A Case of Recovery with Dental Implant under Minimally Invasive Procedure using a Surgical Guide for a Single Intermediate Missing of Upper Molar Region

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Article History
Received 9 April 2018
Accepted 18 April 2018

Keywords:
dental implant, surgical guide,
surgical template

Abstract
Dental implants are one of the major techniques to treatment of the teeth loss region. Some surgical guides for safety dental implant surgery have been presented. This paper show the case of a single intermediate missing treated by dental implant with minimally-invasive safety procedure using novel guide template. This paper produces the contents of dental treatment, the checks of the operability in the mouth by simulation with the maximum use of radiographic guide, and the points at the operation with clear figures.

Introduction
Dental implant treatment has begun to fit to general persons after 1960’s(1). Technology of dental implant makes remarkable progress and still also keeps developing now. To treatment of some teeth defect are bridge, partial denture and dental implant. As for the treatment for a single intermediate missing of upper molar region with healthy adjacent teeth, a dental implant is better choice (2). Novel guide template, one of the surgical guides is very useful for implant placement (3). We report the case of a single intermediate missing of upper molar region in which the implant could be placed with minimally-invasive safety treatment using surgical guide.

Case report
A 52-year old female came to Sugetawa Dental Clinic with a chief complaint of a discomfort feeling of upper right second premolar and gingival swelling on June 11, 2006. X-ray examination demonstrated the fracture of tooth root. The tooth was extracted. She has treated by a dental implant at the left maxilla. She hoped the treatment using dental implant and heeling terms of extracted wound was set. In June, 2007 (one year after the extraction), existing teeth were not required any treatment by X-ray and periodontal examination. But, CT examination demonstrated that the width of the implant surgery site was 6 mm and the distance up the floor of maxillary sinus was only 7 mm. We planned the dental implant surgery using surgical guide to avoid the anatomical restrictions safely with minimally invasion and without bone overgrowth. We got the patient’s agreement to our operation plan.

The contents of dental treatment were as follows.
1) oral hygiene instruction
2) professional care
3) extraction of upper right premolar (chief complaint part)
4) X-ray and intraoral photographs (Figs. 1–3)
5) production of working model
6) production of radiographic guide (Figs. 4–6) and CT photography setting the guide
7) simulation the CT photograph by simulation software (Figs. 7, 8, 12)
8) production of the surgical guide and adjustment on the working model (Figs. 9–11)
9) trial test of the surgical guide in her mouth
10) placement of the dental implant using the surgical guide without flap operation (in July, 2007)
11) impression taking of the implant by open-tray method
(in December, 2007)

12) setting of the upper structure (all ceramic crown of zirconia) by the screw

13) X-ray and intraoral photographs (Figs. 13-16)

The checks of the operability in the mouth by simulation with the maximum use of radiographic guide were as follows.

1) The state of the simulation by simulation soft reflect to a radiographic guide and the hole is formed in the insert position in consideration of a position and an angle

2) Set a radiographic guide with the open hole into the mouth, and check whether the contra with a bar can access into the mouth or not.

3) When an access is difficult, tune finely in the position which can be directly accessed within the mouth and be again reflected in the planning of simulation soft.

The points at the operation were as follows.

1) Suit the surgical template within the mouth before the operation.

2) Access the contra with a bar into the mouth, check the contra is smoothly in the position of drill guide using pumping.

3) Fix by a resin, when a case of the surgical stent which cannot use an anchor pin such as the present case.

4) It checks that there is an implant object along the bone slot on the drill, and insert the implant without applying power.

5) Since the drilling hole using surgical guide may become correct and thin, e hole by drilling using simulation soft when a hard bony tissue is contained, a hole is formed more greatly in a case containing hard bone.

6) Remove the implant mount when a torque check is performed.

Result

The maintenance recall is carried out for every half a year. Patient’s satisfaction has been got on aesthetic and functional occlusal viewpoints in April, 2011 (3 years and 3 months after operation). Although the use of radiographic guide and surgical guide needed time and money, the method was significant for the patient.

Discussion

There have been some technical reports of surgical template (4–10). In the case of single intermediate missing of upper molar region, the size and the insertion direction of an implant object are restricted in many cases because of the existence of teeth both mesial and distal sides, nasal cavity and maxillary sinus. This patient had strong aware of normal implant operation, this operation could avoid it. Although appropriate time and cost had to be hung on production of a radiographic guide and a surgical guide, it was the productive operation method for the patient. Since the surgical guide caught the part and direction of insertion in three dimensions, the exact insertion point could be secured. Moreover, incision and exfoliation were unnecessary and less invasive operation could be undergone, and it was suggested that it is the safety implant operation method. However, when the position of a surgical guide shifts, you have to recognize that there is a danger of causing unexpected procedural accidents. In order not to produce an error, the exact master cast manufactured on the artisan side is used, the work which removes the error in all in a radiographic guide, a surgical template, and the mouth is important, and it considers that implant medical

Fig. 1 Preoperative panoramic X-ray image
Fig. 2 Intraoral photographs of preoperation (front view)
Fig. 3 Intraoral photographs of preoperation (occlusal view)
Fig. 4 Production of radiographic guide: Marked 10 points and more of the guides made on a model
Fig. 5 Check the conformity to a model
Fig. 6 Trail test in the mouth
Fig. 7 Simulation images of implant insert by the guide (buccolingual section)
Fig. 8 Simulation images of implant insert by the guide (mesiodistal section)
Fig. 9 Adjustment and trial test of surgical template: Mark delete parts
Fig. 10 Inside adjustment of surgical template (inner face aspect)
Fig. 11 Adjustment of surgical template
Fig. 12 Simulation images of preoperation (mesiodistal section)
Fig. 13 X-ray after operation
Fig. 14 Postoperative panoramic X-ray image
Fig. 15 Intraoral photographs of after operation (front view)
Fig. 16 Intraoral photographs of after operation (occlusal view)
treatment is a key led to a success.

References