

## Maxillary anterior single implant prosthesis ; a clinical case

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Achieving an aesthetic implant-supported restoration in the single tooth missing case can be challenging when the implant site is in the anterior region. The objective of this report is to focus on presurgical evaluation of implant site and systematic development of related prosthetic modalities.

An accurate diagnostic evaluation, a systematically developed presurgical plan, and knowledge and clinical skill of the various related therapeutic modalities are indispensable. Collection of patient's information, appropriate abutment selection, soft tissue contour, implant axis, and occlusion need to be discussed for aesthetic clinical outcome.

For aesthetic restoration, such as surgical guide stent for precise implant positioning, customized provisional restoration for development of optimal periimplant soft tissue contours, and fabrication customized abutment (mesiostructure) for variable emergence profile, are recommended.

As dental treatment methods using implants became various, a method called immediate implantation was introduced. It is an increasingly popular treatment method of implanting a fixture right after extraction. However, there are things to take into consideration when the method is applied to an appearance sensitive area. The aesthetic problem can be solved by collecting sufficient information from a patient's intraoral examination, radiography, and model before restoring prostheses. In order to select an appropriate abutment, a patient's periodontium type, thickness of marginal gingiva, gingival contour,

and occlusion need to be analyzed through intra-oral examination. A patient's submergence profile can be examined through radiography while apicocoronal position, long axis, gingival contour, and occlusion of a patient can be analyzed through his working model. It is also important to note that these days a number of patients desire to have not only aesthetic teeth but also aesthetic gingiva.

### CASE REPORT

The subject was a woman aged 23 with chief complaints of discoloration and pain of her max-

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illary right central incisor (Fig. 1). She did not have a notable systemic history besides replantation treatment she had received three years ago after the abulsion of her maxillary right central incisor. The length and diameter (Replace TM D: 4.3mm L: 10mm) of an implant fixture were determined after analyzing her study model and panoramic view. A positioning index was made to construct a surgical stent (Fig. 2) and an individualized healing abutment. During th

e first surgery, the patient's positioning index was taken and her implant fixture was located in the study model (Fig. 3). Right after the surgery, a temporary restoration was manufactured for an

aesthetic reason. A fixed type temporary restoration was built not to hinder the healing of the patient's soft tissue and not to give a heavy load to the fixture. It also had a purpose of fixing a restoration in the patient's mouth so that remove and insertion will not easily take place. The restoration was constructed 2mm above the healing area. Two weeks after the first surgery when the patient's soft tissue was somewhat healed, the temporary restoration was made slightly contacted to the gingiva. Using a fixture mounter, a full contour wax-up was done on the study model in which a fixture was located. After duplication, an individualized healing abutment was



Fig. 1. The picture taken during the first examination of the patient.

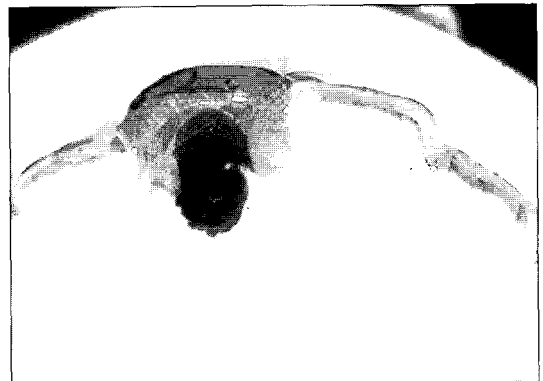
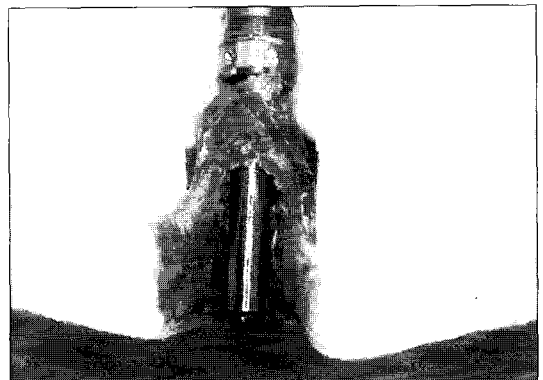


Fig. 2. Occlusal view of the surgical stent.



