Part 5 - The maintenance steps after superstructure placement

Chapter 1- A checklist for postoperative consultation

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I. The timing of follow-up and the checklist

The excessive mechanical stress exerted on the implant or the bacterial infection in the surrounding tissues can break the interaction formed between the implant and the bone, thus resulting in the treatment failure. The mechanical stress that could be applied on the implant body can be controlled by the dental practitioner; and the way in which the occlusion is achieved with the application of the superstructure can influence the success of the implant treatment. The exertion of excessive mechanical stress can result in damages to the prosthetics, or in the case of two-piece type, fracture or the loosening of the abutment screw. The fracturing of the implant body is rare, but it has been noted to have occurred, with the interactions between the implant and the bone to have been broken in extreme case examples.

The characteristics of implant in current use are that they have been designed to interact strongly with the bone but not to the same extent with the soft tissues. The surfaces of natural tooth roots are surrounded by a layer of cementum embedded with collagen fibers but is absent in the implant surroundings. Additionally, the surrounding collagen fibers are arranged so that they are lying parallel to the implant surface, and are not involved within the implant body. It is obvious from these structural differences of the variations in the degree of the infection. In fact, infection is known to spread in the surroundings of the implant structure more easily than with the natural teeth. The accumulation of plaque in the surroundings of implant body and the prosthesis becomes the inducing factor for peri-implantitis. This is the reason for which the plaque control; on top of relieving the excess mechanical stress are vital after the implant treatment.

Regular follow-ups should be conducted, at two weeks, four weeks, followed by two months, and six months, as a rough guide with increased time periods between each session. Where no problems are observed, follow-up after that should be conducted at six months intervals. At each of the sessions, the patient should be asked of the problems, and then the state of the implant checked including the gingivae conditions, presence of plaque and tartar; condition of the prosthetics (occlusion, state of contact with other teeth, presence of any damage), as well as of the bone surrounding the implant (Table 5-1-1).

Follow-up intervals
2 weeks, 4 weeks, 2 months, 6 months, and 6 months for thereafter, from the time of the placement of final prosthesis
Checklist to be conducted in the follow-up
➢ Presence of any problems (ask the patient) ➢ State of mucosa ➢ Accumulation of plaque and tartar ➢ Probing (pocket depth, any bleeding) ➢ State of the prosthetics (occlusion, contact with the other teeth, any damages) ➢ Examine with finger tips and with tapping for sound ➢ State of the bone surrounding the implant (dental X-ray)

Table 5-1-1 The check points for the follow-up sessions

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II. Investigations before the withdrawal

A. Analysis of prosthesis and occlusion

Before conducting routine examinations, it is essential to ask the patient for any discomfort felt or for any changes experienced since the last session, then the occlusion should be checked with the prosthesis of the implant treatment. The implant body bonded to the bone does not move inside the mouth, but natural teeth shift in accordance with the changes in occlusion, therefore a regular check of the occlusal state is vital for the success of the implant treatment. Where there are teeth present in the mesial or distal positions of the implant, the contacting state with the teeth should be inspected with dental floss. The relationship with the adjacent teeth that had been deemed suitable at the time of implantation can become altered after several years. Next inspect for any damages present on the prosthetics, then feel for any loose movements of the prosthetics by placing a finger on one side, and then hammering lightly from the opposite side with a pair of dental forceps (Fig. 5-1-1). This method does not require any specialized tools, unlike the Periotest, and is sensitive to the presence of abnormalities in the treatment area, therefore proving as a useful and simple means with which to examine the surrounding structures. The loosening detected in the cemented prosthesis are most likely to be due to the damages on the cement layer or the loosening of the abutment screw; whereas with the screwed prosthesis, the probable cause is likely to be the loosening of the screw or the abutment screw.

