPD) and gingival recession (GR) were measured at the baseline (T0), immediately before surgery (T1), 3 (T2) and 6 (T3) months after surgery. Moreover, the bone conditions were evaluated by digital subtraction radiography before and six months after surgery. Data were analyzed by SPSS23 software.

Results: No significant difference in radiographic parameters was observed between the groups (p= 0.08). There was no significant difference in the mean levels of VPD, VCAL and HPD between the groups at different times (p<0.05). Comparison of clinical parameters of VPD, VCAL and GI in the treatment groups compared to the baseline showed a significant improvement in each group (p< 0.05) but there was no significant difference between different groups (p< 0.05).

Conclusion: The use of PRGF with ATV 1.2% in grade II furcation involvement in mandibular molars was effective in the improvement of clinical and radiographic parameters six months after treatment, but this effect revealed no difference in comparison with the other groups.

Introduction  
Periodontal disease is a multifactorial condition that causes pocket formation, clinical attachment loss and bone resorption. Furcation involvement is the destruction of periodontal tissue in the interradicular area of bone in multirooted teeth that occurs due to plaque-associated periodontal diseases [1-3]. Some of the features of furcation defects clinically include attachment loss in both vertical direction along the root and horizontal direction to the interior of the furcation area [4].
Due to the complex morphology of the area, the furcation involvements is considered as one of the most challenging aspects of periodontal treatment, and causes problems in the success of periodontal treatments [5-6].

Although the prognosis of furcation-involved molars has not been reported to be hopeless, the presence of periodontal disease in these areas will significantly increase tooth loss due to limited access to the dentist and patient. The treatment of periodontal lesions in these areas is one of the most difficult problems facing general dentists and periodontists, and so far no completely predictable and ideal treatment has been provided for this condition [7].

In general, the outcome depends on many contributing factors including tooth-related (anatomical) and patient-related factors (i.e.; Diabetes, smoking, stress) [2].

Many therapeutic strategies, including the use of autogenous bone grafts and bone substitute materials [7-11] and growth factors [1, 6, 12-15] have been proposed to promote regeneration of periodontal tissues.

The treatment of periodontal furcation lesions in multi-root teeth is a major challenge in regenerative medicine [6-7, 12, 16]. The goal of periodontal treatment is to regenerate the tissues lost due to periodontal disease. Lesions of the periodontal ligament and surrounding alveolar bone may result from infections of the periodontium or tissue of the dental pulp [17].

A approaches to regenerative periodontal therapy are based on the use of growth factors and bone regeneration materials [7-8, 18-19], guided tissue regeneration [7, 17, 20] and enamel matrix derivatives [20], in grade II furcation involvements. Statins are materials that are being tested for the regeneration therapies [21-22].

Biologically active endogenous proteins offer a new approach to tissue regeneration. In 1999, Anitua [23] described a technique for preparing plasma rich in growth factors (PRGF). This autologous preparation is enriched with biological mediators that accelerate regeneration of both hard and soft tissues. PRGF contains a high concentration of a platelet-derived growth factor, insulin-like growth factor, and fibroblast growth factor and because of the lack of leukocyte has a minimum concentration of pro-inflammatory interleukins [16].

The PRGF is a second-generation system, similar to platelet-rich plasma (PRP), which is used to obtain plasma proteins and platelets and requires less venous blood, is easier, takes less time to prepare, is safe and easy to use, and leads & faster healing [24]. In an article the periodontal pocket improvement is related to increasing gingival epithelial attachment on the root surface through cell differentiation and proliferation. The growth factors released from the PRGF induce some bioprocesses’ such as cell proliferation, migration and differentiation [24].

Mansouri et al. [6] employed bovine porous bone mineral plus PRGF for the treatment of grade II furcation and reported a significant reduction in the relative vertical clinical attachment level, relative horizontal clinical attachment level and gingival index relative to baseline.

