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# Clinical and Radiological Evaluation of Treatment of Grade II Furcation Defect Using Bio-Oss Bone Graft Alone and In Combination with Platelet-Rich Fibrin (PRF)

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**Type of Publication:** Original Research Article

**Conflicts of Interest:** Nil

## Abstract

**Introduction**: This case study explores the treatment of a Grade II furcation defect in a mandibular molar using deproteinized bovine bone mineral (Bio-Oss) as a bone graft material. The patient was treated using two different approaches: first, with Bio-Oss alone and, in the second instance, with Bio-Oss combined with Platelet-Rich Fibrin (PRF).

**Objectives**: This study aims to evaluate the clinical outcomes, including probing pocket depth (PPD), Plaque Index (PI), Gingival Index(GI), Horizontal Depth Defect (HDD), Relative Clinical Attachment Level (RCAL), Relative Vertical Depth Defect (RVDD) and radiographic assessment of bone regeneration, were compared to evaluate the effectiveness of these two treatment modalities at baseline, 3 Months and 6 months interval.

**Conclusion**: This case study demonstrates that Bio-Oss alone is effective in treating Grade II furcation defects, resulting in significant improvements in probing pocket

depth, clinical attachment level, and radiographic bone fill. However, the addition of PRF offers notable advantages in terms of soft tissue healing and bone regeneration, with faster healing times, reduced inflammation, and greater clinical outcomes.

**Keywords:** Debridement, Mandibular Molars, RCAL, Systemic Diseases

## Introduction

Grade II furcation defects present significant challenges in periodontal treatment. These defects are characterized by partial loss of the bone in the furcation area of a molar, leading to compromised periodontal support. Regenerative procedures aim to promote the regeneration of periodontal tissues, including bone and soft tissue, to restore the lost architecture and improve clinical outcomes.

In this case study, we explore the application of Bio-Oss, a deproteinized bovine bone mineral with osteoconductive properties, in the treatment of Grade II furcation defects. In addition, we examine the potential synergistic effect of combining Bio-Oss with Platelet-Rich Fibrin (PRF), an autologous tissue regeneration material rich in growth factors.

## Materials and Methods

In this study, 20 patients aged 25- 60 years old with mandibular Degree II furcation defects were selected from those attending the outpatient Department of Periodontology and Oral Implantology at Desh Bhagat Dental College and Hospital, Mandi Gobindgarh. The subjects for the study were selected randomly with no discrimination on the basis of sex, cast, and religion or socio economic status. Complete medical and Dental histories were obtained. Informed consent was taken from the patient in the form of a duly signed document prior to surgical phase. Study was approved from Institutional Ethical Committee.

### Criteria for patient selection

### Inclusion Criteria

After completion of initial phase of therapy, the selected mandibular molars should have following findings:

- Patients exhibiting clinical and radiographic evidence of degree II (Horizontal loss of periodontal tissue support exceeding 3mm but not encompassing the total width of the defect) furcation defects. (Hamp et al,1975).
- Gingival margin coronal to or at the level of roof of furcation.
- Systemically healthy.

### Exclusion Criteria

- Smokers
- Pregnant females
- History of previous periodontal surgical treatment within 6 months
- Furcation at third molars
- Untreated non-vital teeth
- Patients with systemic diseases
- Grade II mobile teeth
- Known allergies to the materials used in the study

### Clinical Measurements

Customized acrylic occlusal stent was fabricated on the study casts and trimmed to the height of contour of the teeth, to serve as fixed reference point to take measurements. The stent was prominent on the buccal or lingual areas. One vertical groove was prepared in the stent with a fissure bur for the furcation that has to be measured. This groove is to provide reproducible alignment for a periodontal probe.

### Study Design

In this study, the patients were divided into two groups:

**Group I**: Involve patients that were treated with BioOss bone graft and platelet rich fibrin (BioOss+PRF).

**Group II**: Involve patients that were treated with BioOss bone graft alone (BioOss).

Each patient was prepared for surgery with an initial phase of therapy including oral hygiene instructions, scaling and root planing, and occlusal adjustments were performed. Following data collection, the decision to use BioOss bone replacement graft material or only will be determined randomly. Clinical parameters will be obtained at baseline 3 months and 6 months postoperatively. The parameters recorded were: Plaque Index (PI) (Silness & Loe), 1964, Gingival Index (GI) (Loe & Silness), 1963, Gingival Recession (GR) Probing Pocket Depth (PPD), Relative Attachment Level (RAL) Horizontal Defect Depth (HDD, Relative Vertical Defect Depth (RVDD)

All subjects underwent Phase 1 therapy, followed with oral hygiene instructions. After a 4 week reevaluation, eligible patients were scheduled for surgery. Intraoral periapical radiographs were taken to confirm the evidence of furcation involvement and include the teeth in study. Radiographs were again taken at baseline, 3 months and 6 months.