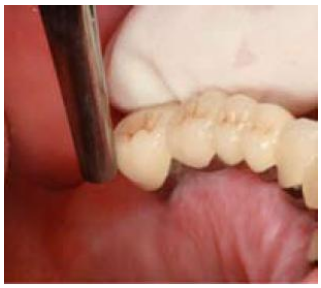

Fig. 5-1-1 Implant prosthesis examination
Place a finger lightly on one side of the prosthesis, then knock from the opposing side slightly with the top of the dental forceps to feel the vibration with the finger.

B. Examination of implant surrounding tissues

First inspect the conditions of the mucosa with a magnifying glass. Even if there are no apparent redness or swelling, check for any exudates after blowing the area dry, and then pressing a finger to the mucosa. Next, probe to determine the strength of the bonding of the implant to the mucosa. A plastic probe is recommended for use in the area of implant, but I have always used a metal unit. The professional

opinions regarding the degree with which probing should be conducted is divided. Unlike the interactions with the bone, the bonding of the implant body to the soft tissues is weak. Additionally, the implant structure from the prosthesis, abutment through to the fixture is often not in a straight line, unlike the natural teeth, therefore probing has been note to result in the detachment of the soft tissues from the surfaces of abutment and fixture.

With certain types of implant, the structures take up a platform switching method whereby a step is present on the joining platform of the abutment and the fixture. Thus the probing next to this type of implant in the same way as for the natural teeth may cause significant damages to the connective tissue structures.

Previously, I had only probed in cases where abnormalities in the mucosa or the bone with radiographs were apparent, but it has become the norm to conduct probing in all of the follow-up sessions. The bleeding on probing (BOP) is an indication of peri-implantitis, therefore must be treated accordingly (Fig. 5-1-2).

The dental X-ray should be conducted to inspect the conditions of the bone (Fig. 5-1-2-b). It is obvious, but the mediodistal sides of the bone can be analyzed with the dental radiography but not those of the buccal or lingual bones. Therefore, proving that probing technique to be an effective method with which to determine the state of the surrounding tissue structures of implant.

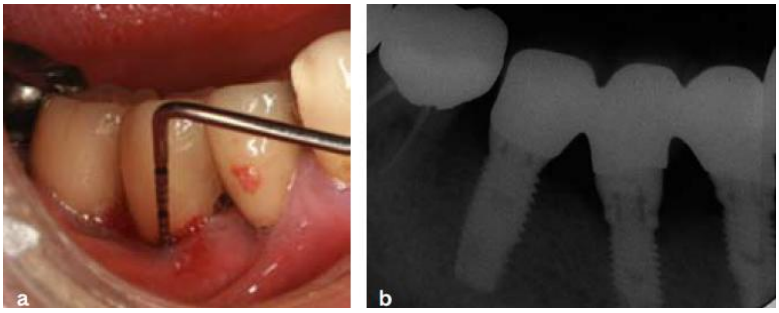

Fig. 5-1-2 a,b

a. Bleeding on probing (BOP)
b. Dental radiograph of the state of the bone where bleeding was observed

The surrounding bone has been severely resorbed

III. Plaque control and teeth cleaning in the follow-up session

Periodontal disease is the most prevalent cause of tooth loss for which implant treatment is indicated. The plaque control is a vital part of the postoperative care for the long-term functions of the implant, not only to the area of the treatment but also to the remaining natural teeth. The method of plaque control to be conducted by the patient themselves is listed in Table 5-1-2. It is a normal tooth brushing method conducted with paying close attention on the area of treatment.

Tooth brushing should be avoided during the period from the time immediately after the implantation, and the removal of the suture, till the soft tissues have stabilized. Mouth wash should be recommended as a means for retaining the level of hygiene. Benzethonium chloride (Neostelin Green 0.2%) mouthwash solution (Nishika) is typically offered to the patients at my clinic. Instruct the patient to start cleaning cautiously with a soft tooth brush, once the soft tissues have stabilized (approx. 3 weeks). Tooth brushes specifically for use directly after the surgery has been placed on the market. The normal toothbrush should be used once confirming that the soft tissue surrounding the implant to have healed properly. Advice the patients brush with caution; and to avoid dental flossing in the implant area to prevent any damages caused to the periodontal tissues.