Statins are one of the lipid lowering drugs that help in reducing cholesterol levels in body by inhibiting 3-hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase; which is a rate limiting enzyme for cholesterol synthesis. Apart from this, statins also help in promoting angiogenesis and inhibiting metastasis. They increase the production of BMP-2 and thus assist in osteoblastic differentiation. They have anti-inflammatory, immune-modulatory, antioxidant, antithrombotic, and endothelium stabilization actions. Osteoblastic differentiation and anti-inflammatory are those actions of statins which can be used to treat periodontal disease [25-27].

ATV has shown that has favorable effects on alveolar bone loss and tooth mobility and it has also shown improvement in clinical parameters like probing depth reduction and CAL gain when used as an adjunct to SRP in the treatment of class II furcation involvements. Statins are materials that are being tested for the regeneration therapies [21-22].

However, to the best of our knowledge, no study has evaluated the effect of ATV gel combined with PRGF in the treatment of class II furcation lesions. Hence, the current research was conducted to evaluate the effect of combined PRGF and Atorvastatin 1.2% on the treatment of furcation involvement in first and second molars of lower jaw.

Materials and Method
The current study was approved by the ethical committee of university (MUBABOL.REC.1396.25). It is also registered in the WHO clinical trial registry, branch of the Islamic Republic of Iran (IRCT: 20100427003813 N7) and a written informed consent was obtained from
all subjects after providing a complete description of the study interventions.

**Study design and eligibility criteria**
This study was designed as a randomized, double-blind (patient, clinician) clinical trial. Fifteen patients with twenty-four defects referred to the Periodontology Department of Babol University of Medical Sciences and suffered from a moderate chronic periodontitis with buccal or lingual Grade II furcation involvement of the first or second vital mandibular molars and had ≥3mm vertical probing depth (VPD) were included in this study. The sample size was estimated to be 24 using the Altman plot with test power of 80% and the type I error of 0.05.

Exclusion criteria were defined as: (1) any systemic disease, (2) taking drugs interfering with periodontal wound healing (e.g., corticosteroids, immunosuppressive and Anti-inflammatory drugs), (3) smoking, (4) the presence of cavity or filling in furcation area, (5) teeth with anatomical complications such as cervico-enamel projection and/or bifurcation ridges and concavity, (6) Miller’s mobility of Grade II and more in involved teeth, (7) the need for antibiotic prophylaxis prior to surgery, (8) any known allergies to the predetermined materials and any contraindication for surgery, (9) the presence of the periapical lesions in radiography and endodontic treatment, and (10) the unwillingness of the patient to do a periodontal surgery and the possibility of unacceptable patient cooperation after initial periodontal treatment.

**Randomization and blindness**
The lesions were randomly divided and coded into four groups of six, including: 1-PRGF, 2-atorvastatin 1.2% (ATV) (Chemidarou, IRAN), 3-ATV 1.2% bio adhesive & PRGF and 4-control. The clinical variables were measured at the baseline and immediately before surgery, 3 and 6 months after surgery around each tooth by a periodontist who was unaware of the treatment using a Williams probe (HU-Friedy; Chicago; IL; USA). A clinician who performed the surgery was different from who measured the parameters. A maxillofacial radiologist blindly reported the osseous changes.

**Study protocol**
All enrolled patients were approached regarding a written informed consent. Oral hygiene instruction and scaling and root planning (SRP) was provided to all patients to control bacterial biofilm level preoperatively. Occlusion was corrected (if needed). All surgical procedures were performed by one person as follows: the administration of local anesthesia (Lidocaine 2% with Epinephrine 1:80, 000), intrasulcular incision with mucoperiosteal flap elevation, debridement of granulation tissue, sub gingival SRP, and rinsing with normal saline. The lesions were then randomly assigned to one of four treatment groups. In the control group (group 1), debridement of the lesion was performed alone. In the second group, 1 ml of activated PRGF was applied to the lesion walls and root surfaces. In the third group, the atorvastatin bio adhesive alone was inserted into the furcation lesion. In the fourth group, first the atorvastatin bio adhesive was placed in a container containing PRGF (PRGF had the ability to remain in the lesion due to the suitable consistency of the atorvastatin bio adhesive) to absorb some of it in the bio adhesive, and finally placed inside the lesion. The PRGF was then placed on the lesion site filled with atorvastatin. Next, the flap was return in all four groups coronally, and sutured with silk suture 3-0.

