

Chapter 2 – Medical examination and diagnosis for the implant treatment

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I. Introduction

Implant treatment has become one of the important treatment methods for improving patient's QOL. Yet, as this treatment procedure is not one that can be taken lightly in terms of its cost to psychological, physiological and financial aspects, the treatment must be effective and be able to provide satisfactory outcome. The treatment plan should be one that has implemented patient's view as much as possible under any circumstances, and one that is best for the patient. The informed consent is a requirement to achieve this, and by approaching this issue with specialists in the field if necessary, I am hoping to derive at the means to recover the best occlusal masticatory function.

The basis of the medical examination necessary for implant treatment is no different from those of general dental treatments, but with the former procedure, the particular importance lies in its comprehensive nature, and that it encompass a whole spectrum of field of dental surgery. For the majority of the implant patients have occlusions that have deteriorated, with a significantly reduced masticatory functions, the final goal is to replace the area of deficiencies with prosthesis, in order to restore the occlusal masticatory function.

Even before this, the knowledge and development of surgical techniques for the procedures such as bone augmentation are fundamental in terms of top-down treatment. Further, from the view of management of complications such as neuroparalysis and hypesthesia, and therefore the familiarity of oral anatomy is essential. It can thus be concluded that the examination and diagnosis encompass a variety of fields, oral surgery, periodontal surgery, prosthodontics, and dental anesthesia.

II. The medical interview at the first consultation

First, information needs to be gathered of the patient regarding chief symptoms, present medical condition, the history of present illness, the medical history, and patient's wish, before the start of the treatment.

Conduct an informed consent with gathered information, to help the patient understand the deterioration in the occlusal masticatory functions that result from the periodontal disease and loss of teeth. There the chief complaint of the patient is the discomfort felt with the artificial denture, the treatment options with the aim to replace the missing teeth by bridge or implants should be explained with regards to the various factors (Table 2-2-1). As an example factors such as: ① the differences between implant and natural tooth, and the characteristic of implants; ② the necessity of prosthesis to the area of defect, comparison with other treatment methods, treatment course, indication, contraindication and treatment results; on top of ③ the necessity to improve the interior of oral cavity, treatment cost and importance of maintenance should be explained fully to the patient and make them understand.

The patient come prepared with the knowledge of dental implants that have been gathered from the media and internet, but these are mostly general information and it is not one that is specific for the individual. The patients usually have the notion that, given that the cost of the implant can be covered,

ideally the treatment of their choice can be performed. For the patients who have arrived at the clinic with a wish for implant treatments, it is important to correct their knowledge if it is wrong, by first recovering their source of information and what exactly they have understood, before giving them the correct information of the treatment options for the patient as an individual. Issues have arisen in the past where, due to their lack of insight, the simplified explanations given by the staff have not been registered by the patient.

It is obvious that the patients with enormous expectations with the implant treatment should be treated with caution, but the opposite is also true. Say, the surgeon gives false expectations, with the idea that the implant treatment works miracles. The misunderstanding between the practitioner and the patient is often stemmed from this form. For this reason, the views of the patient on implant treatment should be grasped accurately and where there are any faults, explanations (in the form of informed consent) should be given till they have fully understood. Even after this, an agreement cannot be achieved, alternatives should be contemplated. The suitability of implant treatment should be evaluated and at the same time confirm that patient corporation can be gained with this treatment option.

The types of implant application is vast, from one tooth loss to a fully edentulous jaw, and implant treatment is thought to undergo further development, but it requires a team approach that integrates the various academic specialty, it is only then that the stability and harmony of occlusal masticatory function, and aesthetic recovery can be accomplished. Therefore, it is regarded the best method for constructing the treatment plan is to compound the information gathered at the time of first medical consultation implementing the ideas from the various specialist fields.

Difference between natural teeth and implants
Characteristic of implant
Necessity of prosthesis placement
Comparison with other treatment methods
Treatment flow
Indication and contraindication
Treatment outcome
Importance of improving the interoral environment
Treatment costs
Importance of maintenance

Table 2-2-1 Important points to be noted at the first visit interview

III. Localized medical examination

With the high demand for the sense of comfort and longevity, as well as an excellent functional recovery or an aesthetic one, the treatment plan should be constructed having conducted sufficient local examination to meet the needs of each individual. To achieve this, the examination of not only the local area but of the oral cavity as a whole should be performed with the treatment plan in perspective.

