Efficacy and Clinical Utilization of UV Activated Implant

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Ⅱ. Clinical Utilization of UV Activated Implant

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5. Clinical Case

With the increase in the demands and more challenging implant surgeries, there has been increasing interest among dental clinics on immediate and early stage loading of the implant. Whether such demand can be met when loading without incision through Digital Guided Surgery will be examined through clinical cases on the basis of theoretical and experimental results of UV Activated implant.

Case 1)

72−year old male patient who is takes heart medications visited the hospital due to inconveniences in the existing 6 UNIT Bridge from no.13 to 23. Deep cervical caries were observed in the 13 and 23 teeth and the root condition of 11 tooth was poor. As such, 22, 13 and 23 teeth were extracted, and implant was loaded at the positions 11, 13, 21 and 23 before establishing treatment plant with implant Bridge from 11 to 13, and 21 to 23.

Fig.10 Panoramic photo at the initial examination

Oral scan and CBCT data were obtained for Digital Guided Surgery 3 months after tooth extraction and surgical guide was designed after having positioned implant at appropriate position with the software with considerations for the shape and location of the final tooth.
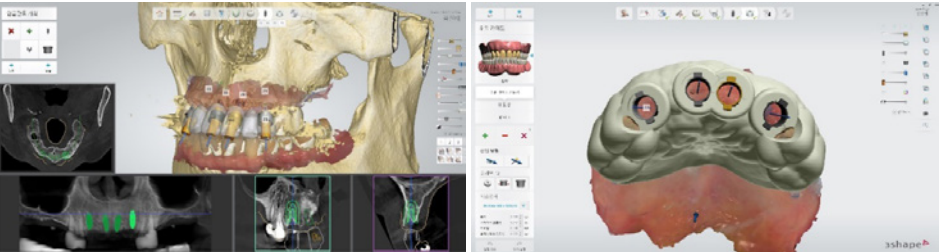

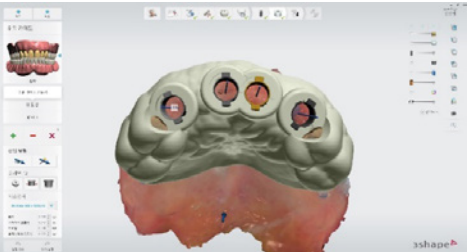Fig.11 Planning Software (Implant Studio)   Fig.12 Surgical Guide Design (Implant Studio)

Implant information			
Implant location (UNN)	13	11	21
Manufacturer	DIO	DIO	DIO
Type	UF(III)3810	UF(III)3810	UF(III)3810
Order No.	UF(III)3810	UF(III)3810	UF(III)3810
Length, mm	10	10	10
Diameter (Ø), mm	3.8	3.8	3.8
Color	Blue	Blue	Blue

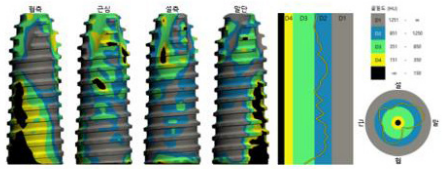| Implant information	
Implant location (UNN)	23
Manufacturer	DIO
Type	UF(III)3810
Order No.	UF(III)3810
Length, mm	10
Diameter (Ø), mm	3.8
Color	Blue

Fig.13 Implant analysis data

Since the recently updated software indicates the bone density for each distal, proximal, buccal and lingual aspect by computing the bone density around the implant, as illustrated in the Fig. 13, it is not much easier to secure appropriate initial fixation prior to the surgery through analysis prior to the procedure.

Fig.14 DIO UV Activator 1

Fig.15 DIO UV implant and UV Activator 2

Procedure was executed in Flapless Digital Guided Surgery format after printing the designed guide with a 3D printer. 4 DIO implants were UV−treated with UV Activator 2 for 20 seconds before placement. Since the existing UV Activator 1 (Fig. 14) neededs 15 minutes to Activate UV light This resulted in the problem of having to wait for 15 minutes for the implant to be UV activated in the middle of surgery when placing implants with different dimension from the original plan during the surgery Since the Activation time markedly shortened to 20 seconds for the UV Activator 2 (Fig.15) it was possible to easily cope with variables that manifest in the surgical process, and it was highly satisfactory from the perspective of the surgeon.
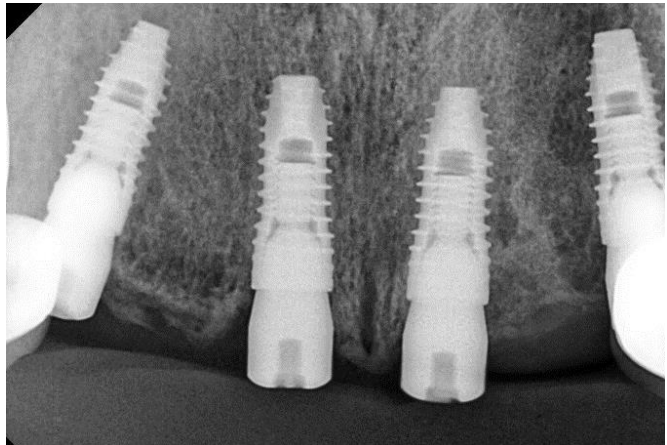