After surgery, the patients were instructed to use 0.12% chlorhexidine mouthwash (Emad pharmaceutical Co.; Isfahan; Iran) twice daily for four weeks. Ibuprofen (400mg, Hakim Pharmaceutical Co.; Tehran; Iran) was administered three times a day for seven days and amoxicillin (500mg, Hakim Pharmaceutical Co.; Tehran; Iran) twice daily for four weeks. Ibuprofen was removed if present and oral hygiene training was re-administered as needed.

**Clinical parameters**
The following parameters were measured in all groups using the Williams probe (HU-Friedy; Chicago; IL; USA). The vertical clinical attachment level (VCAL) (the distance from the cementoenamel junction (CEJ) to the pocket depth), the vertical probing depth (VDP) (the distance from the free gingival margin to the pocket depth) [28], gingival index (GI) (based on Silness and Loe index [29]), recession depth (REC) (distance from the CEJ to the free gingival margin measured in mid-buccal [7]), horizontal probing depth (HPD, horizontal penetration of periodontal probe in furcation area [8]). The VPD, VCAL, GI, HPD, and REC were recorded at
the baseline (T0), at the time of surgery (T1), 3 months after the surgery (T2) and 6 months after the surgery (T3).

**PRGF preparation**

The preparation of PRGF was performed immediately before surgery, according to Anitua [30]. Thus, the blood sample (20 ml) was taken from all patients before surgery, poured into 5-ml test tubes containing an anticoagulant (3.8% sodium citrate), and then centrifuged at 460 rpm for 8 min (PRGF-Endoret System IV Biotechnology Institute, Vitoria, Spain). The resultant was layer 1 consisting of plasma (1ml) containing a small amount of growth factor; layer 2 (PGF layer) with a volume of about twice as much as layer 1 and containing growth factors; layer 3 (PRGF layer) consisting of plasma (0.5ml) containing different growth factors; layer 4 (buffy coat layer) containing white blood cells (0.5 ml); and layer 5 containing red blood cells. A 500-µl pipette was used to take both layers 1 and 2; a 100-µl pipette was used to take the PRGF layer in five small aliquots to avoid mixing with the layer 4. Then, 1 ml of PRGF was added by 50µl of calcium chloride (10%), thereby activating the plasma rich in growth factor.

**Atorvastatin1.2% bio adhesive preparation**

To prepare the biofilm or mucoadhesive patches, 95 cc of distilled water was added to 500cc of Erlenmeyer placed on a warm plate stirrer. Then, the required Carbopol [31] was added to water and heated, after that, the methyl paraben and propyl paraben were solved in 95% of alcohol and all of solutions were added to the beaker, too. Next, the required amount of Glycerin was added to the solution. Finally, 0.5 g of Atorvastatin was added to this base gel per 100 ml of gel to prepare the bio adhesive [32].

**Radiologic assessments**

The first radiograph was taken by a PSP Digital Sensor Size 2 (PCT, Sorex; Helsinki, Finland) with a parallel technique. Bite registration was accomplished by acrylic resin (Duralay, Reliance, Dental, Mfg company, Chicago, USA), which was at first recorded during the radiography to ensure the same occlusion within the next radiography. Hence, the next radiography that was taken six months later was performed by the same kV (kilo voltage), mA (milli Ampere), exposure time, and the same occlusion record. Images were recorded as Digital Imaging and Communications in Medicine (DICOM) se-

### Results

In the present clinical trial, 15 patients were included and 24 sites intervened through open flap debridement / atorvastatin/ PRGF/ atorvastatin and PRGF, including 11 females and four males with a mean age of 42 years ranged from 35 to 46 years. No side effects were observed during and after the operation, such as wound opening and infection.

**Radiologic findings**

Interpretations of radiographs are shown in Table 1. The changes in radiopacity were found in two cases of ATV&PRGF group, and the Chi-square test showed no difference between the study groups (p= 0.08).