A. Points for examination of the oral cavity

The points that are required for examination are as follows:

- ① Oral hygiene conditions
- ② Presence and extent of periodontal disease
- ③ Presence of dental caries and treatment experience
- ④ Presence of bruxism
- ⑤ Usages of denture and cause of extraction (義歯の使用状況や抜歯に至った原因)
- ⑥ Quantity of alveolar bone (width, vertical height, and form)
- ⑦ Condition of clearance
- ⑧ Quantity of attached gingiva or nonmovable mucous membranes in the proximity of tooth loss
- ⑨ Presence of abnormality in attachment of frenulum and its location
- ⑩ Structure of maxillary tuberosity, distomolar tubercle, and buccal shelf
- ⑪ Presence of mandibular torus

Especially since the influence of periodontal disease on the prognosis of implant treatment is significant it can act as an effective indicator for the suitability of the implant treatment and in the postoperative management. In addition, whether the peri-implant gingivae are attached epithelium that is rigid and with stability is also an important factor as it influences the clinical outcome of the implant treatment. This is the reason for which the preservation of keratinized gingival layer is necessary.

Examine the state of the soft tissues with regards to the presence of abnormalities in the attachment of the frenulum, with considerations to the peri-implantitis to have resulted from food stagnation or invagination. Special attention should be paid to the crown structure, coloration, and the structure of the interdental papillae in the region of anterior teeth where aesthetic outcome is expected.

B. Examination of the occlusal state and the alveolar crest

The occlusion at the implanted region should be established once an ideal centric occlusion has been gained with treatment dentures and placement of prosthesis in the other regions, for those examples where the occlusion is unstable due to a vertical or horizontal jaw positions are destabilized. A significant weighting on the evaluation of the occlusal state has been placed when selecting the implant body and the region of installation and of the superstructure in order to avoid any excessive exertion of pressure to the temporomandibular joint.

The factors that requires inspection

- ① Dentition (Dental arch)
- ② Presence of any abnormal forms
- ③ Remaining teeth and their attrition
- ④ Occlusion stability
- ⑤ Temporomandibular joint disorder
- ⑥ Dimensions of tooth extracted cavity (mesiodistal dimension, buccolingual dimension, vertical dimension, etc.)
- ⑦ Clearance between the antagonistic teeth
- ⑧ Buccolingual positional relationship of maxillary and mandibular dental arch
- ⑨ Supporting ability of alveolar ridge structure

The state of the alveolar crest with the defect can be an important indicator for the form of the implant,

the position and orientation of the installation of implants, as well as the necessity of the bone graft or tissue graft procedures.

In the placement of overdentures to cases of multiple teeth loss or edentulous jaws, the supporting form should be decided upon either the implant or the mucosa or both structures, and select an attachment that is suitable for the type of support.

The aesthetic outcome has become heavily regarded in the recent years, especially on the anterior maxilla region therefore a thorough investigation in this area is necessary. External to the oral cavity, factors such as the state of lips and cheeks, any indentations with the loss of the teeth; and the state of interdental papillae, and the size of the crown of the remaining teeth should be checked in the internal structures of the oral cavity.

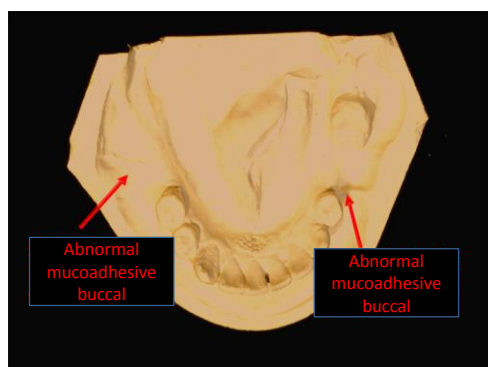


Fig. 2-2-1 Abnormal adhesion of buccal frenum

IV. Image analysis

It is an absolute requirement to conduct examination with X-ray radiography or CT scans for implant treatment. Alongside the recent development of dental CT on top of the X-ray radiography, there has been a rise in the number of practitioners that derive the suitability of the implant treatment from the analysis of the state of the bone or the bone density, alongside the bone quantity/ quality, and the presence of any diseases of the bone. The close inspection of the jaw with the visual intra-oral examinations or with the use of diagnostic models are inarguably required, but the imaging analyses with the orthopantomogram and CT scans have become the ultimate diagnostic tools.

