The New Norms for Ridge Augmentation in Aesthetic Area

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INTRODUCTION

Guided bone regeneration (GBR) is considered one of the most widely accepted procedures for alveolar ridge augmentation. This technique offers favorable outcomes in terms of bone augmentation with long-term follow-up after implant placement. Its predictability has been demonstrated for many years enabling adequate regeneration of the bony defects and rendering proper esthetic and function to the dental implant prosthesis. Depending on the morphology and extension of the defect, different variations of GBR have been described. In addition, onlay block grafting (OBG), distraction osteogenesis (DO), ridge splitting (RS) and mandibular inter-positional grafting (MI) have also been documented as viable options for proper bone regeneration. However, the conventional ridge augmentation technique may present drawbacks and limitation including membrane exposure, infection of the site, resorption of the materials and the need for additive augmentation procedures due to unpredictable results.

Minimally-invasive implant surgery is gaining popularity. The essence of minimally-invasive procedures should be one that encompasses an efficient and meticulous surgery with minimal intra-operative complications through thorough pre-operative assessment and planning, resulting in faster healing. Detailed patient assessment, diagnostic wax-up of the anticipated restoration in relation to the edentulous ridge, and Cone Beam Computed Tomography (CBCT) with radiographic templates improves the assessment of edentulous sites and are essential for treatment planning. Recently, 3-D printing has become commercially available and the CBCT DICOM file can be converted to a stereolithographic file, which can then be employed to construct a three-dimensional cranial model. Clinicians can familiarize themselves with a patient's edentulous ridges and rehears the planned procedures with these models.

The recently introduced Customized Alveolar Ridge Splitting (CARS) technique may represent a viable, minimally-invasive augmentation technique for horizontal bone defects. This customized alveolar ridge splitting technique is indicated for treating severely atrophic horizontal ridges that consist of only cortical bone with a reduced blood supply. This type of defect often requires multiple surgeries to obtain the necessary horizontal bone volume before dental implants placement. The objective of CARS is to convert an extraosseous defect into an intraosseous one with the aid of a trephine drill. The science behind CARS is based on the buccal gap distance described by Greenstein et al. for immediate extraction sockets (15). If the distance between the implant and the buccal plate is less than 3 mm, additional bone graft material is not indicated. The only indication to place graft material is in esthetic cases where a xenograft material is placed externally to enhance ridge contour and to prevent further resorption of the cortical plate in accordance with Hom-Lay Wang et al. As described by Froum and Kadi et al., CARS has similar success rate compared to the conventional ridge splitting technique, but demonstrated reduced patient morbidity, shortened treatment time and minimized surgical site as the expansion is localized to the planned implant site.

The choice of an appropriate surgical solution for a site-specific problem or a complex defect depends on the understanding of the expected outcome and limitation of the chosen procedure as well as its associated complication rate. The aim of this report is to present the new norms for ridge augmentation procedures in aesthetic area.

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CASE REPORT

Case 1. #10 missing, implant placement and conventional GBR

The conventional ridge augmentation technique may present drawbacks and limitation including membrane exposure, infection of the site, resorption of the materials and the need for additive augmentation procedures due to unpredictable results.

Case 2. #9 missing, CARS with GBR

The Customized Alveolar Ridge Splitting (CARS) technique represent a viable, minimally-invasive augmentation technique for horizontal bone defects. This customized alveolar ridge splitting technique is indicated for treating severely atrophic horizontal ridges that consist of only cortical bone with a reduced blood supply.

Case 3. #6 missing, CARS with delayed implant placement

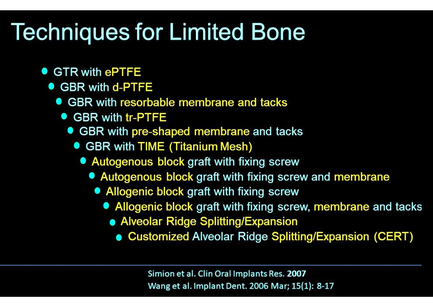
If the segment is densely corticated with minimal blood supply, a two-stage approach of bone grafting then re-entry for implant placement could be considered. In the scenario where fractured occurred, wait at least 2 months after re-adaptation of the trephined segment.

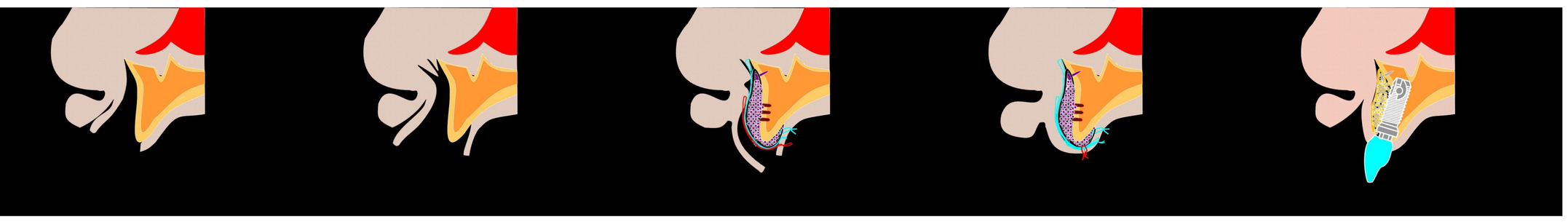
Case 4. #10 missing, CARS with simultaneous implant placement

Using 3D printed models to simulate surgery is recommended as clinicians can have a better idea of the anatomical deficiencies in their patients and plan their surgeries with the final esthetic outcome in mind. GBR could be considered in combination with CARS to improve ridge contour.

