타이타늄 밀링법으로 제작한 임플란트 지지 보철물을 이용한 상악 전방 결손 수복 : 증례보고

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Rehabilitation of anterior maxillary deficiency using implant-supported prosthesis with Ti-milled framework : A case report

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Abstract

Prosthodontic management of alveolar bone defects that result from trauma or surgery has been well-documented. For patient with severe ridge defect a meso-structure needs to be fabricated to compensate for the amount of bone loss. The current trend in implant framework design is towards Ti-milling. Direct build-up of ceramics or cementation of prosthesis onto the framework from CAD/CAM or milling process became more and more popular. The purpose of this article is to present a clinical report that describes the use of a Ti-milled framework and compare the results obtained with similar results in the literature.

Key words : meso-structure, Ti-milling

Ⅰ. Clinical significance

In this case report, fabrication of meso-structure is described as what makes use of a Ti-milling procedure to compensate for the amount of alveolar bone defect and support the superstructure.

Ⅱ. Case report

A 31 year-old female presented Chicago Dental Clinic for evaluation and discussion of implant rehabilitation treatment options. Her medical history was significant for mid-facial traffic accident trauma treated through several times of plastic surgery, followed by iliac bone graft surgery onto the maxillary alveolar ridge, unfortunately only to be failed. Patient accepted neither further GBR procedure, nor the fabrication of conventional denture prosthesis.

Intraoral examination revealed severe maxillary alveolar bone defect with the loss of anterior labial vestibular space. Labial muscle insertion was noted to be at the remained residual alveolar ridge. Minimal attached alveolar mucosa was present at the left side of edentulous ridge (Fig. 1).

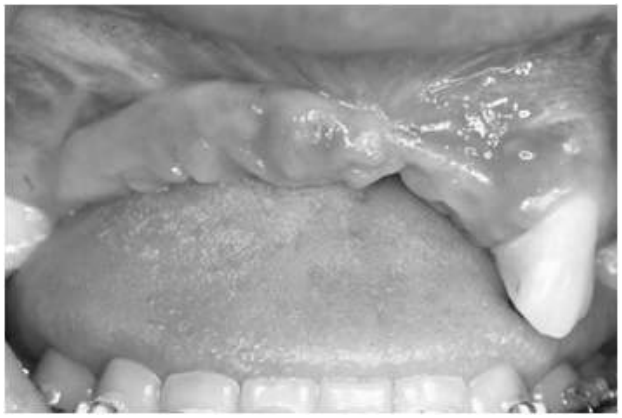

Fig. 1. Maxillary anterior ridge defect from traffic accident

As there was severe alveolar bone loss both vertically and horizontally, implant rehabilitation combined with fabrication of the meso-structure was discussed with the patient in great details.

The patient underwent implant placement using a standard accepted two-stage surgical protocol. Three titanium implants - 4 mm x 10 mm, 4 mm x 8.5 mm, 3.3 mm x 8.5 mm Osseotite (Biomet 3i, Palm Beach Gardens, Fl) and one 4 mm x 10 mm NobelReplace (NobelBiocare, Yorba Linda, CA) were placed in the anterior maxilla (Fig. 2, 3).

Fig. 2. Horizontal and vertical alveolar bone defect at the time of 1st stage surgery.

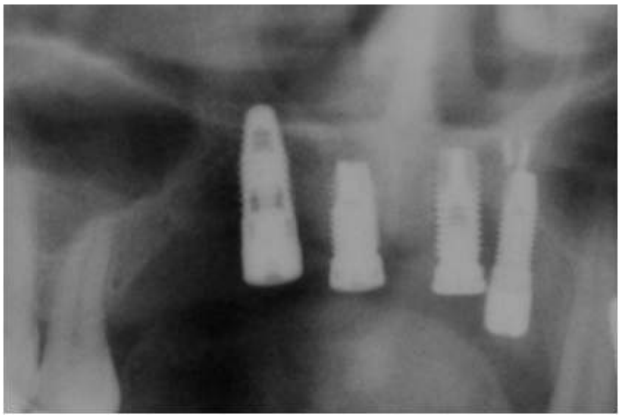

Fig. 3. Implant placement near nasal cavity and maxillary sinus

Post-operative healing was noted to progress uneventfully. The patient returned approximately six months later for implant-uncover and four transmucosal abutments were screwed to place directly on to the implants. Impression was taken with square impression copings.