**Surgical Procedure**

After giving the adequate anesthesia, full thickness mucoperiosteal flap was raised. Thorough debridement was done with help of curette. After removing the subgingival deposits and granulation tissues. Bone graft with or without PRF was compressed into the defect. The flap was positioned back as coronally as possible. Haemostatis was achieved by surgical silk 3:0 suture.

In Group 1, freshly prepared PRF was mixed with Bio-Oss and placed into the defect. A PRF membrane was placed over the graft before flap closure.

In Group 2, the furcation defect was filled with Bio-Oss particles and the flap was repositioned and sutured.

**PRF Preparations** - PRF was prepared using Choukroun's et al method. 10ml of venous blood was collected and centrifuged at 3000rpm for 10 minutes. The fibrin clot was separated and used immediately.

Figure 1: Measuring Grade 2 furcation Defect using Naber's Probe, tooth no. 46

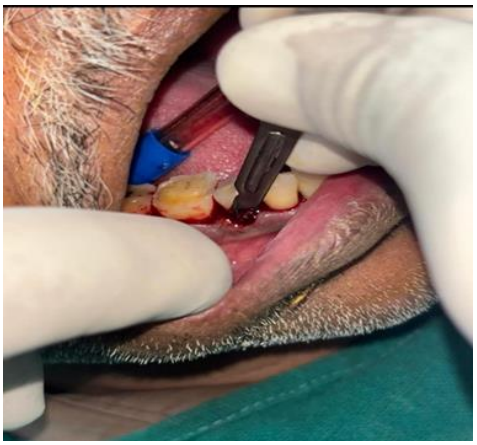

Figure 2: Incision was given to raise the flap, tooth no. 46 (Group 1)

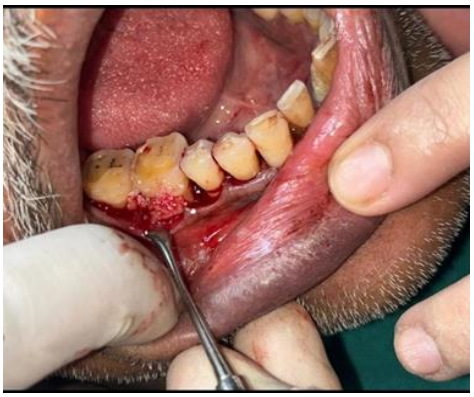

Figure 3: PRF mixed with Bio-Oss placed in the furcation defect (GROUP 1)

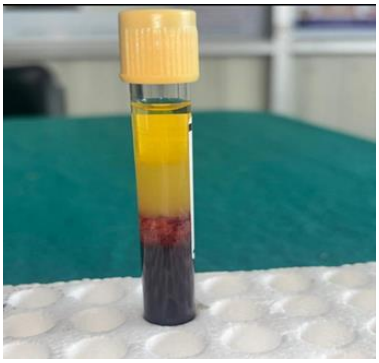

Figure 4: PRF seen in centrifuged blood (Group 1)

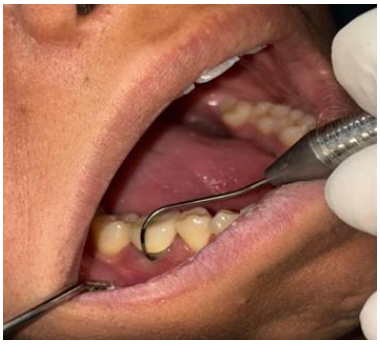

Figure 5: Measuring furcation depth defect using Naber's Probe in Tooth No. 46 (GROUP 2)

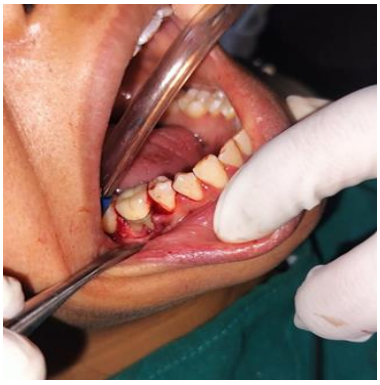

Figure 6: Tooth No. 46 showing furcation Defect (GROUP 2)

