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Use of cyanoacrylate as barrier in guided tissue regeneration in class II furcation defects

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Abstract

The guided bone regeneration (GBR) is a technique that uses resorbable and non-resorbable membranes in association with other filling biomaterials. GBR is one of the optional treatments for therapy of class II furcation defects. The current case report evaluates clinically and radiographically the use of the cyanoacrylate membrane (Glubran ®2) associated with organic bovine bone (GenOx) for the treatment of vestibular class II furcation defect on the lower left molar. Conclusion: The GBR is an option in the treatment of vestibular class II furcation defects and cyanoacrylate surgical glue, acting as a mechanic barrier and providing an efficient stability for the graft.

Keywords: Bone regeneration, furcation defect, guided bone regeneration

INTRODUCTION

The periodontal disease is one of the most prevalent diseases of the oral cavity. The affected tissues in periodontics, such as periodontal ligament, cementum, and alveolar bone, suffer morphological alterations and cause negative consequences to the patients oral health.[1] The periodontal therapies have as an objective the control of the disease progression and inflammatory process giving back the function of the lost support structures. The furcation site is frequently affected by periodontal disease mainly due to its specific anatomy that complicates the effectiveness of calculus removal and decontamination of the area.[2] Factors such as root trunk length, furcation entrance, root separation, and root surface area can affect diagnosis, and consequently, the choice of the appropriate therapy for furcally involved molars.[3] Gottlow *et al.*[4] once suggested that guide tissue regeneration (GTR) could restore the lost periodontal tissues in class II furcation defects. In order to avoid a second surgery for membrane removal, a bioresorbable barrier was developed. Difficulties with barrier membranes have included in space maintenance of the site and limited bone fill in furcation areas. Alternatively, class II furcation bone replacement grafts have achieved similar results to GTR barriers. The use of bone graft materials has been suggested as beneficial with non-resorbable and resorbable barriers. Most reports suggest an enhanced effect of combined therapy. Guide bone regeneration (GBR) is based on the formation of new bone to fill bone defects.[5] The result of the GTR depends on the membrane stability, the flap first intention healing, and patients compliance.[6] Some complications can occur with the membranes such as: Exposure, collapse, and infection, causing the

regeneration to fail. If during the healing process occurs a displacement or collapse of the membrane, the formation of the new bone will be affected. The procedures will result in healing with long junctional epithelium and limited connective tissue attachment.[7]

The bone substitutes present themselves commercially in many ways: Organic and inorganic, cortical or spongy, macro or and micro particles, block, floccus and fragments.[8] The demineralized bovine bone, with 0.5 to 1.0 mm particles, is a biocompative bone substitute, acellular, not cytotoxic, not immunogenic, not pyrogenic and of high level of purity, indicated for the filling of bone failures. Its mechanism of action is by osteoconduction and act again as support for bone being reabsorbed and bone matrix formation on the place, allowing this material to be used isolated or in association with graft materials with the osteoinductive or osteogenic action.[9]

The surgical glue used for helping in a lot of procedures is consisted of on N-butil-2-cyanocrylate (NBCA) modified by the addition of a monomer. It has high hemostatic and adhesive properties and, once solidified, produces an antiseptic barrier effective against against infectious agents or pathogens frequently found in surgical environment. It is light yellow, transparent, and ready for use.[10] When in contact with tissue or humid environment, it polymerizes rapidly, creating a thin elastic coating with high resistance to tension, which guarantees a solid accession of the tissues. This coating adapts itself naturally to the tissue anatomy which is applied, it is waterproof, and is not damaged by blood or organic fluids. Once solidified, the coating can be perforated by a suture needle, once the product polymerization does not form crystalline aggregates. The polymerization time is short when correctly applied; starts its solidification after around 1 to 2 seconds, completing its reaction after around 60 to 90 seconds. The reaction of polymerization occurs at an approximated temperature of 45°C.[10]

The treatment of molar furcation defects remains a challenge. A combined GBR therapy with bioabsorbable hydroxyapatite and tetracycline or GTR with a coronally advanced flap showed better results on furcation closure compared to open flap debridement.[11]

The use of lyophilized bovine bone in association with the NCBA-glue as a barrier in attempt to treat Class II furcation lesions can be an option of treatment. Therefore, the objective of this study was to evaluate the clinical response of GBR and barrier of NCBA surgical glue (glubran glue 2) in the treatment of mandibular buccal Class II furcation lesion.