Fig. 3. The process of locating an implant fixture in the study model during a surgery.



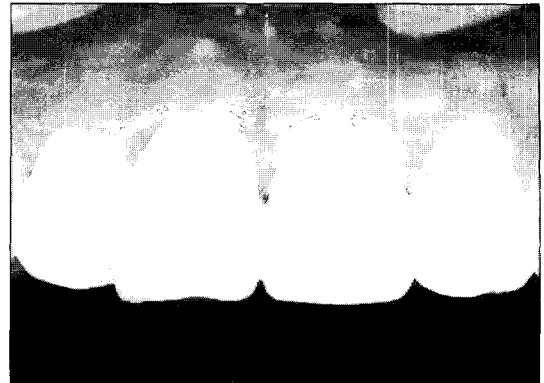


Fig. 4. The wax-up of the study model was duplicated and used to construct an individualized healing abutment, which was installed in the patient's oral cavity.

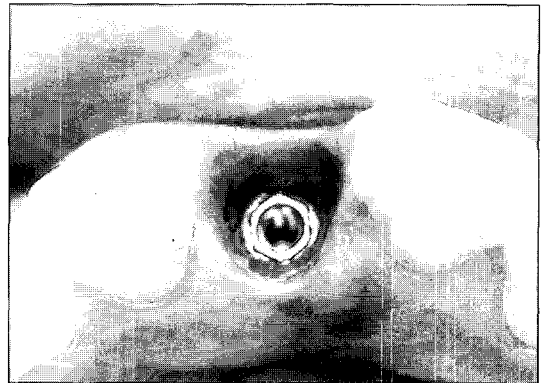
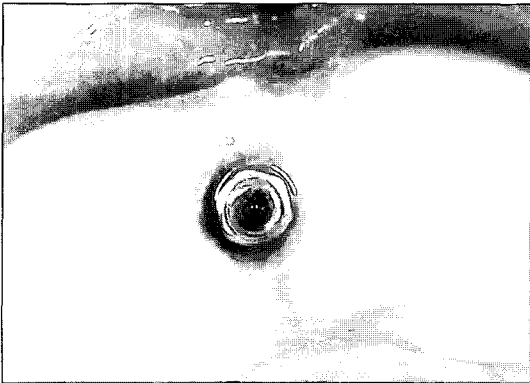


Fig. 5. Before (a) and after (b) contouring the gingiva using the individual healing abutment.



Fig. 6. The duplicated individualized healing abutment is being used as an impression coping.

manufactured and installed two weeks after the second surgery (Fig. 4). The abutment had been installed for eight weeks and the patient was made to check in every two weeks to have her soft tissue examined. When eight weeks passed, the gingiva around the implanted area was similar to its adjacent gingiva. However, slight gingival recession took place since the fixture was deeply implanted (Fig. 5). The individualized healing abutment was duplicated to take the impression of the patient's fixture and gingiva and the duplicated was used as an impression coping (Fig. 6). It is most aesthetic when the margin of a crown is 1~2mm below a gingival margin<sup>9)</sup>. Therefore, a UCLA abutment instead of a traditional one was

used to have a crown margin that is 1.5mm below an even gingival margin. For an aesthetic reason and enhanced biocompatibility with the gingiva, the part where the abutment and the gingiva met was made from gum porcelain while the crown was built from precious PFM with a collarless margin (Fig. 7).

## DISCUSSION

**Periodontium Type.** It was suggested by Ochsenbein and Ross in 1969<sup>29</sup>. They classified the periodontium into a thick flat type and a thin scalloped type. Each type was said to have different inflammatory responses to external stimuli and to periodontal treatments. In 1997, Weisgold