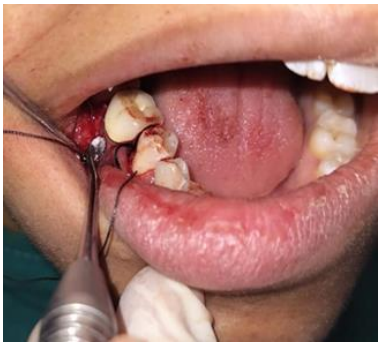

Figure 7: Placement of Bone Graft (Bio-Oss) in Furcation Defect (GROUP 2)

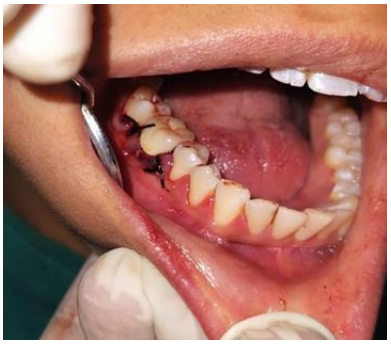

Figure 8: Suture Placement Done (GROUP 2)

**Post-Operative Care and Follow-up intervals**

- Necessary Antibiotics + Analgesics were prescribed.
- Chlorhexidine mouthwash (0.12%) twice daily for 2 weeks.
- Sutures removed after 10 days.
- Patients were recalled at 3 and 6 months postoperatively for evaluation.

**Data Analysis**

After the completion of the study, statistical analysis was carried out.

**Results**

The present study evaluated and compared the clinical outcomes of Group I (Bio-Oss + PRF) and Group II (Bio-Oss alone) in the management of Grade II furcation defects in mandibular molars. Clinical parameters assessed at baseline, 3 months, and 6 months included Plaque Index (PI), Gingival Index (GI), Gingival Recession (GR), Pocket Probing Depth (PPD), Relative Clinical Attachment Level (RCAL), Horizontal Defect Depth (HDD), and Relative Vertical Defect Depth (RVDD).

**Plaque Index (PI)**

Intergroup comparison is presented in Table 1

At baseline, mean PI was 1.40 ± 0.22 in Group I and 1.71 ± 0.20 in Group II, with a statistically significant difference ($p = 0.004$).

At 3 months, Group I showed a reduction to 0.93 ± 0.13, while Group II reduced to 0.91 ± 0.10, showing no significant intergroup difference (p = 0.81).

At 6 months, further reduction was observed in both groups (0.74 ± 0.12 in Group I and 0.80 ± 0.13 in Group II), with no statistically significant difference (p = 0.29).

Table 1: Intergroup comparison of plaque index (PI) at different time intervals

| | Mean diff | Std. Error Difference | t | Df | P vale | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower | Upper |
| PI at Baseline | -.318 | .095 | -3.35 | 18 | 0.004* | -.517 | -.119 |
| PI at 3 Month Interval | .013 | .054 | | 18 | 0.81** | -.100 | .126 |
| PI at 6 Month Interval | -.063 | .059 | -1.072 | 18 | 0.29** | -.186 | .060 |

*statistically significant **statistically non-significant

**Gingival Index (GI)**

Results are shown in Table 2

At baseline, mean GI values were comparable (1.63 ± 0.27 in Group I vs. 1.61 ± 0.37 in Group II, p = 0.888).

At 3 months, Group I improved to 0.88 ± 0.12 and Group II to 0.91 ± 0.11, with no significant difference (p = 0.577).

At 6 months, values further reduced to 0.71 ± 0.13 in Group I and 0.80 ± 0.13 in Group II, showing no statistical significance (p = 0.160).

Table 2: Intergroup comparison of Gingival Index (GI) at different time intervals

| | Mean diff | Std. Error Difference | T | Df | P value | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower | Upper |
| GI at Baseline | .021 | .147 | .142 | 18 | .888 | -.289 | .331 |
| GI at 3 Month Interval | -.031 | .055 | -.568 | 18 | .577 | -.146 | .084 |
| GI at 6 month Interval | -.0890 | .0607 | -1.466 | 18 | .160 | -.2165 | .0385 |

**Gingival Recession (GR)**

Descriptive and intergroup comparisons are presented in Table 3.

At baseline, both groups exhibited minimal gingival recession across surfaces with no significant differences (p > 0.05).

At 3 months, slight changes were noted, but intergroup comparisons remained non-significant.

By 6 months, recession values further decreased, particularly in Group I, yet no statistically significant intergroup difference was found across all sites (p > 0.05).