Fig.16 Radiograph image of root apex after surgery

Dental formula NO.	Implant Size	Bone Density	ISQ					
			OP	1 Week	2 Week	3 Week	4 Week	5 Week
#13	DIO UV Φ 3.8X10mm	D2~D3	65	65	75	75	76	75
#11	DIO UV Φ 3.8X10mm	D3	65	66	80	80	81	82
#21	DIO UV Φ 3.8X10mm	D3	68	68	73	73	73	74
#23	DIO UV Φ 3.8X10mm	D2~D3	80	80	82	82	83	83

Table 1. ISQ measurement values immediately after the surgery and at 1 week interval thereafter.

Fig. 16 shows the radiograph image of root apex immediately after embedding of implant and the ISQ values measures immediately after the surgery and at 1 week intervals thereafter are illustrated in the Table 1. All 4 implants displayed ISQ values of more than 70 in the 2nd week and production of prosthesis was executed on the 4th week. ZIRCONIA prosthesis was produced in modeless method by using oral scanner for the left side while PFM prosthesis was produced by using impression for the right side since it was insurance covered implant.

Fig.17 Panoramic photo after the final prosthesis

Fig.18 Radiograph image of root apex after the installation of final prosthesis   Fig.19 Photograph of teeth after the installation of final prosthesis

Changes in the ISQ values of the implants embedded in the maxillary anterior teeth area shows increase in the values on the 2nd week, thereby illustrating that synostosis of the implant and alveolar bone can be achieved within short period of time through Digital Guided Surgery and UV implant.

Case 2)

51−year old male patient without any specific past history of diseases visited the hospital to restore maxillary molar teeth on the right side. Since there was approximately 9mm of residual bone, treatment plan was made to place 8.5mm UV implants at the 17 and the 16 teeth locations without bone graft.

Fig.20 Panoramic photo at the initial examination

After acquiring oral scan and CBCT data the position of the implant was designated with the software, and the surgical guide was designed.
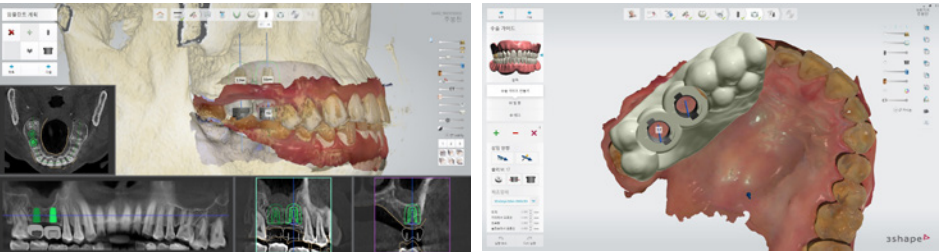

Fig.21 Planning Software (Implant Studio)   Fig.22 Surgical Guide Design (Implant Studio)

Implant information	
Implant location (UNN)	17
Manufacturer	DIO
Type	UF(III)5008
Order No.	UF(III)5008
Length, mm	8.5
Diameter (Ø), mm	5
Color	Green
Sleeve information	
Name	DIO GS 53
Type	Completely guided
Order No.	GS 53
Offset, mm	9
Color	Blue
Drill information	
Minimum drill length	17.5
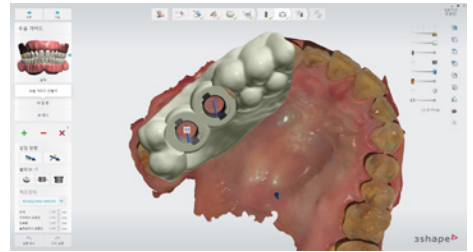
Implant information	
Implant location (UNN)	16
Manufacturer	DIO
Type	UF(III)5008
Order No.	UF(III)5008
Length, mm	8.5
Diameter (Ø), mm	5
Color	Green
Sleeve information	
Name	DIO GS 53
Type	Completely guided
Order No.	GS 53
Offset, mm	9
Color	Blue
Drill information	
Minimum drill length	17.5

