Chapter 7: Treatment to patients with underlined systemic diseases/ disorders

1. Human immunodeficiency virus (HIV) patient

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Acquired Immunodeficiency syndrome (AIDS) is a progressive disorder caused by the retrovirus human immunodeficiency virus (HIV) primarily infecting the lymphocytes (mainly the $CD4^+$ T cells). The loss in the number of infected immune cells causes gradual decline in the immune system of the affected individual, which can take few years to a decade till acute HIV infection to eventually develop into AIDS. This late stage in this infectious phase is characterized by the manifestation of other disease conditions such as pneumocytis carinii pneumonia and Kaposi's sarcoma. Once the number of $CD4^+$ T cells in an HIV infected individual (reflective of patients immunity, average for a grown adult: 800 to 1000/μl) drops to a level below 200/μl, various opportunistic diseases are contracted.

Patient: 37 year-old male
Main complaint: Request for implant
Medical history: Diagnosed as a HIV infected patient in 2007
Treatment course: Implant treatment in conjunction with socket-lift to a HIV infected individual.

The surgery was conducted in accordance with the evidence based medicine (EBM) standard safety precautions for HIV infected, B-type and C-type hepatitis infected individuals (Image-1 to 3). Evidently, the knowledge of HIV infection and its systemic conditions are essential to control the spread of infection when conducting dental operation to those affected individuals. The practitioner should be well acquainted with the vital factors such as the number of $CD4^+$ T-cells as well as the spectrum of HIV drugs prescribed, and be well informed of the interactions and the contraindications for these agents (Table 1).

Here, the implant treatment to No. 14 is presented to an HIV infected individual. The patient is currently undergoing HIV pharmacological therapy, and was confirmed to be in stable condition from the blood and physiological tests. As the $CD4^+$ count was above 400/μl, the implant surgery was considered to be safe. Nevertheless the cell count was still below those of healthy individuals therefore surgery was conducted cautiously to minimize the risk of infection.
The width of the maxillary alveolar bone was shown to be satisfactory but insufficient in terms of height (Image-4,5) therefore two-piece implant (4082) was installed facilitated with socket-lift technique. Under 2% xylocaine (with epinephrine) infiltration anesthesia, the gingival mucosa and the periosteum was incised up to No. 15 posterior position, and elevated before performing socket-lift procedure using Dr Cosci sinus-lift kit (Hakuho Corporation). Maxillary bone was extracted from the position relative to No. 15 position using the ϕ3.5 trephine bur. This was then combined with 1g of bone filling agent, Boneject® (derived from bovine bone with atelocollagen, Koken Co., Ltd.) (Image-6,7) and then applied to the area.

The radiograph confirmed the elevation of the schneiderian membrane (Image-8). The secondary surgery was conducted 4 months later upon confirming that adequate healing process had taken place. The progress after the secondary surgery was also satisfactory (image-9,10,11), therefore the straight abutment S size was installed, impression imaging taken, and was finally placed with the final superstructure (Image-12).

The implant treatment to an HIV infected patient can be conducted in a similar manner to the healthy individuals. The only difference with the HIV infected individual would be the requirement for a longer monitoring period due to a higher risk of contracting infection. The importance of the collaborative treatment with the patient's medical doctor from the planning stages of the treatment goes without saying.

Anti-HIV drugs	Contraindications and cautionary drugs
Protease inhibitors	Midazolam (systemic anesthesic drug, Domicum®)
Non-nucleoside reverse transcriptase inhibitors (NNRTI)	Macrolides
Nucleoside and nucleotide reverse transcriptase inhibitors (NRTI):	
Zibobudin (azidothymidine, AZT)	Ibuprofen (NSAID)
Didanosine (2',3'-dideoxyinosine, ddI)	Tetracyclines, quinolone antibiotics

Table 1- The contraindicated drugs and those that should be used with caution when taking anti-HIV drugs.

