

A dental implant case with aesthetics using HA bone graft fabricated by CAD/CAM based on CT simulation

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Abstract

A dental implant case with bone defect is shown. The patient had a bone defect in buccal side of #5 and #6 region, an aesthetic area. The bone defect volume was determined by CT simulation data. A HA bone graft was fabricated from HA sintered block using CAD/CAM technology. Anchoring the HA bone graft and implant placement was performed by the guided surgery designed by the same CT simulation software. First, bone defect region and missing teeth were recreated into ideal form by wax-up, and a plaster model was matched and the bone augmentation volume necessary for the bone defect region and precise implant placement position were designed. In order to avoid the contact of the bone graft block and the implant, implant access holes on the bone graft block were designed slightly bigger than the diameter of the implant. One year after the surgery, it successfully maintains its aesthetics and functionality.

Keywords: dental implant, aesthetics, CT simulation, CAD/CAM, HA bone graft

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1. Introduction

For dental implant cases with bone defect, an autologous bone block or GBR method using granular bone substitute and multiple membrane are commonly used. But it is difficult to design the ideal form prior to surgery especially in aesthetic area because of the difficulties involved in prediction of hard and soft tissue volume and amount loss of the grafting material over time.

A little ingenuity was given to the designing

procedure of bone augmentation volume data for HA bone graft block on simulation software explained in this paper. First ideal form was reproduced for the missing teeth and bone defect region with wax-up for an implant case with bone defect in labial buccal side, and a plaster model was made. The plaster model and simulation software (SimPlant® manufactured by Materialise Dental Co, hereinafter SimPlant) data of the same region were matched and the bone augmentation volume necessary for the bone defect area and the precise implant placement position were designed. Figure1

and 2 show the CT images.

The implant case in this study had a bone defect in buccal side of #5 and #6 region, an aesthetic area. HA bone graft were anchored and implants were placed by guided surgery.

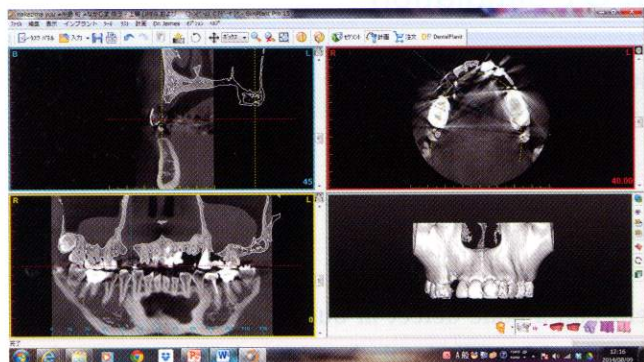


Fig.1: Matching the CT data and the plaster model on simulation software

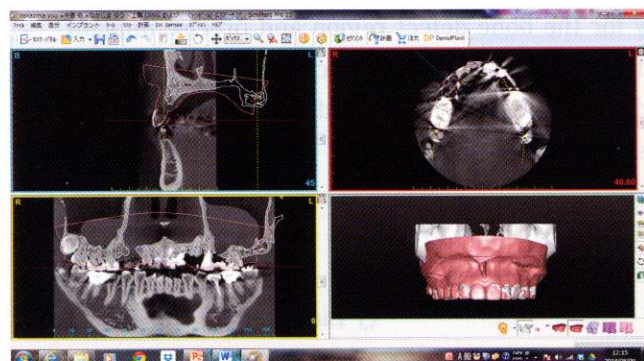


Fig.2: Matching the CT data and the plaster model on simulation software

2. Clinical case

1) Patient

Patient: 32 years old female

First visit: July 2012

Main complaint: Cosmetic disturbance in #5 and #6

Pre existing condition: N/A

Family medical history: N/A

Current medical history: Tooth #6 was extracted by the primary care dentist one month prior to her visit. She wanted implant treatment and the

primary dentist referred her to our clinic.

Current status: Countenance was bilaterally symmetric. Horizontal and vertical defect was observed in #5 and #6. Severe vertical and horizontal bone resorption in #6, vertical and horizontal bone resorption in #5 was observed in intraoral photograph. CT image shows extraction socket with severe bone defect on buccal side in #6, and horizontal bone defect in #5 (Fig 3, Fig 4)

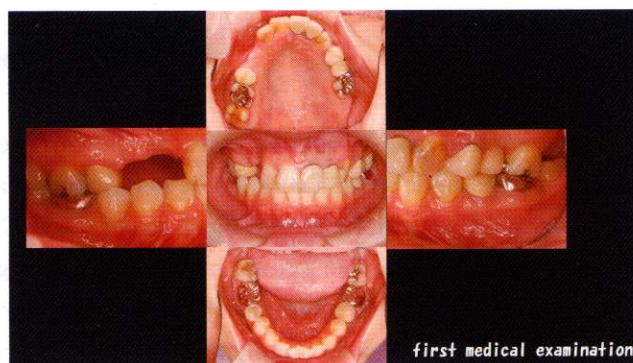


Fig.3: Interoral photograph at the first medical examination

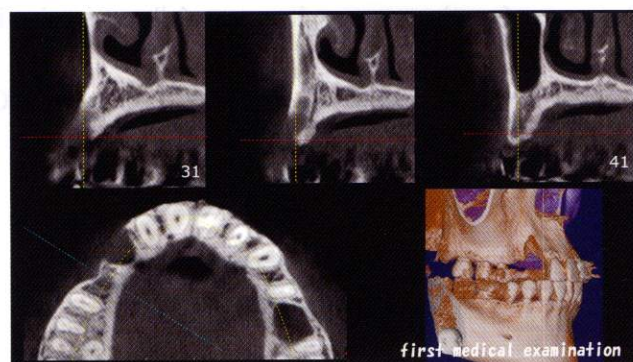


Fig.4: CT images at the first medical software

2) Treatment plan

The implant case in this study had a bone defect in buccal side of #5 and #6 region, an aesthetic area. HA bone graft block was anchored and implants were placed using guided surgery. It was designed to use the fixation pin holes to anchor the bone graft block at the same time as the implant placement.

(1) A plaster model of ideal form of the buccal bone defect region and the missing teeth was