CASE REPORT

A 30-year-old healthy man, leukodermic, non-smoking presented for treatment in the dental clinic at Positivo University. Anamnesis and clinical examination were performed and the periodontal clinical parameters were assessed and are described in Table 1. No systemic problem or use of medicines was reported. It was observed, a clinical attachment loss (CAL) at buccal surface of the tooth 37 and class II furcation lesion through the buccal-lingual (B-L) direction. The patient was submitted to a basic periodontal therapy and hygiene orientation. After 90 days from baseline, the patient was reevaluated [Figure 1a–b]. Once the furcation lesion was still present and remained on similar levels as the initial periodontal exam, it was decided by a surgical intervention. The proposed treatment was GBR associated with NCBA-glue as a barrier [Figure 2]. The surgical procedure began with extern antisepsis, with polivinil-pirrolidonaiodo (PVPI) and mouthwash with chlorhexidine digluconate at 0.12% (Periogard®) during 1 minute. Surgery was performed under local anesthesia (Mepivacaine with epinephrine 1:100.000). A reverse bevel incision was from the distal face of tooth 37 and extending to the mesial face of the same tooth, encompassing the papillae with vertical releasing incisions beyond the mucogengival line in a full thickness flap [Figure 3]. The furcation defect was filled with GenOx Org cortical® (Genius; Baumer S.A. –Biomaterial Division, Made in Brazil), [Figure 4] moistened with physiological serum, inserted in the furcation area with a type Lucas no 2. One milliliter of surgical glue was applied with an insulin syringe distributed over the graft in drops [Figure 5]. Once polymerized, when in contact with blood, a homogeneous coating is formed. The flap was replaced and sutured with a 5-0 mononylon wire (Ethicon- Johnson and Johnson). For postsurgical pain control, 600 mg ibuprofen every 4 to 6 hours and 500 mg amoxicillin was prescribed three times daily for 7 days.

It was observed after 10 days post-treatment, [Figure 6] the gingival margin was on the same level of the cemento-enamel junction. No complications were observed at the treated site, no acute inflammation neither an abscess. The patient was evaluated after every 3 months until complete 1 year. After 1 year of treatment it was observed that a small CAL had occurred at the buccal site. The furcation region had a horizontal bone gain [Figure 7a–b].

DISCUSSION

The proposed treatment for this case report was GBR associated with NCBA-glue as a barrier in a class II furcation lesion. It has been shown that the use of bone graft for filling the buccal defect of molar with class II furcation lesion associated with a membrane of NCBA-glue to stabilize the bone graft resulted in a horizontal bone gain and clinical stability.

The treatment of bone defects is a challenge for periodontists that always seek for a complete closure. Also, the studies that involve class II furcation lesion treatment need a larger time of proservation to evaluate the durability of the clinical effects and confirm the results.[7]

Beyond the influence of anatomic characteristics of furcation lesion, the location in the arc and the furcation entry position interfere in a negative way in the daily sanitation reducing the periodontal treatment through the bacterial recolonization.[2]

There is no evidence that the GTR associated with bovine graft is a predictable treatment for level III furcation lesion in humans,[1] but it was observed that in class II furcation defects the combination of GTR with a bone substitute and not absorbable membrane found significant results in vertical and horizontal bone level in mandibular molars.[11]

Beyond that, a long-term study has shown that the molars with periodontitis involving furcation have a bigger rate of periodontal destruction.[12] It was descript that to achieve horizontal and vertical bone increase in GTR, four principles must be followed as: The epithelium exclusion and the conjunctive tissue, maintenance of space, clot stabilization and primary wound closure, to allow that osteogenic cells invade the GTR area.[5,12]

According to the literature, the size of bone particles can interfere with the GBR therapy success. When a liophillized demineralized bone is used in particles sizes of 0.12 to 1.00 mm have a better osteoinductive effect then the particles smaller than 0.12 mm. Very small particle sizes can cause an answer of macrophages and are rapidly reabsorbed with a little or no bone formation.[8]

The use of barriers in GTR optimizes the results and confirms a bigger gain of clinical insertion level. A study done by Montanaro *et al.*, 2001, about the cytotoxicity of the Gulbran2 and its compatibility with blood showed that the toxicity is associated with the polymerization heat and that the glue has an acceptable toxicity when diluted and presented blood compatibility,[13] and it was also verified in the present study. Surgical glue have a strong capacity of ligament with the biological tissues and high resistance when polymerized, and resistance to traction.[10] A membrane of NCBA-glue has been used in surgical procedures and endoscopes where tissue adhesives are commonly used as reinforcement of sutures or as collage and homeostatic agent.[7] The use of NCBA-glue as barriers had optimized the results in class II furcation lesion treatment.

CONCLUSION

The guided tissue regeneration is an option in the vestibular level II furcation lesion. The surgical glue provided a faster surgery time and efficient stability of graft.

Footnotes

Source of Support: Nil

Conflict of Interest: None declared.