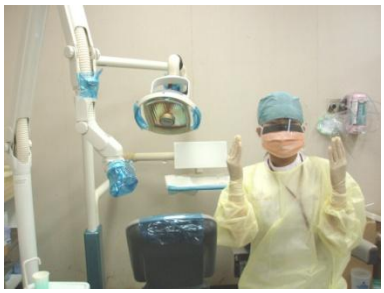
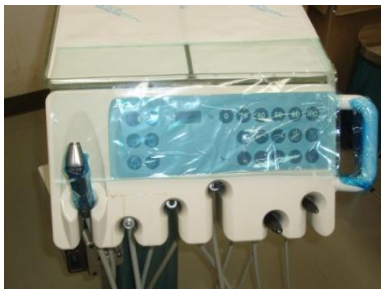
1  2  3 

Image-1: As a standard safety precautionary measures to maintain sterile conditions, masks, gloves, face shields and surgical gown must be worn.

Image-2: The areas that could get contaminated should be covered with barrier film.

Image-3: Hygo Jet® system (DÜRR DENTAL AG). The main constituent is glutaraldehyde.

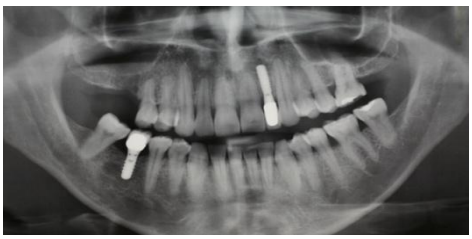
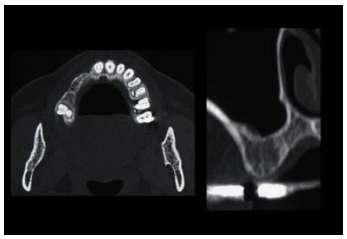
4  5 

Image-4,5: Due to the insufficient height of the maxillary bone, socket-lift procedure was deemed necessary.

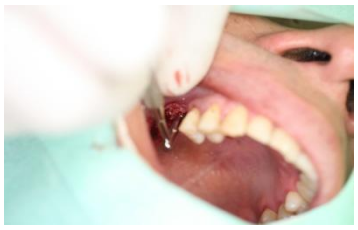
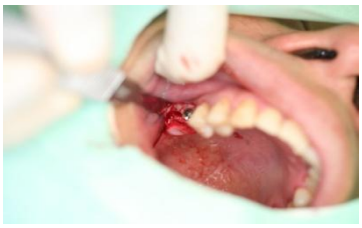
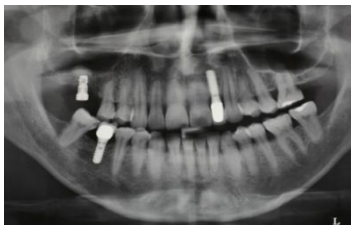
6  7  8 

Image-6: Socket-lift procedure was conducted using the sinus-lift kit.

Image-7: Fixture (4082) was installed.

Image-8: Panoramic radiograph confirmed the elevation of the schneiderian membrane.

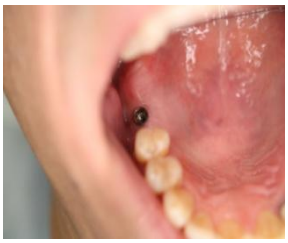
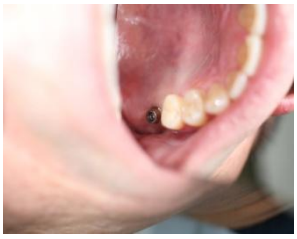
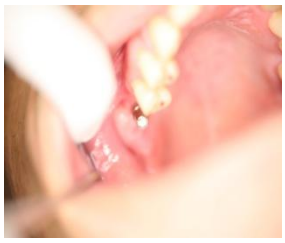
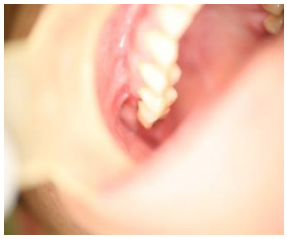
9  10  11  12 

Image-9: Before the placement of straight abutment. No abnormal symptoms were found in the surrounding mucosa.

Image-10, 11: The state after the placement of the straight abutment.

Image-12: Placement of superstructure.

2. Idiopathic thrombocytopenic purpura (ITP) patient

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Idiopathic thrombocytopenic purpura (ITP) is a condition with abnormally low platelet count without bone marrow hypoplasia that was not induced by other disorders, drug administration, or radiotherapy. The number of platelets in the blood serum involved in the primary blood clot is normally 150,000 to 300,000/μl, but once it drops below this range, conditions such as incidental bleeding, and purpura (bruising) in the limbs and the abdomen are known to result. It is not uncommon for this condition to be uncovered by the dental practitioners from the presentation of gingival bleeding, or bleeding from tooth extraction and is a condition that is likely to be encountered by many of the professionals. The surgical interventions are contraindicated for those cases where the platelet count is below 50,000/μl.