Table 3: Intergroup comparison of Gingival Recession (GR) at different time intervals

| | Mean diff | Std. Error Difference | t | Df | P vale | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower | Upper |
| GR at baseline on buccal surface | .0000 | .1764 | .000 | 18 | 1.000 | -.3706 | .3706 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| GR at baseline on mesiobuccal surface | .0000 | .1155 | .000 | 18 | 1.000 | -.2426 | .2426 |
| GR at baseline on distobuccal surface | -.0500 | .1167 | -.429 | 18 | .673 | -.2951 | .1951 |
| GR at baseline on lingual surface | .0000 | .1155 | .000 | 18 | 1.000 | -.2426 | .2426 |
| GR at baseline on mesiolingual surface | .0500 | .1462 | .342 | 18 | .736 | -.2573 | .3573 |
| GR at baseline on distolingual surface | .1000 | .1453 | .688 | 18 | .500 | -.2053 | .4053 |
| GR at 3 months on Buccal surface | .0000 | .1155 | .000 | 18 | 1.000 | -.2426 | .2426 |
| GR at 3 months on mesiobuccal surface | .0000 | .1155 | .000 | 18 | 1.000 | -.2426 | .2426 |
| GR at 3 months on distobuccal surface | .0000 | .1080 | .000 | 18 | 1.000 | -.2269 | .2269 |
| GR at 3 months on lingual surface | -.0500 | .1014 | -.493 | 18 | .628 | -.2630 | .1630 |
| GR at 3 months on mesiolingual surface | .1500 | .1344 | 1.116 | 18 | .279 | -.1323 | .4323 |
| GR at 3 months on distolingual surface | .2000 | .1291 | 1.549 | 18 | .139 | -.0712 | 4712 |
| GR at 6 months on buccal surface | .0000 | .1155 | .000 | 18 | 1.000 | -.2426 | .2426 |
| GR at 6 months on mesiobuccal surface | .0000 | .1080 | .000 | 18 | 1.000 | -.2269 | .2269 |
| GR at 6 months on lingual surface | .0500 | .0500 | 1.000 | 18 | .331 | -.0550 | .1550 |
| GR at 6 months on mesiolingual surface | .0500 | .0500 | 1.000 | 18 | .331 | -.0550 | .1550 |
| GR at 6 months on distolingual surface | .0500 | .0500 | 1.000 | 18 | .331 | -.0550 | .1550 |

**Pocket Probing Depth (PPD)**

Data is provided in Table 4.

At baseline, mean PPD values were comparable across all sites in both groups ($p > 0.05$).

At 3 months, Group I showed greater reduction (e.g., mesiobuccal surface: 3.90 ± 0.73 vs. Group II: 5.10 ± 0.56), with statistically significant differences across all sites ($p < 0.01$).

At 6 months, further reduction was seen in Group I (e.g., buccal surface: 3.20 ± 0.42) compared to Group II (4.20 ± 0.42), with intergroup differences remaining statistically significant ($p < 0.01$).

Table 4: Intergroup comparison of Pocket Probing Depth (PPD) at different time intervals

| | Mean diff | Std. Error Difference | T | df | P value | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower | Upper |
| PPD at baseline on mesiobuccal surface | -.200 | .294 | -.679 | 18 | .506** | -.818 | .418 |
| PPD at baseline on buccal surface | .000 | .189 | .000 | 18 | 1.000** | -.396 | .396 |
| PPD at baseline on distobuccal surface | -.200 | .226 | -.885 | 18 | .388** | -.675 | .275 |
| PPD at baseline on mesiolingual surface | -.200 | .294 | -.679 | 18 | .506** | -.818 | .418 |
| PPD at baseline on lingual surface | -.100 | .203 | -.493 | 18 | .628** | -.526 | .326 |
| PPD at baseline on distolingual surface | .000 | .231 | .000 | 18 | 1.000** | -.485 | .485 |
| PPD at 3 month on mesiobuccal surface | -1.200 | .294 | 4.076 | 18 | .001* | -1.818 | -.582 |
| PPD at 3 month on buccal surface | -1.000 | .189 | 5.303 | 18 | .000* | 1-1.396 | -.604 |
| PPD at 3 month on distobuccal surface | -1.200 | .226 | 5.308 | 18 | .000* | -1.675 | -.725 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PPD at 3 month on mesiolingual surface | -1.200 | .294 | 4.076 | 18 | .001* | -1.818 | -.582 |
| PPD at baseline on lingual surface | -1.100 | .203 | 5.425 | 18 | .000* | -1.526 | -.674 |
| PPD at 3 month on distolingual surface | -1.000 | .231 | 4.330 | 18 | .000* | -1.485 | -.515 |
| PPD at 6month interval on mesiobuccal surface | -1.200 | .294 | 4.076 | 18 | .001* | -1.818 | -.582 |
| PPD at 6 month interval on buccal surface | -1.000 | .189 | 5.303 | 18 | .000* | -1.396 | -.604 |
| PPD at 6 month interval on distobuccal surface | -1.200 | .226 | 5.308 | 18 | .000* | -1.675 | -.725 |
| PPD at 6 month interval on mesiolingual surface | -1.200 | .294 | 4.076 | 18 | .001* | -1.818 | -.582 |
| PPD at 6 month interval on lingual surface | -1.100 | .203 | 5.425 | 18 | .000* | -1.529 | -.674 |
| PPD at 6 month interval on distolingual surface | -.900 | .233 | 3.857 | 18 | .001* | -1.390 | -.410 |

