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The evaluation of effectiveness of combination of bone graft, bioresorbable membrane and lasers in the treatment of mandibular grade ii furcation defects in humans: A case series

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Abstract
The ideal goal of furcation therapy is to retain the tooth by achieving complete closure of the furcation defect thus improving the prognosis of involved tooth. Therefore the aim of the study was to evaluate, the effectiveness of DFDBA in combination with bioresorbable membrane (Biomesh) and LASERS in the treatment of mandibular class II furcation defects in humans. A total of five patients with grade II furcation defects were treated with bioresorbable membrane and bone graft and LASERS. At six months postoperatively, vertical probing pocket depth was reduced from 3.63 mm to 2.3 mm, horizontal probing depth was reduced from3.66 mm to 1.66 mm. The gain in the clinical attachment was observed from 1.66 mm to 3.97mm. Significant improvement in the clinical attachment level, horizontal defect depth vertical probing pocket depth at 6 months postsurgically which showed that the use of Combination of GTR, bone graft and LASER was a viable treatment for the management of grade II Furcation defects.

Keywords: furcation involvement, bone graft, bioresorbable membrane, GTR, diode laser

Introduction
One of the greatest challenges in the field of Periodontics continues to be the treatment of multirooted teeth demonstrating inter-radicular loss of periodontal tissues (Matia *et al* 1986) [1], as furcation involved teeth and their surrounding tissues possess anatomic characteristics that make treatment difficult and unpredictable. The ideal goal of furcation therapy is to retain the tooth by achieving complete closure of the furcation defect thus improving the prognosis of involved tooth (Calongne *et al* 2001, Yukna *et al* 2000) [2, 3].

Several techniques have been proposed to treat and improve the clinical condition of mandibular class II furcation involved molars with varying results. The use of guided tissue regeneration membrane is considered the standard treatment for the furcally involved molars (Carnevale *et al* 1995, Machtei and Schallhorn 1995) [4, 5]. However, the results obtained from most of the studies, where guided tissue regeneration was used as the treatment for class II furcation defects, regardless of the barrier membrane material used, clearly shows the limitation of this therapeutic procedure in this type of defect.

It was suggested that the combination treatment including both a bone replacement graft + GTR barrier would provide beneficial regeneration therapy for class II furcation defect (Luepke *et al* 1997) [6]. However Use of bone grafts in combination with GTR also does not justify for the management of class II furcation invasion. In recent years LASER were found to be effective in debriding Furcation areas where mechanical instruments cannot eliminate microbiological etiological factors (Gopin *et al* 1997) [7]. Therefore the aim of the study was to evaluate, the effectiveness of DFDBA in combination with bioresorbable membrane (Biomesh) and LASERS in the treatment of mandibular class II furcation defects in humans.

Method and Materials
A total of five patients with grade II furcation defects affecting either buccal or lingual surfaces of the mandibular molars, presence of ≥3mm horizontal and vertical furcation probing depth, bone height coronal to the furcation bone level ≥75%of the root length, presence of ≥ 3mm of keratinized gingiva, intact tooth surfaces adjacent to the furcation area were included

in the study. However, patients who were smokers or used any other tobacco products, exhibiting tooth mobility for experimental tooth, Confirmed allergy to the graft material, previous history of any periodontal regenerative therapy at the same site were excluded from the study.

Clinical Measurements
The clinical measurements recorded were

Probing measurements
The following probing measurements were recorded for the assessment of results in all the three treatment groups: Vertical Probing Pocket Depth (V-PPD), Vertical Relative Attachment Level (V-RAL), Horizontal Probing Depth (HPD) and Relative Gingival Margin Level (RGML).