The typical interdental brushes are produced with a metal wire at the center of the brush, and is not suitable for use in the area of implant. Recently, however, a type with a resin coating on the metal has become commercially available suitable for use in the implant area (Fig. 5-1-3). Superfloss is a flossing tool adapted for use in the pontic area, but it has also proven to be of use in the areas where implant prosthesis had been applied (Fig. 5-1-4).

- Tooth brush
- Floss
- Interdental brush
- Superfloss
- Mouth wash
- Water pick

Table 5-1-2 Methods to control plaque accumulation

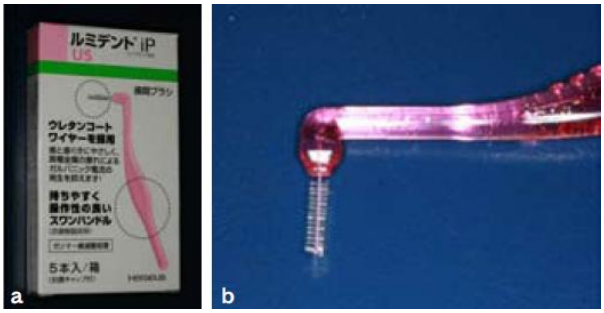

Fig. 5-1-3 a,b Interdental brush for plaque control (Lumident, Heraeus K.K.) suitable for use in the area of implant. The highly elastic wire is coated with urethane therefore the wire cannot bend during its use, and therefore does not does not cause any damages to the prosthetics or the implant.

The mainstream dental treatment in the current practice applies prosthesis to lie closely to the mucosa, therefore allowing no spacing to enable the tooth brushes or super floss to reach the area adjacent to the implant body. The simplicity in the plaque control method is the most desirable for patients, and therefore the increase the number of tools and the steps is not practical. I instruct my patients to combine brushing with the use of mouth wash that are available from the general stores, as well as purchasing an oral irrigator, Waterpik, to be used before going to bed. The ineffectiveness of Waterpik in the removal of plaque has often been reported, but I consider it effective for removal of the food pieces that have been stuck within the complex structure of implant prosthesis.

The inspections for the accumulation of plaque in the follow-up are conducted in the same way as for the natural teeth, and then instruct the patient to clean the area where there a build up can be observed. Remove the tartar with scaling, or use ultrasonic scaler in severe cases. However, this should not be applied to the treated area, and a manual version with a plastic tip should be used instead, since the usual metal tip would damage the implant body and the abutment (Fig. 5-1-5).