**Clinical findings**

Data of patients’ clinical parameters are given in Tables 2, 3 and 4. There was no significant difference in the mean VPD, VCAL and HDI between the studied groups

<table>
<thead>
<tr>
<th>Table 1: Radiographic changes of bone within each treatment group and comparison between groups</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Radiolucency</td>
</tr>
<tr>
<td>No change</td>
</tr>
<tr>
<td>Radio opacity</td>
</tr>
</tbody>
</table>

X2(2)= 6.545, p Value*=0.08

*: Chi square test
Table 2: Vertical probing depth (VPD) changes within each treatment group and comparison between groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>T0</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>p Value***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (n=6)</td>
<td>5.33±0.81</td>
<td>4.33±0.51</td>
<td>4±0.63</td>
<td>3.5±0.54</td>
<td>0.001</td>
</tr>
<tr>
<td>ATV (n=6)</td>
<td>5±0.89</td>
<td>4.5±0.54</td>
<td>3.8±0.75</td>
<td>3.5±0.54</td>
<td>0.000</td>
</tr>
<tr>
<td>PRGF (n=6)</td>
<td>5.16±0.75</td>
<td>4.5±0.54</td>
<td>4±0.63</td>
<td>3.83±0.75</td>
<td>0.001</td>
</tr>
<tr>
<td>ATV&amp;PRGF (n=6)</td>
<td>4.66±0.81</td>
<td>4.16±0.40</td>
<td>3.66±0.81</td>
<td>3.83±0.75</td>
<td>0.000</td>
</tr>
<tr>
<td>p Value</td>
<td>0.552**</td>
<td>0.599**</td>
<td>0.770**</td>
<td>0.497**</td>
<td></td>
</tr>
</tbody>
</table>

*: ANOVA, **: Kruskal-Wallis Test, ***: Repeated measurement ANOVA

Table 3: Vertical clinical attachment loss (VCAL) changes within each treatment group and comparison between groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>T0</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>p Value***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (n=6)</td>
<td>4.66±0.51</td>
<td>4.5±0.54</td>
<td>4.1±0.4</td>
<td>4±0.63</td>
<td>0.292</td>
</tr>
<tr>
<td>ATV (n=6)</td>
<td>4.1±0.4</td>
<td>4.16±0.4</td>
<td>3.66±0.51</td>
<td>3.33±0.51</td>
<td>0.009</td>
</tr>
<tr>
<td>PRGF (n=6)</td>
<td>4.33±0.51</td>
<td>4.33±0.51</td>
<td>3.5±0.54</td>
<td>3.33±0.51</td>
<td>0.001</td>
</tr>
<tr>
<td>ATV&amp;PRGF (n=6)</td>
<td>4±0.0</td>
<td>4±0.0</td>
<td>3.5±0.54</td>
<td>3.5±0.54</td>
<td>0.076</td>
</tr>
<tr>
<td>P value*</td>
<td>0.080</td>
<td>0.235</td>
<td>0.133</td>
<td>0.196</td>
<td></td>
</tr>
</tbody>
</table>

*: Kruskal-Wallis Test, **: Repeated measurement ANOVA

at times T0, T1, T2 and T3 (Tables 2 to 4). At the time T2, the GI score was significantly different (p= 0.04) between the groups (Table 5). According to Tukey's test, the mean GI score in the ATV group was significantly lower than in the control group (p= 0.03) and the comparison between other groups was not significant.

Based on the repeated measurement ANOVA test, a statistically significant difference (p< 0.001) was observed in the VPD level between all groups from the baseline to the end line of the study (Table 2). In addition, regardless of the evaluation time, the mean VPD level was significantly different between the four groups (p< 0.001). However, the interaction between the VPD level and the groups had no significant difference (p> 0.05).

The repeated measurement ANOVA test showed a statistically significant difference (p< 0.05) in the VCAL level between the ATV and PRGF groups from the baseline to the end line of the study (Table 3). Furthermore, regardless of the evaluation time, the mean VPD level was significantly different between the four groups (p< 0.001). However, the interaction between the VCAL level and the group revealed no significant difference (p> 0.05).

According to the repeated measurement ANOVA test, there was no statistically significant difference (p> 0.05) in the HPD level between all groups from the baseline to the end line of the study (Table 4).
Regardless of the evaluation time, the mean HPD level was not significantly different between the four groups and the interaction between the HPD level and the group had no significant difference \((p > 0.05)\).