*statistically significant **statistically non-significant

**Relative Clinical Attachment Level (RCAL)**

Results are presented in Table 5

At baseline, both groups were comparable ($p > 0.05$).

At 3 months, Group I demonstrated greater attachment gain (e.g., buccal surface: 3.79 ± 0.21 vs. 4.14 ± 0.20 in Group II, $p = 0.002$). Statistically significant differences were also noted at lingual surfaces ($p = 0.013$).

At 6 months, Group I showed consistently greater attachment gain (e.g., buccal surface: 3.41 ± 0.17 vs. 3.83 ± 0.21, $p < 0.001$; lingual surface: $p < 0.001$; distal surface: $p = 0.011$).

Table 5: Intergroup comparison of Relative clinical attachment level (RCAL) at different time intervals

| | Mean diff | Std. Error Difference | t | Df | P value | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower | Upper |
| RCAL at baseline on mesial surface | -.040 | .202 | -.198 | 18 | .845** | -.464 | .384 |
| RCAL at baseline on distal surface | .010 | .163 | .061 | 18 | .952** | -.332 | .352 |
| RCAL at baseline on buccal surface | -.090 | .107 | -.842 | 18 | .411** | -.315 | .135 |
| RCAL at baseline on lingual surface | -.030 | .102 | -.293 | 18 | .773** | -.245 | .185 |
| RCAL at 3 month on mesial surface | -.310 | .165 | 1.881 | 18 | .076** | -.656 | .036 |
| RCAL at 3 month on distal surface | -.240 | .146 | 1.646 | 18 | .117** | -.546 | .066 |
| RCAL at 3 month on buccal surface | -.350 | .094 | 3.729 | 18 | .002* | -.547 | -.153 |
| RCAL at 3 month on lingual surface | -.270 | .098 | 2.760 | 18 | .013* | -.475 | -.065 |
| RCAL at 6 months on mesial surface | 2.540 | 2.954 | .860 | 18 | .401** | -3.666 | 8.746 |
| RCAL at 6 month on distal surface | -.400 | .140 | 2.854 | 18 | .011* | -.694 | -.106 |
| RCAL at 6 months on buccal surface | -.420 | .089 | 4.729 | 18 | .000* | -.607 | -.233 |
| RCAL at 6 months on lingual surface | -.420 | .093 | 4.512 | 18 | .000* | -.616 | -.224 |

*statistically significant **statistically non-significant

**Horizontal Defect Depth (HDD)**

Comparative results are given in Table 6.

At baseline, mean HDD values were similar across groups ($p > 0.05$).

At 3 months and 6 months, Group I showed greater defect fill compared to Group II, although intergroup differences were not statistically significant ($p > 0.05$).

Table 6: Intergroup comparison of Horizontal Depth Defect (HDD) at different time intervals

| | Mean diff | Std. Error Difference | t | df | P value | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower | Upper |
| HDD at baseline on buccal surface | -.100 | .987 | .101 | 18 | .920** | -2.173 | 1.973 |
| HDD at baseline on lingual surface | .100 | .961 | .104 | 18 | .918** | -1.919 | 2.119 |
| HDD at 3 months on buccal surface | -.630 | .840 | -.750 | 18 | 0.04* | -2.395 | 1.135 |
| HDD at 3 months on lingual surface | .370 | .826 | .448 | 18 | 0.04* | -1.366 | 2.106 |
| HDD at 6 months on buccal surface | -.640 | .712 | -.899 | 18 | 0.03* | -2.136 | .856 |
| HDD at 6 months on lingual surface | .220 | .692 | .318 | 18 | 0.04* | -1.234 | 1.674 |

**Relative Vertical Defect Depth (RVDD)**

Data is presented in Table 7.

At baseline, RVDD values were similar in both groups ($p > 0.05$).

At 3 months and 6 months, both groups demonstrated reduction in RVDD, with Group I showing slightly better improvements. However, intergroup differences were not statistically significant ($p > 0.05$).