The panorama X-ray radiography, with its ability to evaluate the state of ramus of the mandible and the maxillary sinus, has become the primary method of imaging analysis conducted at the time of first medical check-up. The majority of cases can be observed with the panorama X-ray radiography. The radiograph is able to display the lesions of impacted teeth, remaining roots, cysts, any presence of dental caries or apical lesions of remaining teeth, as well as the condition of alveolar bone resorption. The structures such as the nasal cavity, maxillary sinus, incisive foramen, mandibular canal, mental foramen are the important anatomical indices, however, these images should be interpreted carefully. Although these information are sufficient for the primary screening but are not effective in order to gain detailed accounts. For example, with regards to the bone quantity, the vertical cross section can be interpreted, but cannot gain the state of horizontal section. In addition, with regards to the magnification in the panorama radiography, there is only a standard magnification, and therefore the implant size should be selected with the enlargement ratio. The bone quantity can act as an indicator for the amount of frictional heat, the period of primary consolidation period, and the period to the secondary surgery, but there are

limitations to this method of presumption.

The examination with CT scan has become the main stream diagnostic device with which to obtain the images parallel to the occlusal plane, and the height and the width of the localized area (Fig.2-2-2 to -4). The cone-beam CT has been implemented recently, which has the ability to display axial, sagittal, and coronal cross-sections at the discretion of the operator, in associations with each other. Furthermore, a simple analysis software for implant has been developed for simulation of the CT scanned data, enabling the reconstruction of the separate data with their original associated positions, therefore contributing to the medical treatment practice that has a high predictability.



Fig.2-2-2-a,b,c

Preoperative intraoral and orthopantomogram images The radiograph displays high transparency, indicating thinness of the bone.

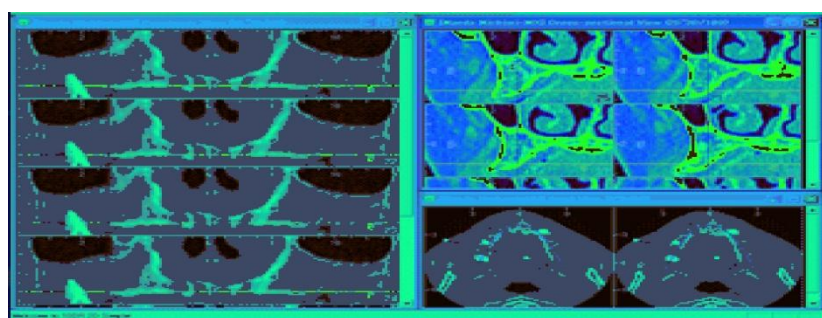


Fig.2-2-3

Diagnosis with two dimensional CT imaging

This scan confirmed the thinness of the alveolar bone.

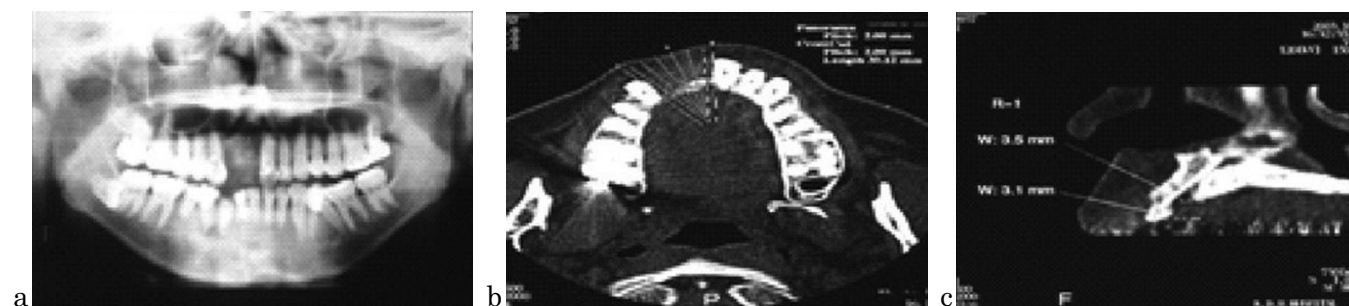


Fig.2-2-4-a,b,c

Preoperative diagnostic imaging

In the orthopantomogram observation (a), the alveolar bone of No. 9 and 10 seem to appear healthy. However, from a horizontal- CT cross-section image, the extreme thinness in the width of alveolar crest is confirmed (b, c).

V. Analysis with the diagnostic model

Prior to the treatment planning stage for implant surgery, both the diagnostic model of upper and lower jaw should be mounted on the articulator for analysis (Fig. 2-2-5).

