

Efficacy and Clinical Utilization of UV Activated Implant

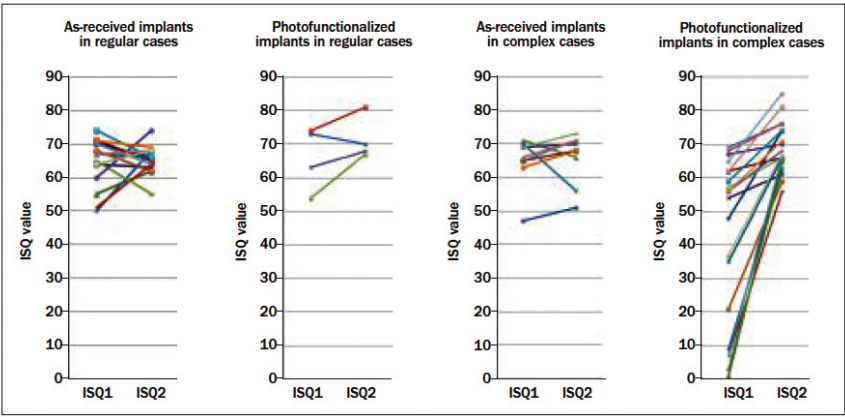
III. Theoretical base for ISQ measurement for determination of the early stage implant load and the effects of UV Activation on the time of loading / IV. Overcoming difficult cases by using UV Activated implant

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IV. Overcoming difficult cases by using UV Activated implant

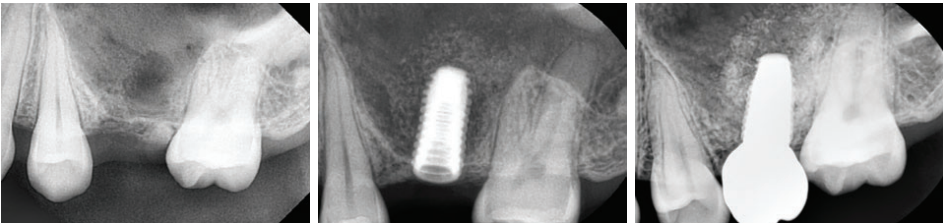
Team of professors Makoto Hirota and Tomomichi Ozawa of Yokohama University, Japan compared the implant stability through the measurement of ISQ values during the process of osteosynthesis by placing both the UV Activated and non-Activated implants into the maxillary sinus lifting area accompanied by bone graft and area of bone graft requiring artificial placing, which are classified as clinically difficult cases, in 2016. As the results, they reported that photoactivation of implant surface accelerated the speed of placing particularly in bones with poor osseous tissues and other difficult cases of implant and improved the stabilization level in comparison to the ordinary implant with UV treatment acting as more decisive factor than other already tested host related factors from the perspective of implant stability (Table 1-1).On the basis of the aforementioned results, I also obtained excellent results by placing UV Activated implant into maxillary sinus area with insufficient residual bones, area needing extensive alveolar bone graft, and areas needing re-placement due to tooth extraction and failure in implant osseointegration for various reasons, along with digital guide (DIONavi,). As such, I would like to introduce them in this paper.



(Table 1-1) Implant stability quotient at placement (ISQ1) and stage-two surge ry (ISQ2) of as received (untreated) and photofunctionalized implants. Implants were divided into two groups of regular and complex cases. The complex cases included the implant placement with either simultaneous guided bone regenerat ion (GBR) or sinus elevation, or placement in a fresh extraction socket

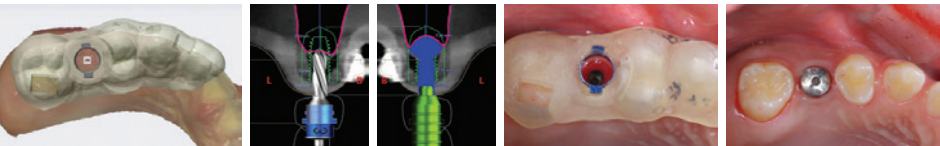
1. Effects in the case of having executed maxillary sinus lifting and UV Activated implant simultaneously with residual bone of less than 5mm

[Case 1] In this case of 22-year old female patient with a lot of fear towards dental treatment, 3mm of residual bone in the maxillary sinus was confirmed under radiation examination. As such decision was made to perform implant placement along with maxillary sinus lifting. Consultation was provided for procedure without incision by using digital guide for the patient, Findings prior to and after the surgery, and after finishing radiation are as follows (Fig. 1-1).



(Fig. 1-1) Radiation examination images from the early stage of surgery to the time of completion of prosthesis (3,5 months)

At the time of surgery, digital guide (DIONavi,) manufactured in advance and maxillary sinus surgery kit for exclusive application for guide was used. After having lifted the maxillary sinus membrane by using maxillary sinus drill and water pressure, UV Fixture (DIO UFII) with diameter of 5,0mm and length of 11,5mm was activated for 20 seconds with DIO UV Activator II before placing it along with bone graft (heterogeneous bone) simultaneously. ISQ value measured after the was 63. Healing abutment was connected at the top portion of embedded implant (Fig. 1-2).