Table 7: Intergroup comparison of Relative Vertical Defect Depth (RVDD) at different time intervals

| | Mean diff | Std. Error Difference | t | df | P value | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower | Upper |
| RVDD at baseline on mesiobuccal surface | . 000 | .825 | .000 | .18 | 1.00** | -1.734 | 1.734 |
| RVDD at baseline on distobuccal surface | .150 | .797 | .188 | 18 | .853** | -1.524 | 1.824 |
| RVDD at baseline on distal surface | .200 | 1.280 | .156 | 18 | .878** | -2.490 | 2.890 |
| RVDD at baseline on lingual surface | -.050 | 1.233 | -.041 | 18 | .968** | -2.641 | 2.541 |
| RVDD at baseline on mesiolingual surface | -.400 | .774 | .517 | 18 | .612** | -2.026 | 1.226 |
| RVDD at baseline on distolingual surface | -.100 | .789 | .127 | 18 | .901** | -1.757 | 1.557 |
| RVDD at 3 months on mesiobuccal surface | -.050 | .620 | .081 | 18 | .937** | -1.353 | 1.253 |
| RVDD at 3 months on distobuccal surface | .150 | .927 | .162 | 18 | .873* | -1.797 | 2.097 |
| RVDD at 3 months on lingual surface | -.050 | .827 | .060 | 18 | .952** | -1.788 | 1.688 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RVDD at 3 months on mesiolingual surface | -.150 | .543 | -.276 | 18 | .785** | -1.291 | .991 |
| RVDD at 3 months on distolingual surface | -.150 | .543 | -.276 | 18 | .785** | -1.291 | .991 |
| RVDD at 6 months on mesiobuccal surface | .050 | .423 | .118 | 18 | .907** | -.839 | .939 |
| RVDD at 6 months on distobuccal surface | .200 | .436 | .459 | 18 | .652** | -.716 | 1.116 |
| RVDD at 6 months on buccal surface | .200 | .707 | .283 | 18 | .781 | -1.286 | 1.686 |
| RVDD at 6 months on lingual surface | -.050 | .598 | -.084 | 18 | .934* | -1.307 | 1.207 |
| RVDD at 6 months on mesiolingual surface | .000 | .381 | .000 | 18 | 1.000** | -.800 | .800 |
| RVDD at 6 months on distolingual surface | .000 | .381 | .000 | 18 | 1.000** | -.800 | .800 |

*statistically significant **statistically non-significant

**Treatment Approach**

**Treatment with Bio-Oss Alone**

In the first phase of treatment, Bio-Oss was used as a bone graft material. The procedure was as follows:

1. **Surgical Preparation**: The area was anesthetized with local anesthesia, and a full-thickness flap was reflected to expose the defect area.
2. **Debridement**: The granulation tissue was carefully removed, and the roots were thoroughly scaled and planed to remove any residual calculus.
3. **Bone Grafting**: Bio-Oss was placed in the defect site, ensuring that the material filled the mesial and distal furcation areas. Bio-Oss was compacted gently to avoid dislodging the graft material.
4. **Flap Closure**: The flap was repositioned and sutured, ensuring primary closure.
5. **Post-Operative Care**: The patient was prescribed antibiotics and anti-inflammatory medications. Follow-up visits were scheduled at 1 week, 3 months, and 6 months.

**Treatment with Bio-Oss and PRF**

In the second phase, the same patient was treated with Bio-Oss in combination with PRF. The procedure was similar, with the following additional steps:

1. **PRF Preparation**: A blood sample was drawn from the patient, and the PRF was prepared using a centrifuge to concentrate the platelets and growth factors.
2. **Bone Grafting**: After debridement and root planing, Bio-Oss was placed into the defect, similar to the previous procedure.
3. **Application of PRF**: A membrane of PRF was placed over the graft site before suturing the flap into position. The PRF membrane was intended to promote soft tissue healing and potentially enhance bone regeneration.
4. **Flap Closure**: The surgical site was closed as before, with PRF applied to the soft tissue interface.
5. **Post-Operative Care**: Similar to the first phase, the patient received antibiotics and analgesics and was advised to follow a soft food diet for two weeks.

**Soft Tissue Healing**

Soft tissue healing was more favorable in the Bio-Oss + PRF group**.** The PRF membrane significantly contributed to reducing inflammation, enhancing soft tissue adaptation, and promoting faster mucosal coverage. The healing was smooth, with minimal gingival recession and no visible signs of infection.