Patient: 65 year-old male
Main complaint: Referred from the haematology unit with a request for a close oral inspection and conditioning
Medical history: ITP was diagnosed in 2003

No. 31 tooth was deemed unable to be preserved therefore was extracted. Although the platelet count was half those of the average count (80,000/μl), the serum level showed stability, and no steroids agents were being administered. No abnormal bleeding resulted at the time of tooth extraction, and the healing

process showed satisfactory progress. However, in terms of practicality, this low platelet count was not suitable for the bone augmentation for implant installation (Image-1 to 3). Additionally, a problem of bone neoplasticity presented after the extraction and installation of the fixture.

With given explanations of the difficulty in the hemostasis, as well as the increased risk of the implant extradition with postoperative bleeding and incomplete osteogenesis, the patient accepted the risks and possible complications with the present disorder. Two-piece implant fixture-5102 was chosen. After 30 minutes into the treatment, antibiotic agent was infused intravenously as the neutrophil count was found to be low (Table-1). The installation surgery was conducted under the application of 2% xylocaine (with epinephrine) for conduction and infiltration anesthesia.

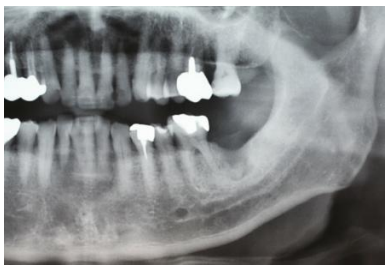
The fixture installation was possible but due to a significant deficiency of lateral bone quantity, mandibular bone in No. 32 position was extracted using ϕ 4.3 trephine bur which was amalgamated with 1g of Boneject® true bone ceramics to cover the deficiency. In order to prevent the invasion of the connective tissues into this treated area, the open wound was covered with a collagen membrane, BIOMEND® (Zimmer Dental Inc.) of size 15×20 mm, and closed with suturing. No abnormal or postoperative bleeding was presented.

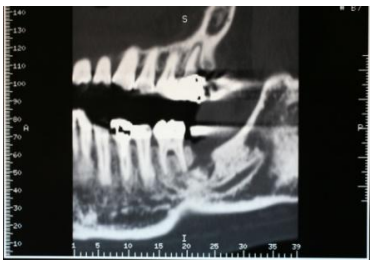
The postoperative progress was found to be satisfactory (Image-4,5), and the secondary surgery was conducted 4 months later. Upon exposing the bone surface with alveolar incision, the implant fixture appeared to be rooted firmly with no loose motions, but a slight indentation at the mesial bone grafted site was found and exposing a portion of Boneject particles to be present (Image-6,7,8). The secondary surgery was complete with the placement of healing abutment (L) and closing with suture (Image-9,10).

The stitches were removed a week later (Image-11), and a straight abutment (L) was mounted (Image-12) before taking impression image. The final prosthesis of metal bonded crown was selected (Image-13,14). It has only been days since the placement of the final superstructure, but a satisfactory progress has been observed.

Test type	Result	Test type	Result
WBC count	5000 / μl (approx.)	Neutrophil count	30 - 40 %
RBC count	3,500,000 / μl (approx.		
Haemoglobin content	12 - 13 g/dl	Reticulocyte count	16 - 17 %
Haematocrit	37 - 39 %		
Platelet count	8 – 9 ($\times 10^4$)/ μl		

Table 1: The blood test result of the patient, (The values are within the physiological range).

1 

2 

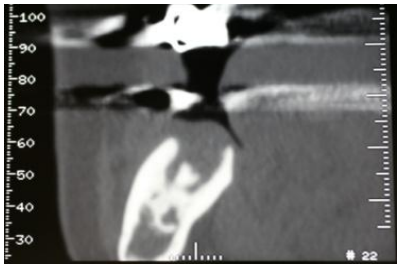
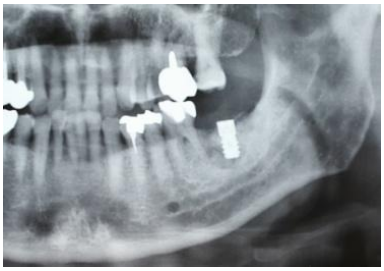
3  4 

Image-1: Preoperative panoramic radiograph

Image-2,3: Preoperative CT scan, confirming incomplete osteogenesis of the implant cavity.