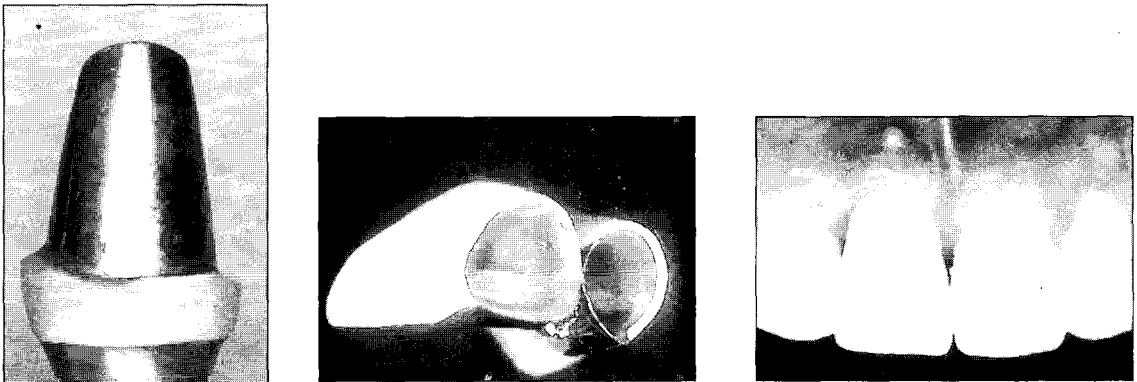


Fig. 7. With the use of a UCLA abutment, the margin of the crown was evenly located 1.5mm below the gingiva. The part where the abutment and the gingiva met was made from gum porcelain (a) while the crown was made from collarless margin (b).

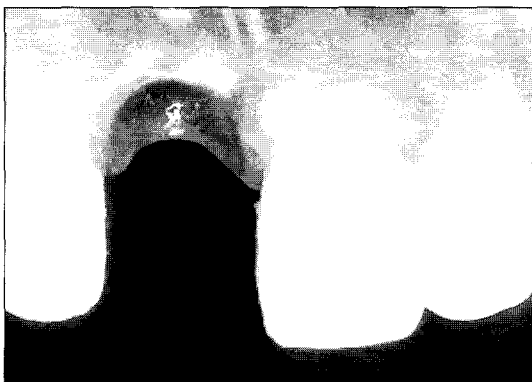


Fig. 8. Right after the patient's thin scalloped type gingiva was contoured.



Fig. 9. The patient's submergence profile was measured to be 5mm.

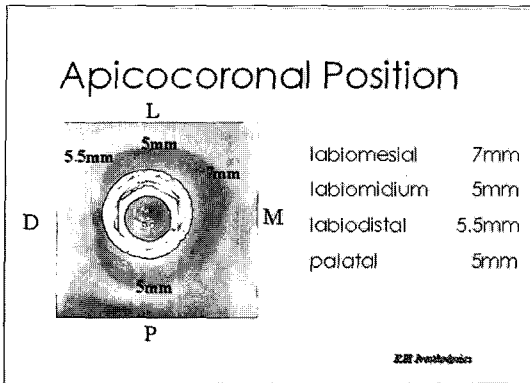


Fig. 10. The apicocoronal position was measured from four areas of the final model.



Fig. 11. The proximal view of the patient's long axis. The patient had a relatively fine long axis.

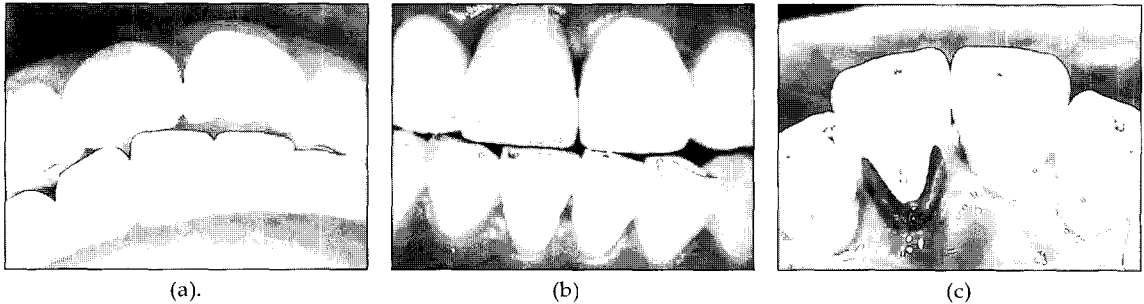


Fig. 12. The patient's four anterior teeth were made discluded for MICP (a). For protrusive movement, occlusion that was weaker than their adjacent teeth was made (b) (c).

applied the idea to implantation<sup>3)</sup>. The patient in this case report had a thin scalloped type pre-dontium (Fig. 8), which is susceptible to external stimuli and causes gingival recession. In an effort to prevent such recession, extra attention was paid in the course of constructing a restoration, but slight gingival recession took place later.