**Discussion**

The present clinical study was designed to evaluate and compare the effectiveness of Bio-Oss in combination with Platelet-Rich Fibrin (PRF) (Group I) versus Bio-Oss alone (Group II) in the treatment of Grade II furcation defects in mandibular molars. Clinical parameters including Plaque Index (PI), Gingival Index (GI), Gingival Recession (GR), Pocket Probing Depth (PPD), Relative Clinical Attachment Level (RCAL), Horizontal Defect Depth (HDD), and Relative Vertical Defect Depth (RVDD) were assessed at baseline, 3 months, and 6 months.

**Plaque Index (PI)**

Both groups demonstrated a progressive reduction in plaque scores over the study period, with statistically significant improvement from baseline to 6 months. However, intergroup differences were not significant after therapy. This indicates that the oral hygiene reinforcement and professional maintenance provided to both groups were equally effective in controlling plaque accumulation.

Similar findings were reported by Loe and Silness (1963), who emphasized the role of patient motivation and repeated oral hygiene instructions in maintaining plaque control[1.] Our results corroborate those of Sharma et al. (2017), who observed that plaque scores generally improve following periodontal regenerative procedures due to professional maintenance rather than the regenerative material used[2].

**Gingival Index (GI)**

A consistent decline in GI scores was observed in both groups, indicating reduced gingival inflammation following therapy. Intergroup differences were not statistically significant at any interval. This suggests that both treatment modalities were equally effective in improving gingival health, which may be attributed to improved plaque control.

Our findings are in agreement with Ainamo and Bay (1975) and Cortellini et al. (2008), who reported that reduction in gingival inflammation following regenerative therapy is primarily related to improved oral hygiene and reduction in local irritants, rather than the regenerative material itself[3,4].

**Gingival Recession (GR)**

Minimal gingival recession was recorded in both groups, with slight improvements observed over time. No statistically significant intergroup differences were found. These results suggest that both regenerative approaches maintained gingival margin stability, with no adverse effects on soft tissue position.

This finding aligns with Pradeep et al. (2012), who demonstrated that the addition of PRF does not increase the risk of recession in furcation defect therapy, likely due to its fibrin matrix providing a biologic seal and stabilizing the wound[5].

**Pocket Probing Depth (PPD)**

A highly significant reduction in PPD was observed in both groups, with Group I (Bio-Oss + PRF) showing greater improvements compared to Group II (Bio-Oss alone). At both 3 and 6 months, the intergroup differences were statistically significant.

The superior outcomes in Group I may be attributed to the biological properties of PRF, which releases growth factors such as PDGF, TGF-β, and VEGF that enhance wound healing, stimulate angiogenesis, and promote

periodontal regeneration. These properties may have accelerated tissue maturation and facilitated greater probing depth reduction.

Our results are in agreement with Choukroun et al. (2001), who first described PRF as a biologically active scaffold enhancing periodontal healing, and Sharma & Pradeep (2011), who demonstrated significantly greater PPD reduction with PRF combined with grafts compared to grafts alone[6, 7].

**Relative Clinical Attachment Level (RCAL)**

Group I showed significantly greater attachment gain compared to Group II, especially at 3 and 6 months. This suggests that the addition of PRF improved periodontal regeneration beyond the effect achieved with Bio-Oss alone.

This is in accordance with Aroca et al. (2009) and Pradeep et al. (2012), who reported enhanced attachment gain when PRF was used with regenerative materials. The fibrin matrix of PRF acts as a scaffold for cell migration and provides sustained release of growth factors for up to 7–10 days, thereby supporting connective tissue attachment and bone formation[8,9,10].

**Horizontal Defect Depth (HDD)**

Both groups showed reduction in HDD over time, with Group I exhibiting slightly greater improvements. However, intergroup differences were not statistically significant. This may be due to the limited sample size or short evaluation period, as bone fill in horizontal defects often requires longer follow-up to demonstrate significant differences.

Our findings are comparable to those of Lekovic et al. (1998), who observed gradual improvement in horizontal furcation defects after regenerative therapy, with significant differences appearing only after extended follow-up[11].

**Relative Vertical Defect Depth (RVDD)**

Both groups demonstrated improvement in RVDD at 3 and 6 months. Group I showed slightly better reduction than Group II, although the difference was not statistically significant. This finding suggests that both regenerative techniques were effective in improving vertical bone fill, but the additional advantage of PRF was less pronounced in vertical aspects compared to PPD and RCAL outcomes.

This is consistent with the observations of Sharma & Pradeep (2011) and Kumar et al. (2016), who reported better clinical outcomes with PRF but noted that vertical bone fill often requires longer follow-up for significant differences to manifest[12].