Image-4: Panoramic radiograph after the installation of the fixture.

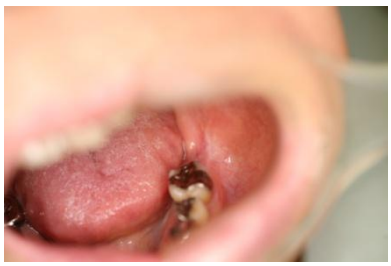
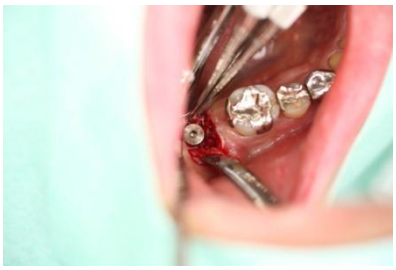
5  6  7 

Image-5: The state of the wound 3 months after the primary surgery.

Image-6,7: The state during secondary surgery, where the incision was applied to the alveolar bone in order to check the conditions of the fixture (mirror-image).

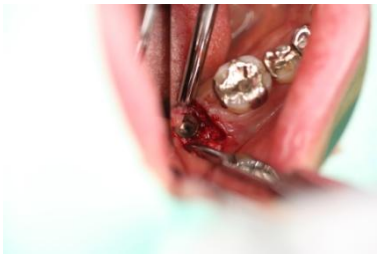
8  9  10 

Image-8: Deficiency of the bone on the mesial side and few Boneject particles were found upon healing cap removal (Mirror image).

Image-9,10: The top was replaced with a healing abutment before closing with suturing.

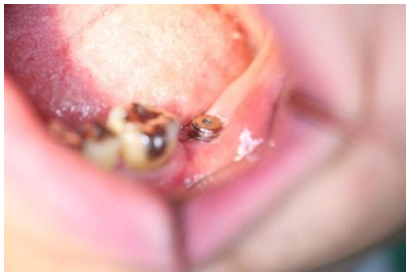
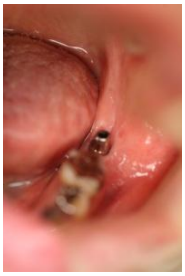
11  12 

Image-11: The wound site at the time of suture after completion of secondary surgery.

Image-12: Straight abutment (L) placement.

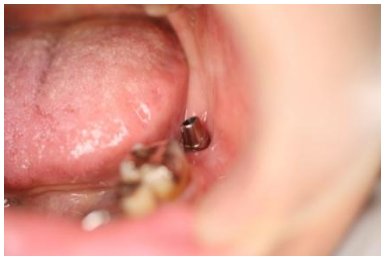
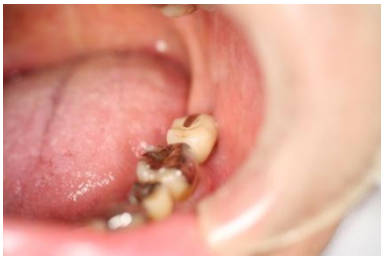
13  14 

Image-13,14: Images of the oral cavity before and after the mounting of the final superstructure.

3. Osteoporosis patient

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Tooth extraction and implant installation are contraindicated in osteoporosis patients, due to the reports of the risks associated with the treatments for jaw bone necrosis in those concomitantly taking oral or injectable bisphosphonates. However, where implant treatment is deemed essential, such as in those where alveolar bone resorption has progressed to such an extent that even the placement of artificial dentures would be unpromising. Japanese Society of Oral and Maxillofacial Surgeons (JSOMS) released a guideline for these cases. It instructs that the use of bisphosphonates should be stopped 2 months prior to the surgery, and for 2 months after it. The risk remains even with the temporary termination of drug therapy, therefore the surgery must be conducted under extreme caution, with minimal intervention to prevent infections and inflammations occurring.