**Submergence Profile.** It is a vertical discrepancy between the fixture head and its adjacent CEJ. It is a vertical space necessary for a round implant with a short diameter to transform into a triangular crown cervical with a long diameter. It is also an index of guided gingival growth during a provisional phase<sup>9)</sup>. The submergence profile of 1 ~ 3mm enables an optimal adjustment of the

gingiva, and the profile of 4 ~ 5mm promises a relatively fine adjustment, but that of over 5mm makes an adjustment difficult. The patient had the submergence profile of 5mm, which made an adjustment of guided gingival growth extremely difficult during a provisional phase and brought about the recession of the gingiva (Fig. 5). In order to prevent it, a surgical stent that can adjust not only the direction but also the depth of an implant fixture needs to be constructed because a submergence profile is determined during a surgery (Fig. 2).

**Gingival Contour.** Peri-implant soft tissue is just like a toy balloon with water inside that can expand to any direction. Thus, an individual-

ized healing abutment can change a form of the marginal gingiva<sup>5)</sup> (Fig. 5).

**Apicocoronal Position.** It is closely related to the diameter of an implant and essential to an aesthetic emergence profile<sup>6)</sup>. When the diameter of an implant is similar to that of an extracted tooth's cervical area, the distance of 3~4mm is required for an aesthetic reason between a free gingival margin and implant shoulders to recover biologic width and peri-implant sulcus. In this study, four areas of labiomésial, labiomidium, labiodistal, and palata were measured from the patient's master model, and the lengths were 7mm, 5mm, 5.5mm, and 5mm, respectively. Since all of them were over 3~4mm and there was deep cervical sulcus, it was difficult to maintain the patient's oral hygiene even though her emergence profile was able to recover (Fig. 9). Thus, the part where the abutment and the gingiva met was made from high biocompatible porcelain to maintain fine oral hygiene.

**Long Axis.** The long axis of an implant determines the dimension of a crown. If a fixture is implanted in parallel with the long axis of a crown restoration, the height of a crown and a natural tooth will be the same. However, if an implant is inclined to the palatal, a restoration with a form of ridge lap will be created on the facial surface, making it hard to maintain fine oral hygiene<sup>7)</sup>. In the process of implantation, a fixture tends to incline to the facial bone softer than the palatal bone. This can be prevented by blocking the labial side when a surgical stent is constructed (Fig. 2). When a restoration was constructed in this study, a long axis was not taken into account since the patient had a relatively fine long axis (Fig. 10).

**Occlusion.** An implant fixture (Replace™ D: 4.3mm, L: 10mm) does not have periodontal ligament and the surface<sup>8)</sup> of the root is only 145mm<sup>2</sup>,

smaller than 204mm<sup>2</sup> of the central incisor and 179mm<sup>2</sup> of the lateral incisor. It is important to consider this during an occlusal adjustment. In this study, the patient's four anterior teeth were made discluded for MICP. For protrusive movement, occlusion that was weaker than their adjacent teeth was made (Fig. 11).

**Thickness of Marginal Gingiva.** The marginal gingiva should be thick on the facial surface to prevent the appearance of metal and inflammatory reaction. Since the patient's marginal gingiva was not thick enough, an abutment and a crown were chosen with caution (Fig. 5b). As a result, the part where an abutment and the gingiva met was constructed from gum color porcelain while a crown was made from collarless margin (Fig. 7b).

## SUMMARY

In this case report, things to take into consideration were studied when a fixture is implanted in an appearance sensitive area. For an aesthetic restoration treatment, a precise examination and an accurate surgical stent should be made. On the basis of that, the location and depth of implantation can be determined with care. Equally important are the understanding and adjustment of peri-implant tissue after implantation. To compare the color of the gingiva, abutments with three different colors were tried in turn. However, no difference was found since the patient's gingiva around the implanted area was reddish. For patients with the thin and white gingiva, a gum color porcelain abutment whose color is similar to that of adjacent gingiva is recommended. In this study, a gum color porcelain abutment was used after considering not only the color of the gingiva but also oral hygiene and biocompatibility of porcelain.

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