Treatment options for restoring missing mandibular incisors

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To date, the treatment options for restoring missing mandibular incisors have been frequently reviewed and researched. Historically, the conventional approach for replacing mandibular incisors was the utilization of a fixed partial denture (FPD) or removable partial denture (RPD), depending on the number of missing teeth that determined the extent of the prosthesis.

At present, given the fact that the growth in dental implants and implant-based dental reconstruction products and services outstripped all other areas in dentistry, the No. 1 treatment choice for restoring missing mandibular incisors would be an implant-supported FPD.

Yet, there are situations where the treatment options associated with the restoration of missing mandibular incisors is not as clear. This case report represents a patient in his 30s who lost all four mandibular incisors subsequent to a sports injury that took place several years ago (Figs. 1a, b).

Ultimately, the intent of this case report is to explore the various treatment options for replacing mandibular incisors. Given the specific anatomical complexity, the future esthetics, phonetics, occlusion...
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As observed in this clinical intraoral image, all four mandibular incisor teeth are missing. Note the knife-edge shape of the gingival tissue in the area of the missing teeth.

Fig. 2a. Three-dimensional CBCT based cross-sectional slices revealed the edentulous anterior section of the mandible from an entirely different perspective. Note the knife-edge shape of the alveolar crest.

Fig. 2b. A closer look at the 3-D CBCT based cross-sectional slice revealed a very slim knife-edge shape, measuring infinitesimal bucco-lingually in the gingival region of the alveolar crest.

Fig. 2c. The 3-D CBCT based cross-sectional slices also revealed anatomical variances in the lingual aspect of the anterior region of the mandible.

As described in a recent publication in the British Dental Journal,1 when defining the need for a RPD, dentists focused on the anatomical and physical properties whereas patients focused on cost and social sense. The article concludes with the notion that further research on the relationship between denture use and social identity could be beneficial.

Nevertheless, considering the age of the patient and the associated social sense, plus the fact that the price tag in this case was irrelevant, other options were considered.

Case No. 3
Implants-supported fixed partial denture extending from tooth #21 to tooth #26. In this option the specific anatomical complexity and condition is very relevant.

As can be seen in the 3-D CBCT-based cross-sectional slices in Figure 2a, the edentulous section of the alveolar crest in the anterior region of the mandible had a sharp knife-edge shaped ridge.

Interestingly, the 3-D CBCT based cross-sectional slices also revealed anatomical variances in the lin-
gual aspect of the anterior region of the mandible. These variances were reported in the Journal of Oral Implantology in 2007. While no biopsies were performed in that study in order to obtain histological data on these anatomic variances, it was assumed that they are most likely developmental rarefactions (regions of decreased particle density) and radiopacities (regions of increased particle density).

The mere fact that the associated mean bone radiodensity within the anatomic variance measured above the mean bone radiodensity observed in adjacent sites suggested that there were no limitations from a bone quality and implant fixation perspective in these regions.

Furthermore, while the overall success rate of dental implants is high, accomplishing predictable reconstruction and esthetic results for single or multiple teeth replacements with dental implants is challenging, and as dental implants become an increasingly viable treatment for replacing missing teeth, we may encounter more random maxillofacial anatomic conditions.

Therefore, and as seen in this case, with the use of CBCT three-dimensional based dental imaging, we captured a volume of data and through a reconstruction process we constructed images that took the guesswork out of our treatment planning and made us more proficient.

Given the unique slim knife-edge shape, measuring infinitesimal bucco-lingually in the gingival region of the alveolar crest as seen in the 3-D CBCT-based cross-sectional slice in Figure 2b, and the eminent buccal concavity in the alveolar crest as seen in the 3DVR in Figure 3a, the following alveolar bone surgical approaches were considered in preparation for the implants-supported FPD treatment option:

3a) A variety of techniques and materials are used to expand the buccal-lingual dimension of the alveolar crest support for dental implants. Alveolar crest augmentation techniques include several surgical approaches, such as onlay grafting and ridge splitting, to name a few. In this particular case, in order to gain an increase in the buccal-lingual dimension of the alveolar crest, a bone ridge splitting technique was considered.

3b) A different technique used to achieve the buccal-lingual dimension necessary to support dental implants is to flatten the alveolar crest. This technique is also referred to as “tabling” the alveolar crest. However, due to the very slim knife-edge alveolar crest, considerable vertical tabling will be necessitated.

Following an interdisciplinary professional consultation between the restoring dentist and the oral surgeon, a decision was made to consider tabling of the alveolar crest in the middle region where teeth #24 and #25 used to be. This surgical approach would increase the buccal-lingual dimension of the alveolar crest and allow placement of two implants-supported four-unit fixed partial denture.

As seen in Figure 4, a computer-generated image represents a four-unit fixed partial denture supported by two implants. This surgical approach would prevent the tabling of the alveolar crest in the regions close to teeth #22 and #27, avoiding future supporting bone loss, thus significantly improving their long-term life span.

Conclusions

The specific goal of this case report was to review the notion of removable partial denture vs. fixed par-
Case study: fixed partial denture

Fig. 4. A computer-generated simulation representing a four-unit fixed partial denture supported by two implants. As illustrated by the dotted line, the tabling procedure is kept away from teeth #22 and #27.

Tial denture vs. implant supported fixed partial denture in the case of missing four lower anterior teeth.

Scientifically speaking, given the diversity in our patient population, with all due respect to our expertise and experience, the quantitative relationship between successful outcomes in the treatment options discussed in this case report is unknown and awaits discovery through large prospective clinical trials.

Therefore, the decision-making is not easy. The restoring dentists face the difficult task of judging the associated risk factors related to each treatment option that can affect the long-term prognosis of a chosen treatment plan.

As a side note and as mentioned indirectly earlier, oral implantology has become the fastest growing segment in dentistry, and therefore, accurate understanding of critical anatomical information may avoid future failure outcomes with dental implants. While researchers studying these CBCT three-dimensional based dental imaging platforms’ methodologies agree that more outcomes assessment research has a long-term value, in the meantime we must work together to optimize our patients’ health.

To that effect, recent introduction of numerous associated cone-beam CT-based imaging systems and surgical guidance platforms are gradually taking our profession through key changes that have major impact on the way we view and practice oral implantology, ultimately yielding substantial public health benefits, translating into more predictable outcomes, preservation of adjacent teeth, protection of critical anatomical landmarks, and improved esthetics and function.

References


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