The points for analysis have been mentioned below:

- ① Conditions of dentition, and of dental arch etc.
- ② Conditions of tooth extracted cavity and occlusal relationship
- ③ Attrition
- ④ Check for the presence of bruxism from the state of attrition
- ⑤ Pattern of occlusal guidance
- ⑥ Presence of any tooth elongation

Where there are multiple loss of teeth, these cases have often been left untreated for a long time. In such cases, investigations as to whether there have been any occlusion modifications must be conducted. If the tooth elongations have been left untreated, it can induce cuspal interference and premature contact, and in the case where several of these states are present, the recovery of the occlusal plane will be required.

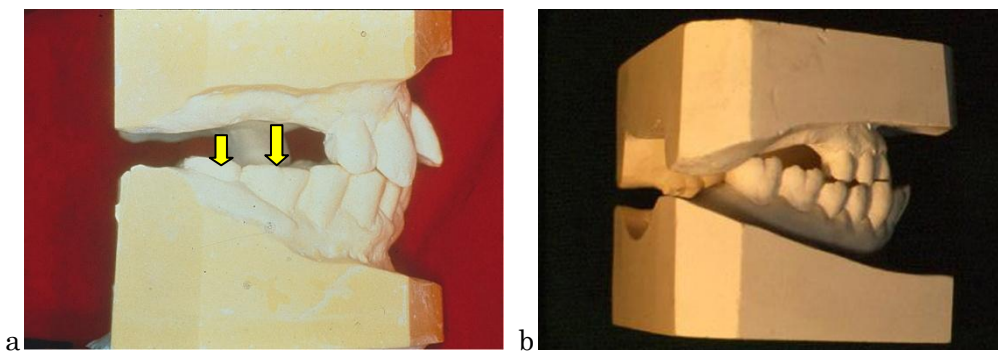


Fig.2-2-5-a,b Check of clearance with diagnostic model. Moderate clearance is desirable.

- a. Ideal clearance
- b. No clearance

VI. Diagnosis and treatment planning

Implant treatment with its high predictability has become widely applied in the field of dentistry, alongside the advances in the implant surgery techniques and the materials used. The basic concept of top-down treatment that aims to achieve the recovery of dentition that is functional and in harmony with the surrounding tissues, has been widely applied in the recent years. The implant treatment has been encouraged in terms of maintenance of oral health as a whole rather than the recovery of region of the implant installation, therefore the importance of treatments to the repair of the remaining teeth as well as the management of the peridontium have been noted.

The treatment of implant should be planned with an accurate understanding of the anatomical aspect of occlusion as well as the mechanical aspects in accordance with the state of the jaw. Ideally, the decision to apply implant treatment should be derived at, as a result of considerations of a whole range of factors observed from different angles.

It may be an idea to create a numerical evaluation system to quantify the scores to judge the suitability of implant treatment.

In designing the treatment plan, the primarily the final superstructure should be selected, followed by the occlusal relationship, degree of defect, structure and bone quantity of the jaw to be considered for the

selection of the implant body as well as the installation position. The past consensus of one implant body for the replacement of one defective tooth has been modified to the installation of dentures, all-on-four or all-on-six. The top-down treatment idea is deemed of importance in implant treatment planning, therefore in situations where there is insufficiency in the alveolar bone quantity, bone graft or filling with the bone grafting material may be necessary.

VII. Implant and related medical care

Anyhow, a treatment plan should fundamentally be designed with a multidisciplinary approach with the dental prosthesis, periodontology, and radiographic diagnosis on top of the oral surgery as its base. With the increase with the number of elderly patients, and those with concomitant disease conditions, reflective of the rise in the aging population, it is necessary to actively pursue close communication with the patient's medical doctor. This, with the aim to gather and exchange information regarding the underlying disease conditions, state of its management; or in the case that the patient is administering bisphosphonates, which has been the subject of recent discussion, the details of its course. I would recommend establishing a professional relationship with the medical doctor as a daily routine.

For plaque management such as to educate the patient, a team management approach is effective. I recommend systematizing oral hygiene management to be the responsibility of the dental assistant. The key tasks are to prevent to the peri-implantitis with regular checking of the state of plaque accumulation; and removal of overload by controlling occlusion, after the superstructure placement.

The state of oral hygiene with regards to plaque accumulation can influence the success of implant, therefore the maintenance of state of hygiene the mouth as a whole should be considered in the postoperative management.

References

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