Castable abutments with gold cylinder were connected to the lab-analogs and full contour wax-up was built on them, in order to verify lip support and pronunciation. Cutback of wax pattern was done on the milling table, followed by double-scanning process to fabricate Ti framework (Fig. 4).

Fig. 4. Ti-milled framework with both internal and external connection at the bottom

Framework was screwed onto the fixtures with the tightening torque of 30 Ncm, and PFM restoration was cemented (Fig. 5). Three years of periodic follow-ups were made and no specific problems such as screw loosening or porcelain fractures were found so far, and the patient was satisfied with the results.

Fig. 5. PFM bridge luted on the Ti-milled framework

Ⅲ. Discussion

Dental implants are currently well accepted as a long-term restorative treatment option in prosthetic dentistry.1 However rehabilitation in maxillary anterior region with implants is not always easy because of inadequate amount of alveolar bone and its poor quality.

PAN shows the history of several big surgeries, resulting in massive loss of alveolar bone in maxillary anterior region (Fig. 6). Where we can get the cortical bone are alveolar crest, upper wall of mandibular canal, lower wall of maxillary sinus, lower wall of nasal cavity, lower border of mandible, buccal and lingual inner wall of alveolar bone, and extraction socket wall. For this specific patient the base of nasal cavity should be considered due to the limited amount of residual ridge. ANS is located 2 - 3 mm above the base of nasal cavity, of which the average length is 4.1 mm. The base of nasal cavity is located lower than the piriform aperture in edentulous patients.2 Anterior margin of left maxillary sinus is shown to be advanced toward the left lateral incisor region, where 9 % of maxillary sinus is found statistically (Fig. 7).3

Fig. 6. Panoramic view with severe ridge defect. Note the advance of left maxillary sinus toward lateral incisor area.

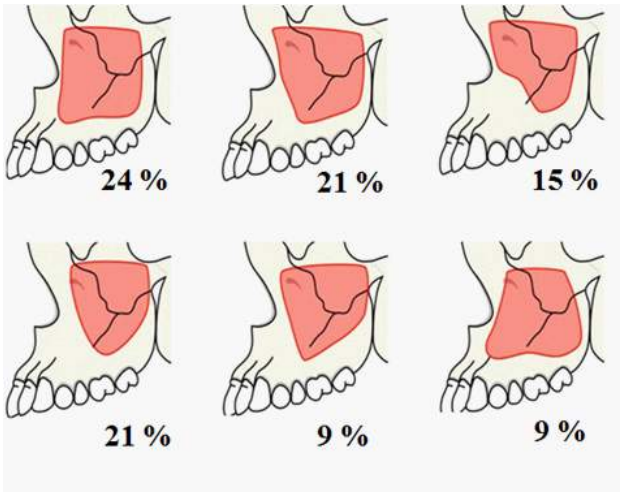

Fig. 7. Various morphology of maxillary sinuses

In order to compensate for the alveolar bone defect, some form of meso-structure must be designed and the framework must be light in weight, considering the disadvantage from too much inverted implant/superstructure ratio. Ti-milled framework was chosen instead of heavy gold framework. Both internal and external type of fixtures were installed together, considering the shape of remaining alveolar ridge, screw loosening problem from possible incomplete passive-fit of the milling processed framework, and the structural aspect of the framework which should resist against the horizontal force from lip. Though internal connection is reported to be excellent at resisting screw loosening,4

passive fit is hard to be gained with multiple internal fixtures. Therefore both types of fixtures were mixed. Verifying the Ti framework on the lab-analog of master cast revealed a slight gap. Even though it was tried with another framework, the misfit during the scanning and milling process was not completely released (Fig. 8). However superior the conventional gold framework' s adaptability may be, the Ti-milling has more advantages such as weight, costs and so on, and is improving continuously. Thus most part of the fabrication procedure of the future prostheses will be replaced with Ti-milled framework.

Fig. 8. Misfit of framework. Not completely solved even with the 2nd framework.

Ⅳ. Conclusions

The technique described could be proved useful in a variety of applications where compensating of severe alveolar bone defect is desired as a part of the overall plan for implant rehabilitation. No post-operative complications were encountered and the patient tolerated all treatments well. According to precision there is still room for improvement, but Ti-milled framework was easy to fabricate and effective stability was maintained over a three-year follow-up period.

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