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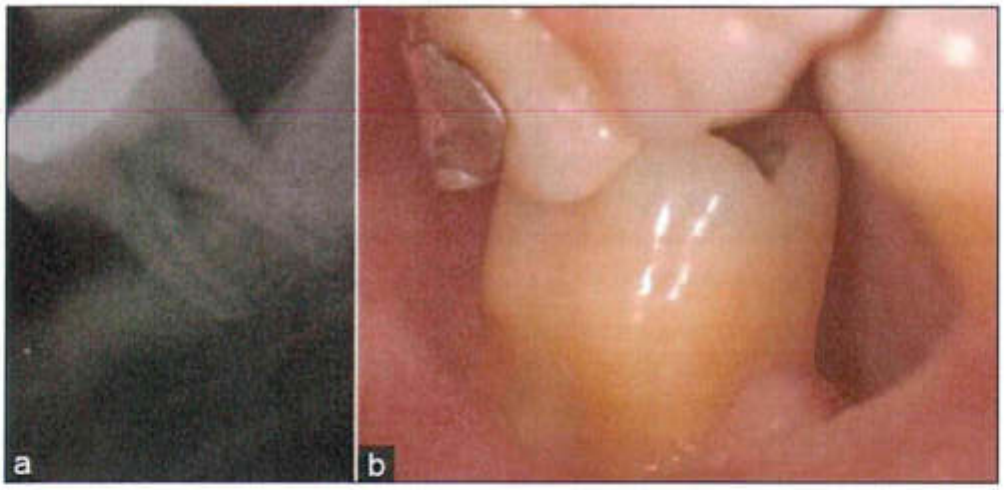
Figures and Tables

Figure 1

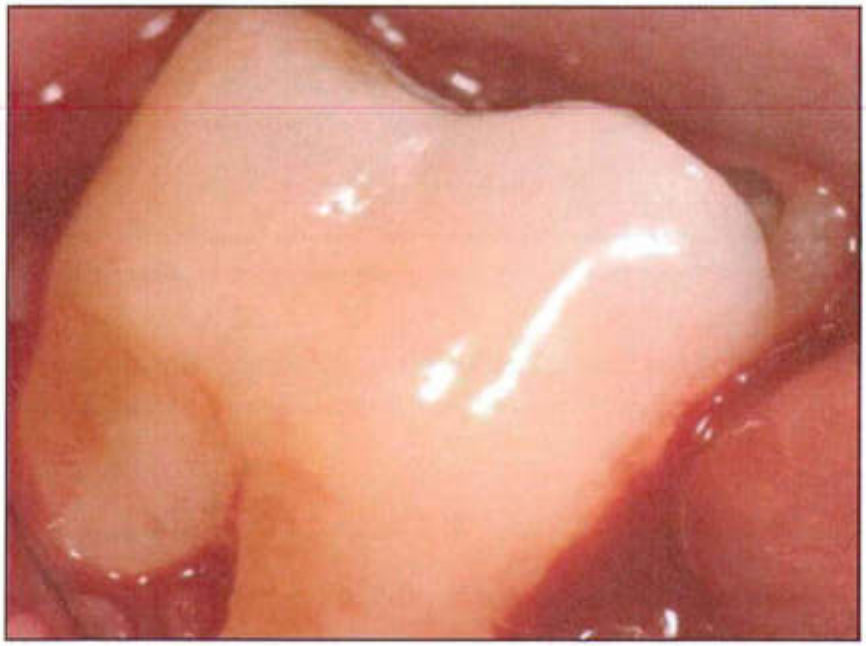


(a) Initial X-ray from tooth 37. (b) Initial clinical aspect of element 37 (buccal)