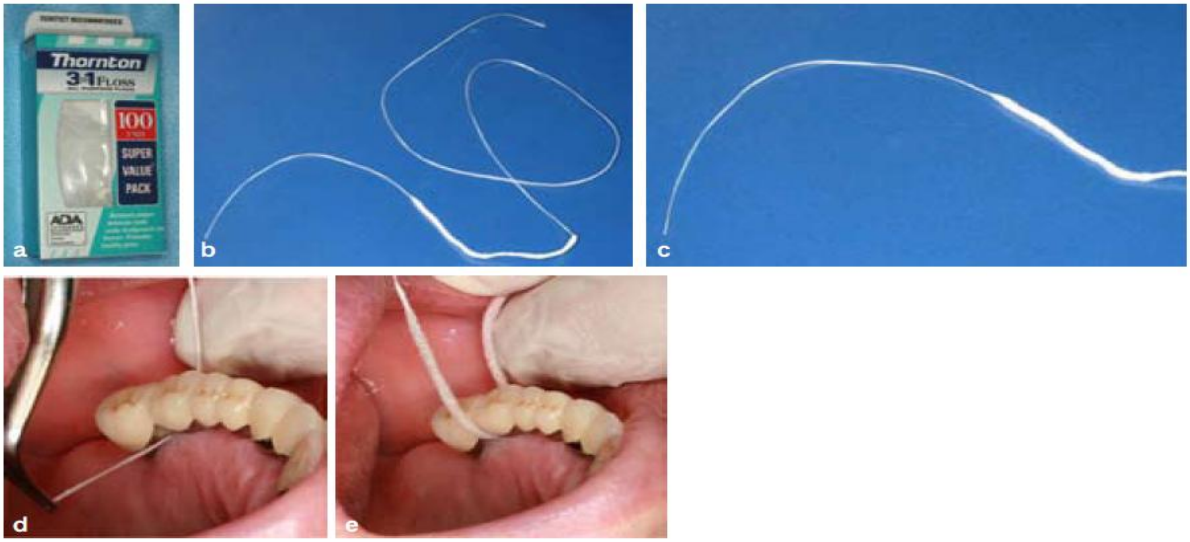

Fig. 5-1-4- a to e

a. Outer package of Thorton 3in1 Floss (superfloss)
b. Superfloss
c. The tip of Superfloss
d. The tip has been designed to enable passing through the area under the pontic or between the teeth. In one end, a spongy filament brush has been attached through the normal flossing material (soft nylon). The dental flossing with superfloss is shown (d and e).

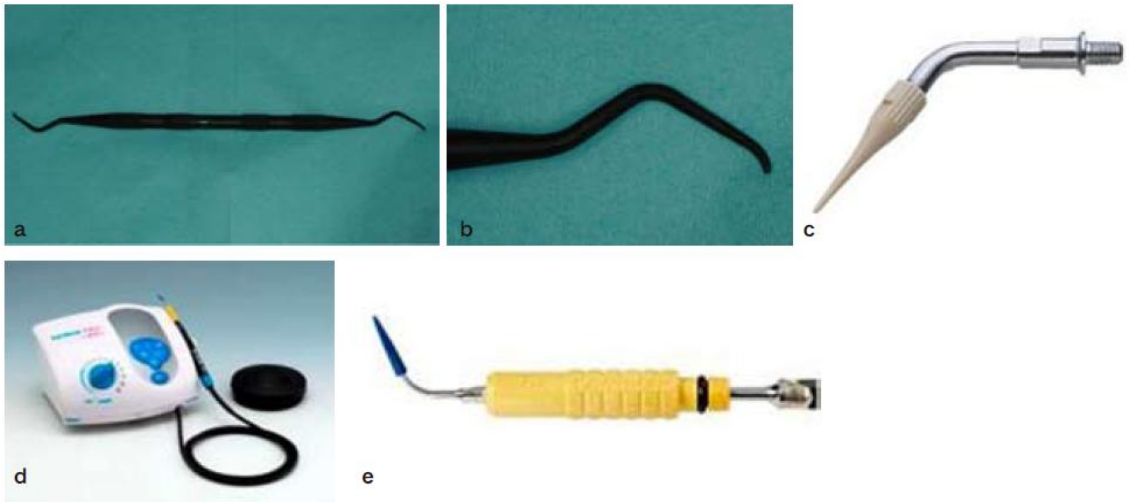

Fig. 5-1-5 a to e Scalers used in implant treatment

a. Plastic scaler
b. The tip of the plastic scaler
c. Ultrasonic scaler (ENAC®, Osada) with tip (IM point) specifically designed for implant use
d. Ultrasonic scaler specifically designed for implant use (Cavitron plus implant version® Dentsply Sankin) (d) and the tip used (e).

IV. Solutions to complications and accidental symptoms

The term used to describe the implant or prosthetics left remaining in the oral cavity is referred to as 'survival', but it does not define whether it has remained in a healthy state or not. 'Success', on the other

hand is referred to as the state of the implant or the prosthesis that are not associated with any complications. The antagonistic term to this is the 'failure' which describes the loss of implant or the prosthetics, or associated with complications, but this term is not commonly used.