Fig.23 Implant analysis data

Procedure was executed in Flapless Digital Guided Surgery format after printing the designed guide with 3D printer. 2 DIO UV implants were Activated with UV Activator 2 for 20 seconds prior to the surgery and placed thereafter.
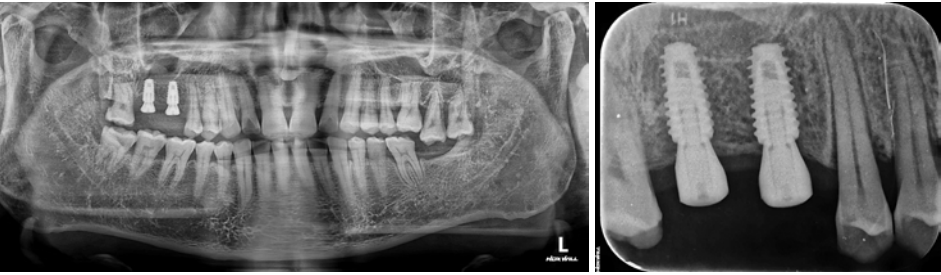

Fig.24 Panoramic photo and radiograph image of root apex after the surgery

ISQ values measures immediately after the surgery and at 1 week interval thereafter were as follows.

Dental formula NO.	Implant Size	Bone Density	ISQ				
			OP	1 Week	2 Week	3 Week	4 Week
#17	DIO UV Φ 5.0X8.5mm	D3	72	74	81	82	85
#16	DIO UV Φ 5.0X8.5mm	D3	65	69	75	79	81

Table 2. ISQ measurement values immediately after the surgery and at 1 week interval thereafter.

All the ISQ values were higher than 70 in the 2nd week and ZIRCONIA prosthesis was produced on the 4th week using an oral scanner.
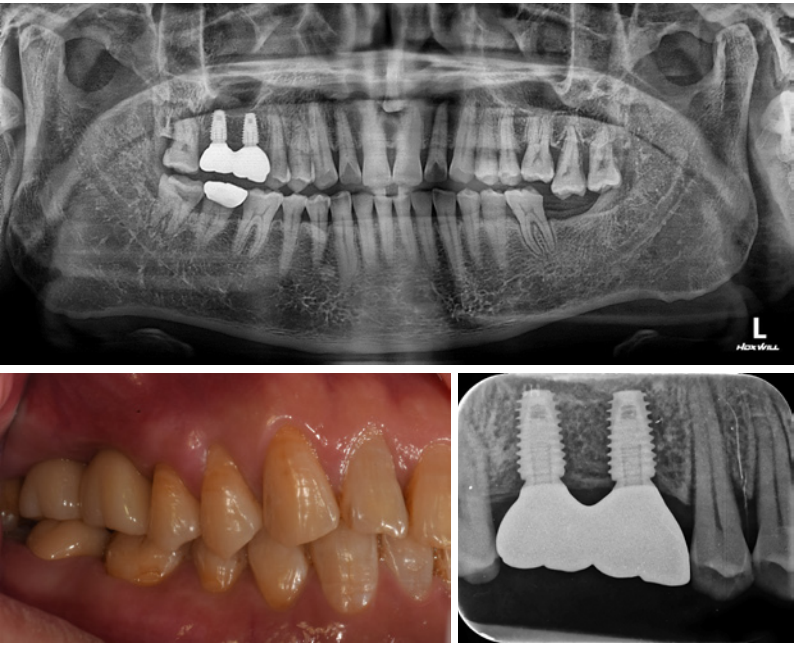

Fig.25 Panoramic photo, oral cavity photo and radiograph image of root apex after the installation of final prosthesis

Regarding the changes in the ISQ values of implants placed in the maxillary molar area, it was possible to observe the increase in the values on the 2nd week. It was also possible to obtain synostosis of the implant and alveolar bone within short period of time through UV Activation in spite having to use an implant with even shorter length (8.5mm).

Effects of UV implant on synostosis in cellular experiment, animal experiment and clinical settings were examined above along with the theoretical considerations on the UV implant. As such, it was confirmed that UV Activation on the implant surface can clean the implant surface by removing organic substances such as hydrocarbon accumulated as the result of biological aging phenomenon UV Activation on the implant surface can also induce quicker synostosis and high BIC by not only transforming the nature of implant surface from hydrophobic to hydrophilic but also promoting adherence of protein and cells by changing the electric charge of the surface from negative to positive. Through such process, it is deemed that UV implants can be used assertively not only in difficult cases including cases with low bone density or immediate placement after tooth extraction but also in the cases of immediate or early stage loading.