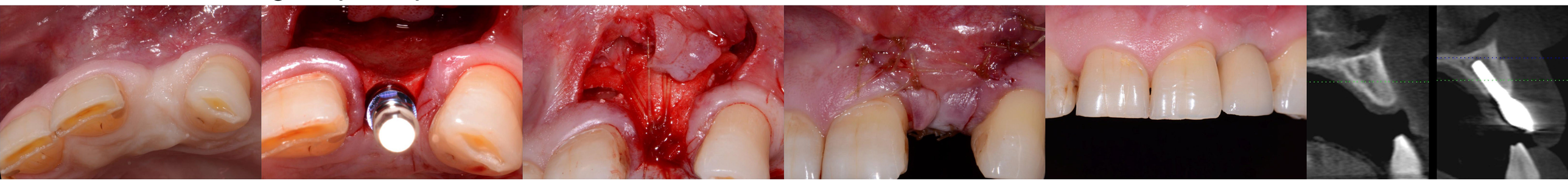
SEQUENCE OF PROCEDURE

History of ridge augmentation Sequence of conventional GBR technique

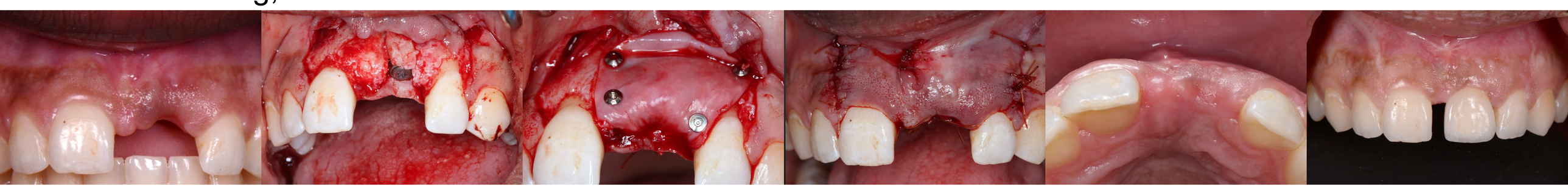




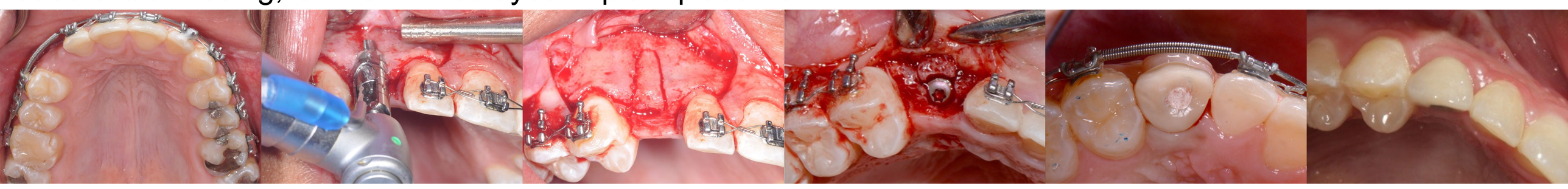
Case 1. #10 missing, implant placement and conventional GBR



Case 2. #9 missing, CARS with GBR



Case 3. #6 missing, CARS with delayed implant placement



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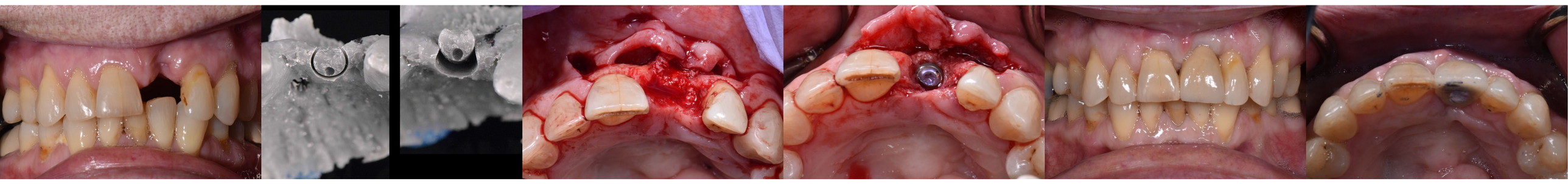

CONCLUSION

Differences in the anatomy, biomechanical loading and esthetic demands make treatment needs for implant placement at different anatomical locations distinct from one another. The current report demonstrated a successful outcome using the CARS technique simultaneously with SA to enable implant placement. The step-by-step surgical treatment showed an alternative way to create hard and soft tissue while minimizing the postoperative risks and complications of other surgical techniques.

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