(Fig. 1-2) Flapless surgery using digital guide, water pressure and guide

The patient was instructed to visit the hospital at prescribed interval for measurement of ISQ (Osstell mentor) to determine the time of loading (Fig. 1-3, Table 1-2).



(Fig. 1-3) Measure ISQ value

	surgery	2weeks	1month	2months	3months	4months
ISQ (Buccal)	68	68	68	72	75	80

(Table 1-2) Implant stability was measured with ISQ (Os stell Mentor) from the time of surgery to prosthesis.

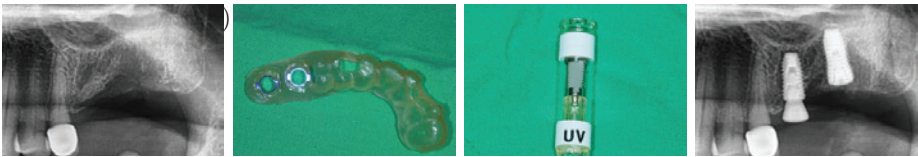
Generally, in the event of placing implant along with maxillary sinus lifting when the residual bone is less than 5mm, it takes approximately 6 months until loading is possible through integration of the bone graft material and implant. However, in this case, loading was performed 3 months after placement since ISQ value of more than 75 was obtained after 3 months. The patient is using the implant without any problem at the present, 10 months after the implant placement. As in the report made by A. Funato (2013) and M. Hirota (2016) mentioned in the previous issue, it can be seen that UV Activated implant imparts substantial influence on the early stage osseointegration even in the difficult maxillary sinus cases, Digital impression acquisition for prosthesis was performed through scanning by connecting the scan-body to the implant and using intra oral scanner, Trios3 (3Shape). When merging process is executed by using Dental system (3Shape) program, implant position is planned digitally. Final prosthesis was designed after having selected the ready-made stock abutment (DIO) available in the program library and was manufactured with zirconia (Fig. 1-4).



(Fig. 1-4) After having acquired digital impression by using scan-body, assess the position of implant through the matching process in the Dental program (3 Shape) before selecting the stock abutment (DIO) from the library to design the final prosthesis. All the processes were carried out digitally without model.

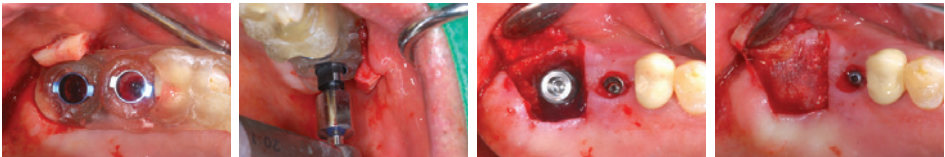
2. Effect of UV Activated implant placement in the area of tooth extraction and extensive loss of alveolar bone

[Case 2] This 64-year old male patient visited our hospital with the history of tooth extraction due to severe tooth mobility about a month ago. He requested for navigation implant (expression used by the patient) at the tooth extraction site(#27) and at the location where tooth was already lost(#26).As the results of radiology examination, the #26 had healthy alveolar bone while the #27 displayed severe bone loss due to tooth extraction and after effect of inflammation. This location required implant placement and extensive alveolar bone graft at the same time.Generally, many people think that digital guide procedure is not possible in the cases accompanying severe bone graft. However, even in such cases, digital guide procedure in accordance with the request of the patient is possible. The advantages of using guide at this time include ability to execute entire prosthesis processes in digital format while placing the implant in the desired location. In the case of this patient, data for guide was obtained by using Trios3 (3Shape) oral scanner and CBCT to design the guide with Implant studio (3Shape) program and manufactured with in-house 3D printing. At the time of the surgery, implant exclusive for UV was activated for 20 seconds with Activator II (DIO) prior to placement. It took a total of 3.5 months from placing to finishing of prosthesis and radiological findings are as UV



(Fig. 2-1) Radiology image and manufactured guide prior to the procedure, and radiology findings after the completion of prosthesis 3 months after UV Activated implant (DIO UFII) embedding

For the location that does not need bone graft, incision was made in a flapless method by using the guide, and for the location that needs bone graft, incision was made by designing the flap to move to the buccal side to ensure there is no problem when using the guide. Then, UV Activated implant (DIO UFII) was placed along with heterogeneous bone before covering with PRF membrane (Fig. 2-2).



(Fig. 2-2) Designing flap for bone graft, and placing an implant while doing bone graft when using the guide.

