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*Case report*

# Guided bone regeneration is a reliable technique in implant dentistry: An overview and a case report

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## *Abstract*

**Introduction**

The use of dental implants has become a widespread and predictable treatment modality for the restoration of missing teeth and various edentulous cases. It is clear that the use of a regenerative technique with dental implant placement is an important step which assists the process of bone regeneration. As the clinical success of implant therapy is based on osseointegration, defined as the direct anchorage of the implant in the bone tissue without the interposition of fibrous tissue, considerable research has been conducted to promote bone growth. The basic principle of Guided Bone Regeneration (GBR) involves the placement of mechanical barriers to protect blood clots and to isolate the bone defect from the surrounding connective tissue, thus providing bone-forming cells with access to a secluded space intended for bone regeneration. The use of GBR to treat bony defects around dental implants has been extensively documented throughout the past decades and among all the available non resorbable barrier membranes used for GBR procedures, membranes made of e-PTFE have become the membrane of choice in many clinical situations. Data reported in the literature seem to demonstrate that GBR procedures are a reliable means for augmenting bone in cases of vertical and/or horizontal defects in partially edentulous patients. These data suggest that GBR should be considered a reliable technique for obtaining bone formation and placing dental implants in cases in which it would otherwise not be possible. This paper reports an overview and a clinical case about the use of GBR in implant surgery.

**Case report**

A 54 year old male underwent surgery with the guided bone regeneration technique (GBR) at the same time of insertion of two implants elements 3.6 and 3.7 (Figure 1). After the insertion of the implants, bone chips have been put around them and covered with a e-PTFE membrane with a core of titanium (GBR). After seven months, it has been seen how the bone graft had completely and totally caught on to the plants and receiving bone. Then it was proceeded to the second step surgery with the insertion of the abutment on which to place the implants later. In this circumstance, the keratinized gingiva was split and positioned around the healing abutment.

**Conclusion**

Based on our result, combined with the information already available in the literature, we may state that GBR is a safe and effective technique for obtaining bone formation and placing dental implants in cases in which it would otherwise not be possible, even if an ideal membrane for treatment is not yet established.

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## *Introduction*

The use of dental implants has become a widespread and predictable treatment modality for the restoration of missing teeth and various edentulous cases[1,2,3]. As progress in material and implant design continues dramatically over time, implant patients have been demanding treatment protocols that take less time and require fewer surgeries[4]. To achieve a good osseointegrated implant with a high degree of predictability, the implant must be sterile, biocompatible, inserted with an atraumatic surgical procedure, placed with initial stability, and non-functionally loaded during the healing period[5]. It is clear that the use of a regenerative technique with dental implant placement is an important step which assists the process of bone regeneration[6,7]. The basic principle of GBR involves the placement of mechanical barriers to protect blood clots and to isolate the bone defect from the surrounding connective tissue, thus providing bone-forming cells with access to a secluded space intended for bone regeneration[8]. It has been recommended that the use of synthetic bone graft material with dental implant placement, as with guided bone regeneration, is important for the preservation of ridge width. In addition, the healing period of the alveolar bone after extraction usually needs 6 to 12 months and sometimes more before placement of the endo-osseous implant[9]. The evolution of surgical techniques, awareness about tissue biology and improving

**Figure 1A:** Missing elements: clinical image.

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quality of implants over time has enabled immediate and early loading protocols to be efficient and reliable if reasonable guidelines are followed. As the clinical success of implant therapy is based on osseointegration, defined as the direct anchorage of the implant in the bone tissue without the interposition of fibrous tissue, considerable research has been conducted to promote bone growth. Many techniques have been developed to reconstruct deficient alveolar jaws for the placement of dental implants performed either in combination or in second stage surgery after a period of healing[10]. The development of the guided bone regeneration (GBR) technique started in the late 1980s with a series of experimental studies. Then clinicians started to use barrier membranes in implant patients for various clinical indications[11]. The use of GBR to treat bony defects around dental implants has been extensively documented throughout the past decades and among all the available non resorbable barrier membranes used for GBR procedures, membranes made of e-PTFE have become the membrane of choice in many clinical situations.

This case report describes a case of GBR using to split keratinized gengiva around implants in order to improve the healing of a surgical wound.

## Case report

A 54 year old male, with an unremarkable history, had partially edentulous of the posteriors areas of the mandible. He underwent surgery with the guided bone regeneration technique (GBR) at the same time of insertion of two implants elements 3.6 and 3.7 (Figures 1a-b). An incision was made along the alveolar crest mucosa with exhaust front at the level of 3.5 and rear. The mucosa was therefore detached with exposure of the ridge. After the insertion of the implants, bone chips have been put around them and covered with a e-PTFE membrane with a core of titanium (Figure 2) (GBR). After seven months, it has been seen how the bone graft had completely and totally caught on to the plants and receiving bone (Figure 3a/b and Figure 4). Then it was proceeded to the second step surgery with the insertion of the abutment on which to place the implants later (Figure 5). In this circumstance, the keratinized gingiva was split and positioned around the healing abutment (Figure 6). This has allowed a better engraftment of the gingival mucosa to the system and therefore a better healing of the surgical wound.