**Summary and Conclusion**

Periodontal disease is a chronic inflammatory condition that leads to the destruction of supporting periodontal structures, including periodontal ligament, cementum, and alveolar bone. Among various periodontal defects, furcation involvement poses one of the greatest clinical challenges due to complex anatomy, compromised accessibility for oral hygiene, and difficulty in achieving predictable regeneration.

Several regenerative modalities have been investigated to overcome these limitations, including bone grafts, barrier membranes, enamel matrix derivatives, and autologous platelet concentrates. Among these, deproteinized bovine bone mineral (Bio-Oss) has been widely used as a bone graft substitute due to its osteoconductive potential, while Platelet-Rich Fibrin (PRF) has gained popularity as a biologically active autologous scaffold enriched with growth factors.

The present study was conducted to evaluate and compare the clinical efficacy of Bio-Oss + PRF (Group I) and Bio-Oss alone (Group II) in the treatment of Grade II furcation defects in mandibular molars.

The present study demonstrated that both BioOss combined with PRF were effective in improving clinical parameters in grade 2 furcation defects. However the addition of PRF resulted in superior improvements in PPD reduction and RCAL gain, highlighting its role as a beneficial adjunct in regenerative therapy.

The results can be explained by the biological activity of PRF, which provides a fibrin network supporting cell proliferation, angiogenesis, and sustained growth factor release. This enhances periodontal wound healing and promotes true regeneration rather than repair.

Within the limitations of present study, it can be concluded that both treatment modalities improved clinical outcomes in grade 2 furcation defects. However, the combination of Bo-Oss with PRF demonstrated superior results in terms of PPD reduction and RCAL gain compared to Bio-Oss alone, underscoring the regenerative potential of PRF n periodontal therapy.

The future scope of this study is that the studies with larger sample sizes and longer follow-up periods are needed. Histological evaluations should be included to confirm true regeneration.

Combination of PRF with other biomaterials (e.g., enamel matrix derivative, growth factor delivery systems) can be explored to maximize regenerative outcomes.

**References**


1. Loe H, Silness J. Periodontal disease in pregnancy. I. Prevelance and severity. Acta Odontol Scand. 1963;21:533-551.
2. Sharma A, gupta R, Mehta P, et al, Effect of professional maintainence on plaque scores following periodontal regenerative procesdures. J Periodontal, 2017.
3. Ainamo J Bay I, Problems and proposals for recording gingivitis and plaque. Int dent . 1975;25(4): 229-35.
4. Cortellini P, Pini Prato G, Tonetti MS, Periodontal Regetaion of human INfrabony defects with enamel matrix derivative: clinical outcomes after 10 years. J Clin Periodotal. 2008;35(9):829-46.
5. Pradeep AR, Rao NS, Agarwal S, Marya CM. Comparative evaluation of platelet-rich fibrin (PRF) and tricalcium phosphate bone graft in the treatment of mandibular Grade II furcation defects: a clinicoradiographic study. J Periodontol. 2012;83(10):1246-55.
6. Choukroun J, Adda F, Schoeffler C, Vervelle A. Une opportunité en paro-implantologie: le PRF. Implantodontie. 2001;42:55-62.
7. Sharma A, Pradeep AR. Autologous platelet-rich fibrin in the treatment of mandibular degree II furcation defects: a randomized clinical trial. J Periodontol. 2011;82(10):1396-403.
8. Aroca S, Keglevich T, Barbieri B, Gera I, Etienne D. Clinical evaluation of a modified coronally advanced flap alone or in combination with a platelet-rich fibrin membrane for the treatment of adjacent multiple gingival recessions: a 6-month study. J Periodontol. 2009;80(2):244-52..
9. Pradeep AR, Rao NS, Agarwal E, Bajaj P, Kumari M, Naik SB. Comparative evaluation of platelet-rich fibrin and a bioactive glass in the treatment of mandibular class II furcation defects: a randomized clinical trial. J Periodontol. 2012;83(12):1499-507.
10. Dohan Ehrenfest DM, et al. Slow release of growth factors and thrombospondin-1 in Choukroun's platelet-rich fibrin (PRF): a new biomaterial for tissue regeneration. J Periodontol. 2009;80(3):546-55.

11. Lekovic V, Kenney EB, Kovac V, Carranza FA Jr, Danilovic V. Evaluation of guided tissue regeneration in class II furcation defects. A clinical re-entry study. J Periodontol. 1998;69(6):755-62.
12. Sharma A, Pradeep AR. Autologous platelet-rich fibrin in the treatment of mandibular degree II furcation defects: a randomized clinical trial. J Periodontol. 2011;82(10):1396-403.