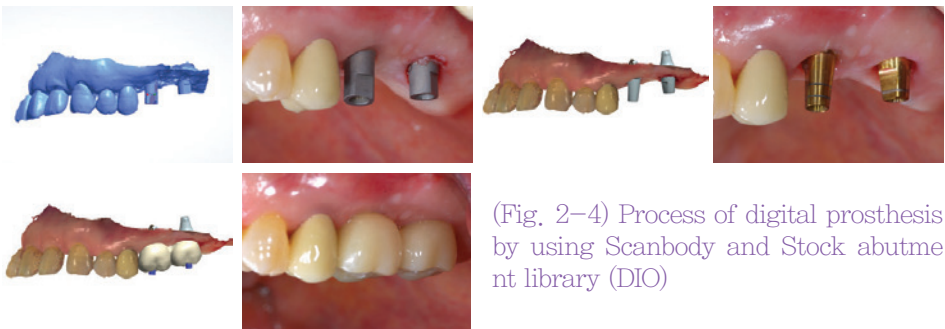
Section #27 which was bone grafted, was exposed to enable ISQ value measuring by using the digital guide and punch which was used during surgery after 1 month of when soft tissue healing is done. ISQ values were continuously measured at the interval of 1 month thereafter. It was decided to manufacture prosthesis since ISQ value (of more than 75) that enables loading was obtained at the 3rd month in the bone grafted location (Fig. 2-3, Table 2-1).



(Fig. 2-3, Table 2-1) 2nd surgery was executed by using guide and punch used during surgery 1 month after the 1st surgery, and implant stability was measured regularly by using ISQ (Osstell Mentor) every month.

	Surgery	1month	2months	3months	4months
#26	67	75	81	83	85
#27	21	52	64	75	81

After acquiring digital impression by using Trios3 (3Shape) oral scanner after attaching the scan-body to the implant for the manufacturing of the final prosthesis, the position of the implant was confirmed through merging process under the Dental system (3Shape) program. Then, the final prosthesis was designed by selecting the ready-made stock abutment (DIO) from the library. Final prosthesis was manufactured by using zirconia and all the processes were executed through digital process without the need for a plaster model(Fig. 2-4).



(Fig. 2-4) Process of digital prosthesis by using Scanbody and Stock abutment library (DIO)

Generally, it is necessary to wait a minimum of 4~5 months for osseointegration after placing an implant along with bone graft in the case of extensive bone loss in the maxillary molar area. However, it can be seen that there was a faster osseointegration when placing a UV Activated implant.

3. In the event of re-placing UV Activated implant in the location where implant placement failed the first time.

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Akiyoshi Funato(2013) reported that ISQ value increased markedly in early stage even in the cases of immediate placement after tooth extraction, vertical bone graft, maxillary sinus lifting and low early stage stability of extensive implant placed in the previously failed location (early stage ISQ <70). I was also able to observe rapid increase in the ISQ values at an amazing pace in the case of having re-placed UV Activated implant in the locations of previous implant failure for various reasons in comparison to that of the ordinary implant, I was able to restore the deteriorated relationship with the patient by completing the prosthesis earlier than usual.

[Case 3] This 66-year old male patient had difficulty in controlling his smoking habit. Although the implant was placed into the corresponding position, the soft tissue did not heal all the way. As such, healing abutment was connected, but the placed implant had to be removed due to detection of increased mobility and bone absorption around the implant under the radiology imaging. 2 months after the removal, sequestrum and inflammatory tissues were thoroughly removed for re-placing. Then, UV Activated implant (DIO UFII) accompanied by additional bone graft was placed. After having executed the 2nd surgery by using Punch for ISQ value measurement 1 month after the initial surgery, healing abutment was attached. Impression was acquired and final prosthesis was manufactured since ISQ value (77) for which loading is possible was displayed 2 months after the resurgery (Fig. 3-1).



(Fig. 3-1) Measurement of extent of fixation of re-placed implant and image of the final prosthesis

As the corresponding patient was undergoing implant treatment under the coverage of insurance policy, all the process were carried out through general impression acquisition method while the final prosthesis was manufactured with PFM. I would like to introduce all the radiology images and dates stored in the patient management program in this paper in order to avoid any possible controversies (Fig. 3-2).



(Fig. 3-2) Implant placement and removal after failure, re-placement of UV Activated implant, period and radiology images until the final prosthesis

As illustrated above, as the results of having used UV Activated implant in a wide range of difficult cases including implant placing simultaneously with maxillary sinus lifting with little residual bone, placement accompanied by tooth extraction and extensive bone graft, and re-placement due to implant failure because of various reasons, etc, by making reference to the cases reported in various literatures, I managed to verify the substantially quicker speed of healing and stability of UV Activated implant in comparison to ordinary non-activated implant. Therefore, I am introducing them here.

(REFERENCE)
1. A. Funato., Photofunctionalized Dental Implants:A Case Series in Compromised Bone Research The International Journal of Oral & Maxillofacial Implants / Quintessence Publishing co, Inc, 2013
2. M. Hirota., Implant Stability Development of Photofunctionalized Implants Placed in Regular and Complex Cases: A Case-Control Study Quintessence Publishing co, Inc, volume 31, Number 3, 2016