Here, an example is presented where further progression of bone resorption could be prevented with multiple one-piece type implant installations into the fragile maxillary bone, by concomitant jaw bone activation.

Patient: 56 year-old female

First medical examination: Nov 2006

Main complaint: Wanted to be able take proper meals.

Treatment plan: Administration of bisphosphonates was stopped 2 months prior to the planned date of the surgery. Implant installation was conducted primarily to the mandibles that have a more compacted structure than the maxilla. The implants were then installed into the maxilla in three batches, in the order of: anterior, right molars, left molars. A temporary crown was fitted for 2 months, during which time the patient was instructed to eat only soft food. The bone was given weak stimulations for it to consolidate, in preparation for the final superstructure placement. This treatment plan was designed for a gradual shift from the use of dentures.

The panoramic radiograph of the right mandible before implantation (Image-1). Upon close inspection, the jaw bone was found to be relatively firm, but the danger still remained where the implant could be inserted too far in.

With regards to the maxilla, the 3LM implants were inserted to positions No. 6 to 11, and the remaining cyst was also extracted in the same surgery. This was followed by implantations to the right and left sides 2 weeks later. Socket-lift procedure was performed to facilitate the implant installation. Three 4SM implants were installed to positions No. 12, 13 and 14 on the right, and then two 4MM to the left No. 3 and 4 positions. The maxilla was found to be fragile as had been expected therefore the installation was conducted cautiously without milling with the reamer. The temporary crown was placed immediately after the implantation, and was left in this state for 2 months with application of light load to derive at a solid bone structure ready for superstructure placement.

Since the masticatory function was recovered without any complications of bone necrosis, the patient was highly pleased with the outcome, particularly since the implant treatment to this individual had been

rejected by several other dental facilities.

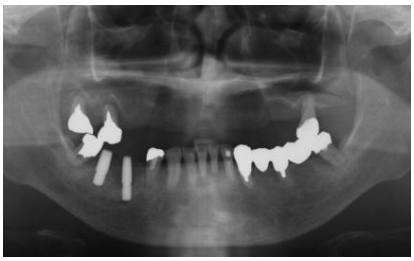
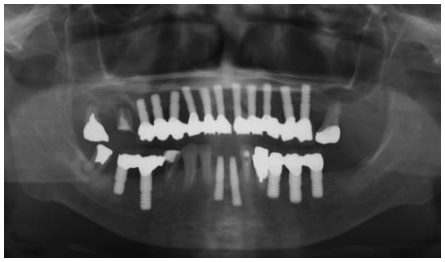
1  2 

Image-1: Panoramic radiograph before the implant installation to the right molar region
Image-2: Panoramic radiograph two years and six months since surgery

4. Cerebral palsy patient

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Keiji Ohmori

Cerebral palsy is an umbrella term that encompasses several motor paralyses caused by damages to the control centers of the brain before birth or during its developmental stages. The basic symptoms of this disorder are characterized by abnormal muscle tones such as muscle tension, muscle paralysis, and hypotonia.

The implant installation was possible in this patient by paying close attention to the preoperative drug use and prosthesis. As a favorable outcome was achieved by making slight alternations to the standard procedures, it is presented here with some observations.

Patient: 56 year-old male
First medical examination: October 2000
Main complaint: Masticatory disorder, pain in the right temporomandibular joint
Medical history: Diagnosed with cerebral palsy soon after birth due to complications encountered during labor.
Disease history: Presence of a slight masticatory disorder had been recognized, but had been left untreated. The patient underwent tooth extraction treatment, May 1999, after which a partial denture was fitted to both sides of the mandible, but was not often used. Complained of the decline in the masticatory function and was re-examined October 7th 2000.

Systemic observation

Presented with a slight muscle constriction in the upper limb due to cerebral palsy. Even though motor function was shown to have deteriorated, he was able to eat and brush his teeth by himself, but not to a level that would be adequate to maintain a sufficient level of oral hygiene. The muscles of the head and neck region, including the facial muscles showed involuntary movements at the time of oral cavity inspections and when he felt nervous. Motor disorder in the lower limbs was also shown presenting as an unsteady gait, but could attend the clinic on his own accord. There was no presentation of epilepsy, and with no delayed intellectual development.

Localized observation

The facial structure was asymmetrical (Image-1), muscular constriction was evident when attempting to open and close the mouth, and muscles were not able to move.