Complication is a condition that requires treatment. It can be divided into biological and technical types. Biological complications include peri-implantmucositis and peri-implantitis, where the former is a reversible disease condition of the soft tissues which is not associated with alveolar bone resorption, while the latter is also a local disease, but that is associated with the loss of the bone interacting with the implant body. The distinction between the two is the same with which the affected area of periodontal tissue inflammation is divided into gingivitis and periodontitis.

There are fractures to the implant body, loosening or damages of the screw, prosthesis damages and fall out to the types of technical complications. Since the technical complications are able to be overcome by the repair or the refabrication of prosthesis, the biological complications will be discussed in the rest of the chapter.

A. Cumulative interceptive supportive therapy (CIST)

A therapeutic strategy known as cumulative interceptive supportive therapy (CIST) has been indicated for biological complications. It comprises of four steps:

1. Mechanical plaque removal
2. Sterilization therapy
3. Antibiotics Therapy
4. Surgical regenerative therapy or implant removal

The treatment should be conducted by combining factors such as the depth of the peri-implant pockets, BOP and the extent of bone resorption at the time of follow-up or by itself (Fig. 5-1-6).

The mechanical plaque removal is done by employing tools such as scalers and rubber cup, alongside motivating and instructing patients with the tooth brushing techniques. Sterilization therapy is conducted subsequently, with washing or gurgling with solutions that have sterilizing properties, classically, those containing 0.1% or 0.2% chlorhexidine are used. Third, as an antibiotic therapy, oral course of metronidazole, 250 mg, three times a day for ten days, or sustained release formulation of tetracycline are typically recommended. Intraoral application of chlorhexidine; and oral administration of metronidazole for the purpose of odontopathy however have not been licensed for use in Japan. Lastly, the fourth step, surgical regeneration therapy or implant removal, is conducted. As regenerative therapy, the effectiveness in combining GBR with application of membrane, autogenous bone graft and bone filling material have been reported, but the efficacies of these therapies have not yet been verified. The implant should be removed where regenerative therapy has been deemed unsuitable.

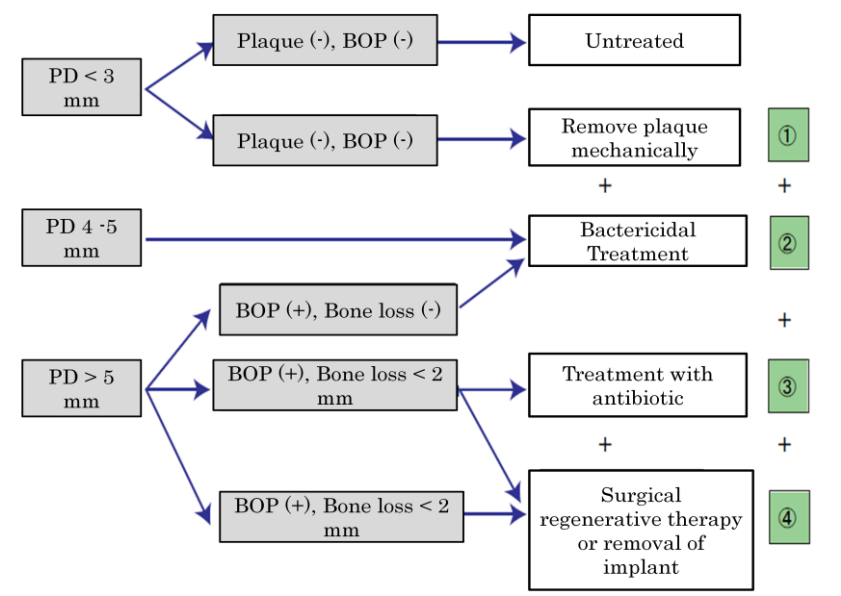

Fig. 5-1-6 CIST (Cumulative Interceptive Supportive Therapy)

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