Figure 2

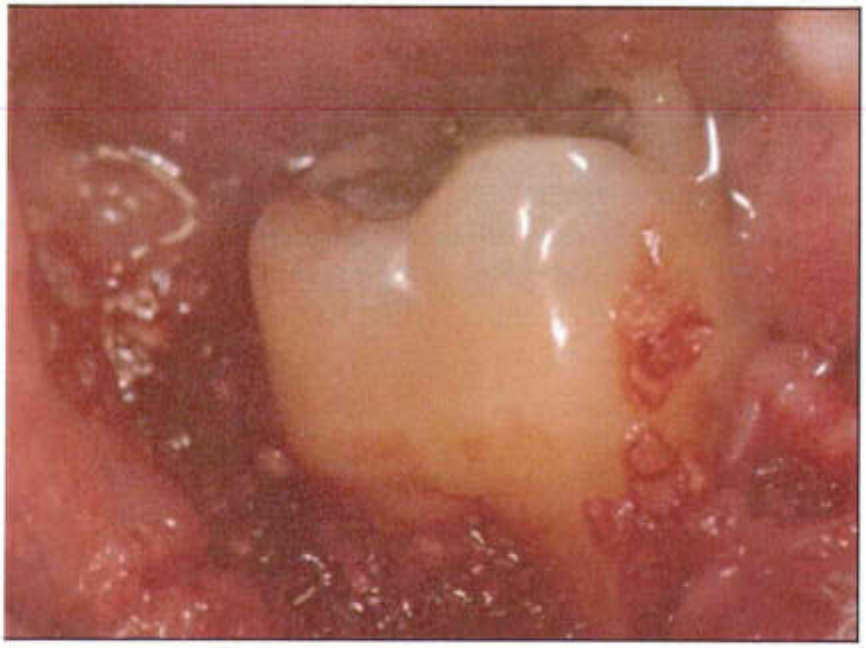
Surgical glue (NBCA) used as a barrier

Figure 3



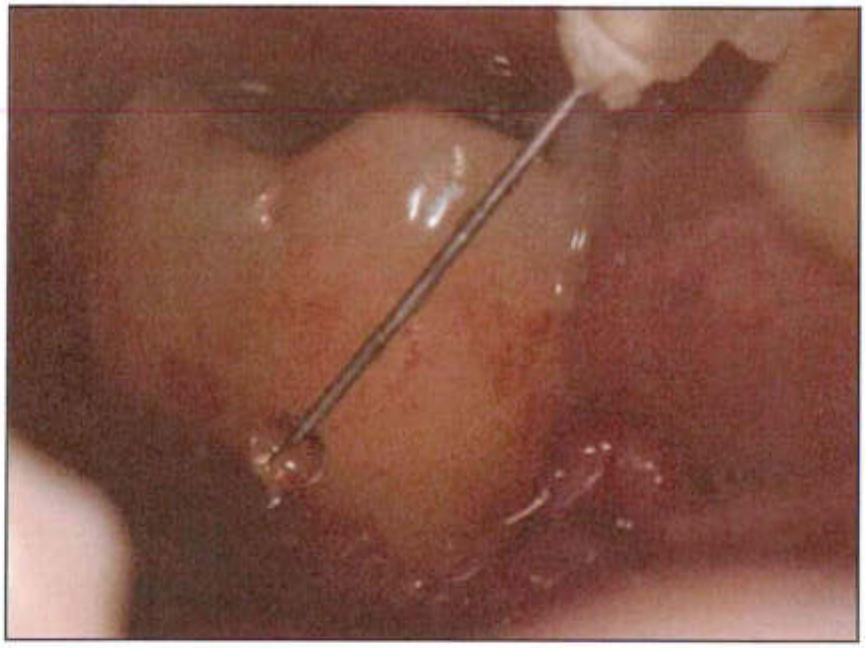
A full thickness mucoperiosteal flap reflected. Furcation class II exposion on toth 37

Figure 4



Furcation area with biomaterial-organic lyophilized bone graft

Figure 5

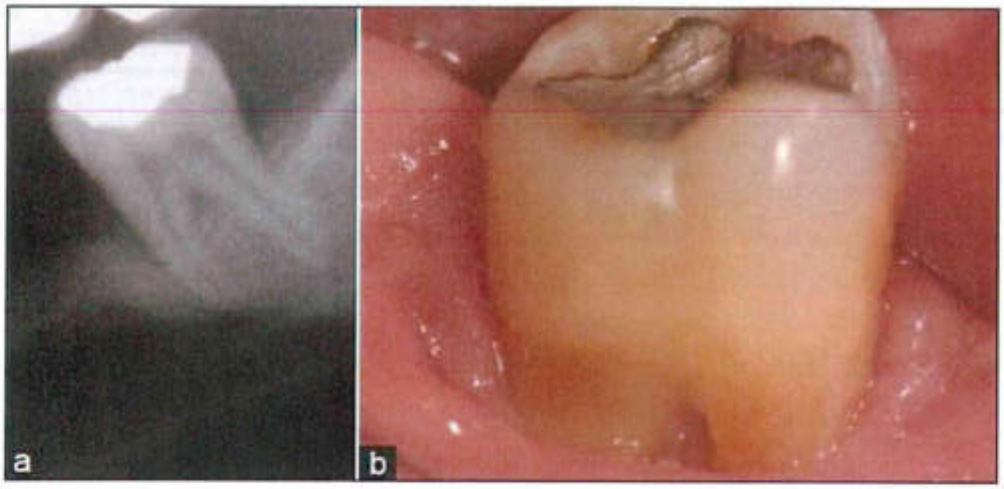


Setting the surgical glue on the bone graft

Figure 6

Clinical buccal aspect (one month post surgery)

Figure 7



(a) X-ray after 1 year of follow up. Overestimation of the furcation involvement on tooth 37. (b) CAL at buccal site, but absence of furcation lesion