The repeated measurement ANOVA test revealed a statistically significant difference \((p < 0.001)\) in the GI score between all groups from the baseline to the end line of the study (Table 5). In addition, regardless of the evaluation time, the mean GI score showed a significant difference between the four groups \((p < 0.001)\), but the interaction between the HPD level and the group had no significant difference \((p > 0.05)\).

The REC parameter was compared between four study groups from T0 to T3 using Fisher’s exact and Friedman tests \((p > 0.05)\) (Table 6).

**Discussion**

In the present study, we conducted the clinical and radiographic evaluation of plasma rich in growth factors (PRGF) along with Atorvastatin1.2% (ATV) in the treatment of grade II furcation defects in the mandibular molars. We applied a combination of PRGF and Atorvastatin1.2% in furcation defects due to the higher benefits of PRGF, compared to PRP systems, which were ease of use, usability in a doctor’s office and hospital environments, the need for simpler tools and lower costs, minimizing patients’ discomfort during bloodletting owing to the need for a very small amount of blood, no possibility of infection and minimum preparation time [7].

According to the results, there was no significant difference between the groups of PRGF, ATV and a combination of PRGF and ATV with the flap group in terms of improvement of clinical parameters (e.g., REC, VCAL, VPD and HPD). Nevertheless, improvement in each group was significant since the beginning to the end of the study. This lack of significance might be due to the complexity of the treatment of regeneration in the furcal region. Radiologically, increased radiopacity was observed in only two out of six cases in the ATV & PRGF group, which was not statistically significant. To the best of our knowledge, no clinical trial similar to our work has been conducted to date. However, several studies have been performed on the use of PRGF along with different types of augmentation materials in the treatment of periodontal lesions, which have had similar results.

For instance, Mansouri et al. [6] evaluated the effect of bovine porous bone mineral (BPBM) along with PRGF on the treatment of grade II furcation defects, concluding that PRGF decreased GI, probing depth (PD) and CAL more than other groups. Nevertheless, their results were not statistically significant. In another study, Lafzi et al. [8] assessed the treatment of molars with grade II furcation involvement in two groups treating autogenous bone grafts with and without PRGF. These scholars reported significant improvement in vertical clinical attachment level (V-CAL) and a significant decrease in clinical probing depth (CPD) and surgically exposed the horizontal probing depth of bony defect (E-HPD) at the end of the study. Nonetheless, the difference between the groups was not statistically significant. Similarly, we found better repair and improvement of clinical parameters in the group but no significant difference between the groups. In the current research, the study’s parameters improved in the PRGF group at the end of the experiment, which was not statistically significant compared to the other groups.

On the other hand, Pradeep et al. [33] assessed the effect of platelet-rich plasma (PRP) on the treatment of grade II furcation defects of mandibular molars, reporting that while the PRP group significantly improved at

### Table 6: Vertical probing depth (REC) changes within each treatment group and comparison between groups

<table>
<thead>
<tr>
<th>REC</th>
<th>Control (n=6)</th>
<th>PRGF (n=6)</th>
<th>ATV (n=6)</th>
<th>ATV&amp;PRGF (n=6)</th>
<th>Total</th>
<th>p Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0 without recession</td>
<td>2 (33.3%)</td>
<td>2 (33.3%)</td>
<td>3 (50.0%)</td>
<td>3 (50.0%)</td>
<td>10 (41.7%)</td>
<td>1.000</td>
</tr>
<tr>
<td>T1 without recession</td>
<td>4 (66.7%)</td>
<td>4 (66.7%)</td>
<td>3 (50.0%)</td>
<td>3 (50.0%)</td>
<td>14 (58.3%)</td>
<td>0.941</td>
</tr>
<tr>
<td>T2 without recession</td>
<td>3 (50.0%)</td>
<td>2 (33.3%)</td>
<td>4 (66.7%)</td>
<td>3 (50.0%)</td>
<td>12 (50.0%)</td>
<td>0.766</td>
</tr>
<tr>
<td>T3 without recession</td>
<td>3 (50.0%)</td>
<td>5 (83.3%)</td>
<td>2 (33.3%)</td>
<td>5 (83.3%)</td>
<td>17 (70.8%)</td>
<td>0.314</td>
</tr>
</tbody>
</table>