Intraoral observation: Presented with lack of No. 18 to 22 teeth on the right, and No. 28 to 31on the left, but was not using the partial denture (Image-2). The states of remaining teeth were P1, P2 levels. No abnormal symptoms to the oral mucosa were seen.

Surgery and treatments

Implant installation surgery was conducted to the both sides of the mandible on December 16th 2000, as requested by the patient and his mother. One tablet of Imovane (Zopiclone) and one injection of Sosegon (pentazocine hydrochloride) were administered to the patient. Even though a slight involuntary movement presented at the time of administration of local anesthesia, the patient remained stable with open mouth for the rest of the procedure. The vital signs also showed stability, both perioperative and postoperatively. Five AQB implants to the right and 3 to the left were installed in the mandible (Image-3), followed by the preparations of the abutment tooth 6 weeks later (Image-4). The Estenia crown was designed paying particular consideration to the oral hygiene. The margin was set to be 1 mm above the gingival margin with the space between the teeth set largely apart for the spaces to be easily accessible when tooth brushing by himself (Image-5a,b). In an attempt to avoid exertion of resultant lateral force, the inclination on the occlusal surface was set to be close to 0°, and its buccolabial width to be 2/3 of natural teeth (Image-6a,b, 7).

Post-treatment progress

On observation, 11 months after surgery a satisfactory progress is evident without any abnormal symptoms, with a favorable condition of the bone surrounding the implant, and no problems with oral hygiene.

Observation

1. The outcomes of implant treatments to patients with disabilities can be improved by setting guidelines to each level of disabilities. This will enable more proactive application of artificial root graft to disabled individuals who request it.
2. It is necessary to confirm that the primary disorder is non-progressive, and that a secondary underlined disorder is not also present.
3. A regular follow-up after the implant should be conducted after the treatment.
4. In cases of cerebral palsy, factors such as presentation of involuntary movements throughout the course of the treatment, during consultation and perioperatively; or the selection of the implant prosthesis that can simplify the maintenance of oral hygiene are required. For, patients with this condition have limitations with their ability to clean, and the application of implants and placement of superstructures with complex structures can foresee a worsened treatment outcome.
5. In this case example, by using the AQB implants and selecting the superstructure with placing the upmost importance on hygiene, we were able to derive at a favorable treatment outcome, with no presentation of abnormal symptoms, 11 months on.

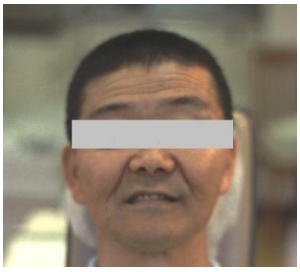
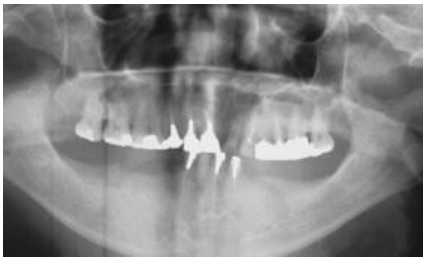
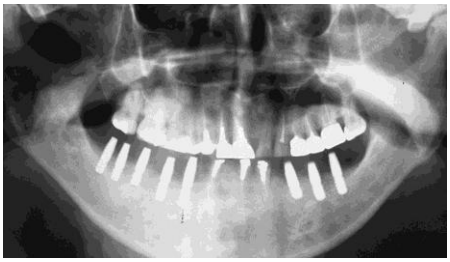
1  2  3 

Image-1: The patient presented with losses of No. 18 to 22 on the right, and No. 28 to 31 on the left, and had been previously fitted with a partial denture, but had stopped using it. It was difficult for the patient to hold the mandibular rest position for more than a few seconds. At the first clinical examination, the patient found it difficult to retain the open mouth state due to the involuntary movement of the facial muscles. No abnormal symptoms with respect to the oral mucosa were shown.

Image-2: Panoramic radiograph featuring the lack of teeth and the presence of slight periodontal disease in the remaining teeth in the mandible. No other complications are present.