**Figure 3B:** Healing soft tissue 7 months later.

**Figure 1B:** Missing elements: X-ray.

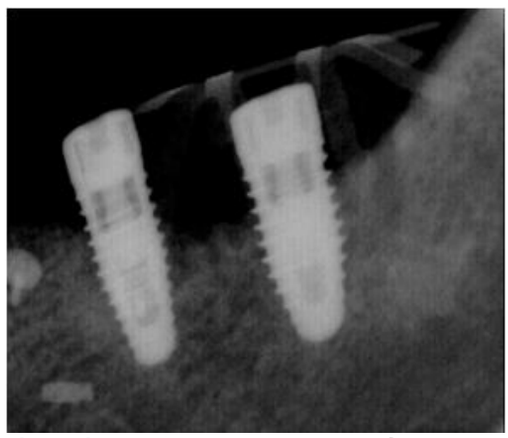

**Figure 2:** Titanium core PTFE-E membrane.

**Figure 3A:** Healing soft tissue 7 months later.

## Discussion

Adequate bone volume is an important prerequisite for a predictable, long-term prognosis in implant dentistry. However, some patients present with insufficient horizontal or vertical bone, which frequently precludes the successful outcome of an ideal implant placement[12].

Data reported in the literature seem to demonstrate that GBR procedures are a reliable means for augmenting bone in cases of vertical and/or horizontal defects in partially edentulous patients. These data suggest that GBR should be considered a reliable technique for obtaining bone formation and placing dental implants in cases in which it would otherwise not be possible[13].

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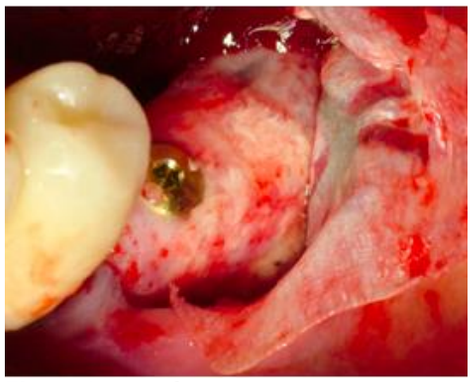

**Figure 4:** second time surgery.

The criticism of these types of studies is the fact that the success of the GBR procedure is assessed through a two-dimensional measurement of the mesial and distal radiographic bone level at the implant site and further clinical parameters. However, in the majority of these GBR procedures, the bone augmentation was performed mainly on the buccal aspect of the implants. Hence, there is limited date available for long-term controller clinical studies assessing the bone dimensions at the buccal aspect of the implants, which have been placed simultaneously with bone regeneration procedures[14]. A very recently published prospective, cross-sectional study reported on the long-term outcome of implants placed simultaneously with GBR procedures. Stable perimplant hard and soft tissues at the buccal aspect were reported after a follow-up time of 5–9 years[15]. It has been reported that the membrane barrier is one of the reconstructive treatments of choice used in a variety of different conditions, such as dehiscence, and adjunctive to immediately replace dental implant. The membrane barrier should be biocompatible, giving a space maintenance tissue integration[16]. The goal of contour augmentation is the establishment of a facial bone wall of sufficient height and thickness to serve as a support for aesthetic soft tissues. The dimensions of this facial bone wall can be examined only by 3D radiographic imaging. Today, CBCT technology offers excellent image quality with a clearly reduced radiation dose risk for the patient when compared with dental CTs. The concept of GBR for the reconstruction of the alveolar ridge defect prior to implant placement has been developed in an effort to optimize treatment strategies. Research from animal and clinical studies in this field is still ongoing in order to establish an ideal membrane for treatment.

## Conclusion

Based on our result, combined with the information already available in the literature, we may state that GBR is a safe and effective technique for obtaining bone formation and placing dental implants in cases in which it would otherwise not be possible, even if an ideal membrane for treatment is not yet established.

The technique of GBR, with non-resorbable membranes, is a very predictable technique and with excellent results, provided that you comply with the universally accepted surgical procedure, the surgeon should have extensive experience in handling especially surgical soft tissue to cover the non-resorbable membrane, which is the key to success.

Literature has recently confirmed the importance of the presence of keratinized gingiva around the implants, in order to ensure their survival and to cope with peri implantitis.

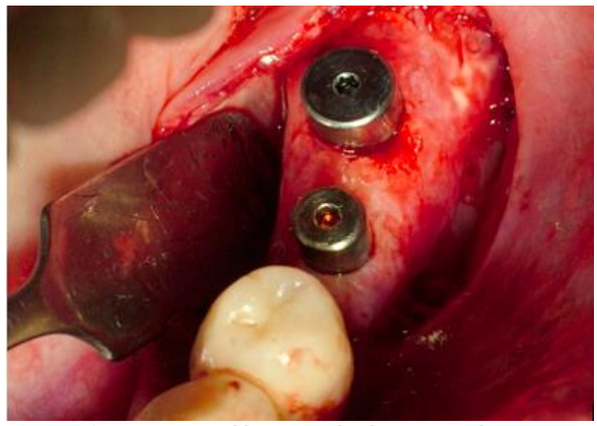

**Figure 5:** Regenerated bone graft after 7 months.

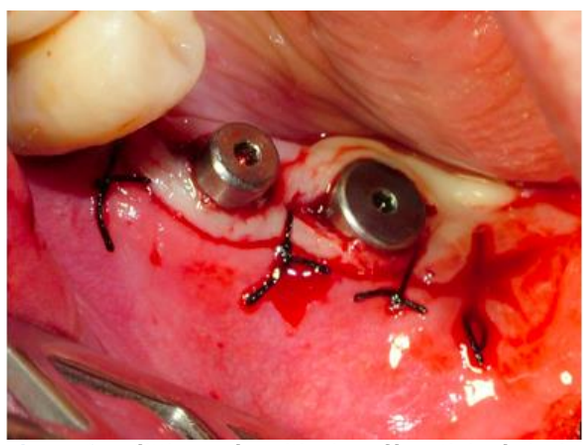

**Figure 6:** splitting and positioning of keratinized gingiva around the healing abutment.

## Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

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