\* Fisher’s Exact Test. **: Friedman Test
the end of the research, compared to the control group, the compound’s inability to completely cure furcation defects showed its limited role in the treatment of defects as a regenerative factor. Therefore, it is still early to make a definitive statement about the clinical and biological effects of the clinical use of PRGF. In another study, Pradeep et al. [22] applied Rosuvastatin (1.2 mg) in a combination of PRF and porous-hydroxyapatite (bone graft) in the treatment of grade II furcation defects. According to the results, clinical and radiographical parameters improved in the lesions treated, compared to open flap debridement.

Martande et al. [34] assessed the effect of ATV 1.2% combined with PRF on the treatment of intraosseous lesions in patients with chronic periodontitis. According to the results of this study, while the use of ATV and PRF had similar clinical improvement effects to the PRF-treated group alone, more improvements were observed in the radiographical parameters in the ATV and PRF group. In the current research, ATV 1.2% had positive effects on the improvement of clinical parameters. However, the results were insignificant due to being compared to other treatment groups. In fact, all of our treatment groups had similar positive effects on clinical parameters.

In a research, Jenabian et al. [7] assessed the effect of PRGF and guided tissue regeneration (GTR) on the treatment of grade II furcation defects, reporting a significant improvement in clinical parameters of GI, VPD, and VCAL at the end of the research.

In addition, Bojarpour et al. [28] evaluated the effect of PRGF and SRP on the treatment of periodontal three-walled intrabony defects, concluding that PRGF improved PPD but not GI. This lack of similarity between the studies might be due to different samples. In the current research, no significant difference was found between the groups in terms of all parameters assessed at T0 and T1. Therefore, the differences observed might be due to the type of treatment. One of the most important clinical changes in regenerative studies is the changes in PPD and CAL after regenerative treatment. In the present study, a VPD decrease was observed in all groups at the end of the experiment. In addition, there was a significant decrease in VCAL in the ATV and PRGF groups, compared to the beginning of the research. However, the difference between the groups was not statistically significant. This finding showed that the increase in attachment plays a major role in reducing the probing depth in both groups and the change in gingival margin position is a small part of the decrease. Attachment increase can be due to true periodontal regeneration or defect healing by new connective tissue attachment or long junctional epithelium [8]. Histological studies are needed to determine the nature of attachment enhancement. Furthermore, the decrease in VPD in the ATV group may be due to the fact that statins inhibit inflammatory cells and MMP levels, which related to PPD and bleeding during probing and play an important role in the regeneration of connective tissue in periodontal disease [25].

The positive role of statins in periodontal regenerative therapy has been shown in systematic reviews [35-36]. Similar to the present research, Shirke et al. [25] and Pradeep et al. [37] evaluated the effect of ATV 1.2% on the treatment of chronic periodontitis, finding that ATV could decrease PPD and CAL when concurrently used with SRP.

In the present study, we evaluated the effect of the simultaneous use of ATV and PRGF Combination, of these two substances showed synergistic effects in partial the resolution of lesions on radiographs in two of the six samples, which was not statistically significant this difference might be due to the small sample size in the current research. We treated early grade II furcation defects and assumed that the remaining surrounding living tissues were able to provide a sufficient amount of periodontal target cells to be affected by growth factors present in PRGF and ATV.

Conclusion
Considering the limitations of the present study, PRGF along with ATV 1.2% was effective in the treatment of furcation defects in the mandibular molars and decreased GI, VPD, and VCAL. However, there was no significant difference between the mentioned treatment and other therapeutic groups. It is recommended that further research be conducted on larger sample sizes along with open flap debridement.

Conflict of Interest
The authors declare that they have no conflict of interest.
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[21] Garg S, Pradeep AR. 1.2% Rosuvastatin and 1.2% Atorvastatin Gel Local Drug Delivery and Redelivery in