Image-3: Postoperative panoramic radiograph

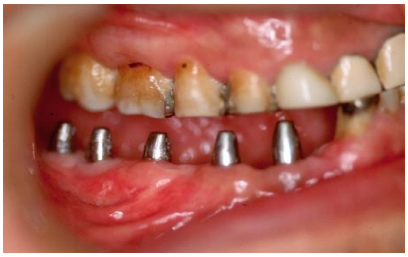
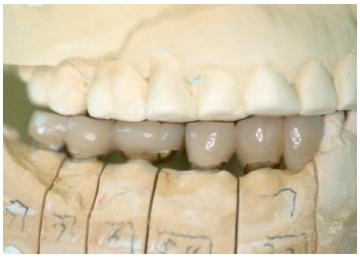
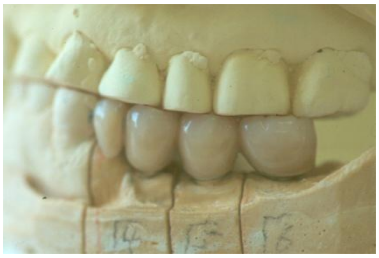
4  5-a  5-b 

Image-4: Six weeks after surgery, abutment preparation. A through plaque control measures were conducted once a week. Estenia crown was fabricated paying particular attention to the maintenance of hygiene in designing the margin, and was set 1 mm above the gingival margin. The inclination plane of the dental cusp was designed to be 0° to avoid the resultant lateral force.

Image-5a,b: Prosthetics (on the working model)

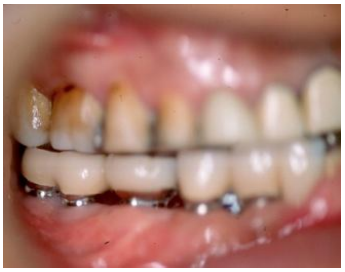
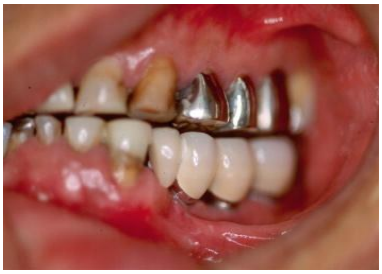
6-a  6-b 

Image-6a,b: The superstructures were placed 7 weeks after the operation. Large spaces were created between the teeth. The buccolabial width of the occlusal plane was set to be 2/3 of natural tooth.

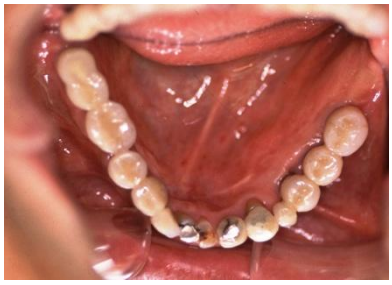
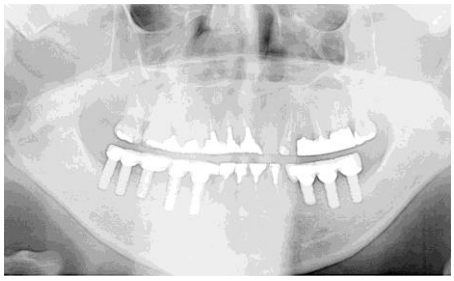
7  8 

Image-7: Image of the oral cavity after superstructure placement.

Image-8: Panoramic radiograph, 5 years and 9 months since the surgery. Favorable condition can be seen around the implants.

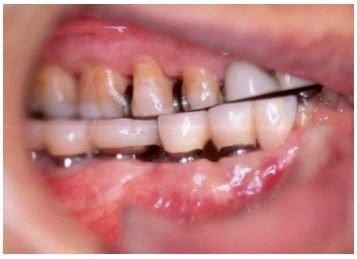
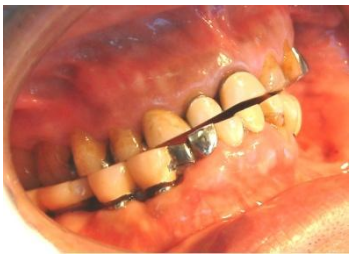
9-a  9-b  9-c 

Image-9 a,b,c: Image 5 years and 7 months since the surgery. Plaque control was conducted for the first 6 months from the time of primary operation, and a regular follow-up, once a month, has been continues up till now. A cooperative and proactive oral cleaning has been directed by the patient's mother, and a good oral hygiene level has been maintained till now.