Surgical Procedure
Prior to the surgical procedure, the patients were instructed to rinse their mouth with 0.2% chlorhexidine gluconate solution (Hexidine, ICPA Health products Ltd., India) for 1 minute. The area subjected to surgery was anaesthetized by nerve block and infiltration anesthesia using local anesthetic solution of 2% Xylocaine containing 1: 80,000 concentration of epinephrine.
Conventional flap approach consisting of a periodontal access flap was initiated by intra-sulcular incisions using Bard-Parker number 12 and 15 surgical blades on the buccal and lingual aspects with the blade directed towards the crest of the alveolar bone and if necessary, incisions were extended the alveolar mucosa with the aim of achieving proper access to the defect, as well as for obtaining coronal displacement of the flap. Full thickness flap (mucoperiosteal flap) was reflected buccally and lingually using a periosteal elevator to expose defect margin. The subsurface of the flaps were carefully curetted to remove pocket epithelium. The granulation tissue in the furcation defect was removed, and the exposed root surface including the roof of the furcation, was scaled and planned using hand instruments and ultrasonic instruments.
After irrigation with physiologic saline solution and obtaining haemostasis, intra surgical measurements both horizontal and vertical defect depth at the furcation site were obtained. 1) Horizontal defect depth (HDD) of the furcation defect was measured horizontally at its deepest location, using William's graduated periodontal probe and another reference probe placed across the most prominent root surface to bridge the first probe. 2) Vertical defect depth (VDD) of the furcation defect was measured vertically at its deepest location using the fornix of the furcation as the fixed reference point. Root surface modification was done by using LASER. A bioabsorbable membrane (BioMesh-S®, Biodegradable GTR barrier, Samyang crop, Korea) was trimmed to cover the defect 2 mm beyond the edge of furcation defect and placed on the tooth with the help of loose sutures to cover the furcation defect. Then the bone graft was placed directly into the furcation defect after which the bioresorbable membrane was sutured over the defect. The flap was carefully closed over the site, ensuring that the membrane was not moved, and the buccal or the lingual entrance of the furcation defect was completely covered. The flap was coronally repositioned and sutured in such a way that the flap margin was located 1 to 2mm coronal to CEJ, thereby completely covering the membrane.

Results
A total of 5 patients in the age range of 32-39 years with grade II Furcation defects on mandibular first molar were included in the study. During the 6 months study period, the wound healing was uneventful. No bioresorbable membrane was necrosed, nor were any of the sites eliminated from the study. None if the selected patients dropped out before the termination of the study and all the patients were satisfied with the results. The Clinical parameters were recorded at baseline and 6 months post surgery as shown in Tables 1.

Discussion
The aim of the present study was to evaluate, the effectiveness of DFDBA in combination with bioresorbable membrane (Biomesh) and LASERS in the treatment of mandibular class II furcation defects in humans.
A primary goal of periodontal therapy is to reduce the pocket depth. In the Present study V-PPD was reduced from 3.65mm at baseline to 2.3mm at 6 months post surgery with mean V-PPD reduction of 1.3mm. Similar study was proposed by Ozcelik *et al* (2008) [8] who reported a PPD reduction of 1.3mm at 12 months post surgery by using EMD and LLLT.
Another important goal of regenerative furcation therapy is to reduce the magnitude of the furcation defect. Significant amount of gain in vertical attachment of 2.31 mm and horizontal depth of 2mm was obtained with the use of bone grafts, GTR and LASER. Ozcelik *et al* (2008) showed a mean gain of 3.1 mm at12 months post surgery. Mean gain in CAL was may be due to the production of basic fibroblast growth factor.
The main clinical end point to treat furcation lesion is the full closure of furcation, or the conversion of a deep into a shallow lesion (Sanz& Giovannoli 2000) [9]. In the complete closure of the Furcation defect was obtained in all the five cases.

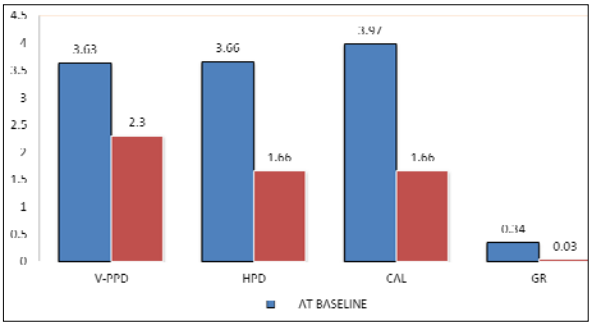

Fig 1: Comparison of clinical parameters between baseline and 3 months post-surgery

Fig 2: Incision made at the surgical site

Fig 3: Reflection of flap

Fig 4: Vertical defect depth measurements

Fig 5: Horizontal defect depth measurements

Fig 6: Root surface biomodification by LASERS

Fig 7: Placement of bone graft and GTR

Fig 8: Flap sutured

Fig 9: Placement of Periodontal Pack

Fig 10: Post-operative after 6 months

Conclusion

Significant improvement in the clinical attachment level, horizontal defect depth vertical probing pocket depth at 6 months postsurgically which showed that the use of Combination of GTR, bone graft and LASER was a viable treatment for the management of grade II Furcation defects.

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