Denfo Clinic Cowellmedi Clinical Part

Case report using INNO implant of Hydrophilic SLA surface

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It is safe to say that the history of dental implants is the history of the surface of the implants. Numerous surface methods have been developed and produced: the first-generation method of smooth-surface; the method of second-generation surface increase such as RBM, dual acid etching, sintering and SLA; the third-generation method of surface chemical modification using ions, such as anodizing, use of fluoride, HA coating and SLActive; and the fourth-generation method of biomimetic-technology-based surface using BMP-2, peptide and a growth factor, which are expected to appear. Most of the implant surfaces that are used in Korea are considered to be based on the second-generation methods of RBM and SLA, for several reasons.

Reported herein are cases of the use of INNO implants with a hydrophilic SLA surface,which have recently been marketed by CowellMedi. The SLA surface shows the hydrophilic property of 90 or less degrees of contact angle immediately after they are produced, but the contact angle is known to increase to 139° with the passage of time due to the hydrophobic property produced by the hydrocarbon in the air. The surface of the hydrophobic property is known to be due to the effect of the Cassie-Baxter regime (the Lotus effect), which means incomplete contact of liquid with the surface caused by the air bubbles captured in the macrocavity on the SLA surface. Consequently, as reported by Schwartz et al., the blood compatibility of the hydrophobic property is lower than that of the hydrophilic property, and the contact surface with new bones is significantly reduced after the healing in cases of GBR that include dehiscence defects. To achieve a stable marginal bone level even in cases of loading after GBR, the surface of the hydrophilic property may be used.

The most recently developed INNO hydrophilic SLA surface that is based on the sessile method has a 36° contact angle and an extreme hydrophilic property. This surface undergoes the processes of SLA, special cleaning and additional alkali cleaning using NaOH. Sodium hydroxide (NaOH), which is a major element of the alkali cleaning solution, combines with the element of silicon (Si) to form water-soluble Na2SiO2(OH)2 · 4H2O (water glass) and to remove the silicon. In addition, the SO4 2- and Cl- ions of sulfuric acid and hydrochloric acid, which are used for heat acid etching, form Na2SO4, NaCl and water-soluble salt, and then are completely removed. Through these processes, foreign objects of RBM sanding materials, which are produced during the alkali cleaning, and the remaining acid etching solution are considered removed. The augmented oxygen radicals after the cleaning activate the implant surface to increase the surface energy, and this physicochemical change seems to sustain the extreme hydrophilic property. Of course, how long the hydrophilic property is sustained is another issue.

The next case is that of a patient who underwent placements of two anterior maxillary implants with bone grafting and provisional restoration, followed by the wearing of a dental prosthesis. (Clinical Case 1)

The four anterior maxillary incisors, which showed severe tooth mobility and chronic periodontitis, were surgically extracted, two 4.0x10mm INNO implants were placed in the lateral incisor area, and finally, bone grafting was performed. For temporary restoration, a temporary implant was placed in the pontic area.

At 1.5 months post-operatively, a fixture level impression was obtained to perform a provisional restoration, and then a final prosthesis was completed after the soft tissues were stabilized. The preceding table shows the ISQ measurements. (Table 1)

months	#12 SLA	#22 SLA	
0	75	76	1st. Op.
1	72	75	
1.5	78	77	loading with temporary restoration

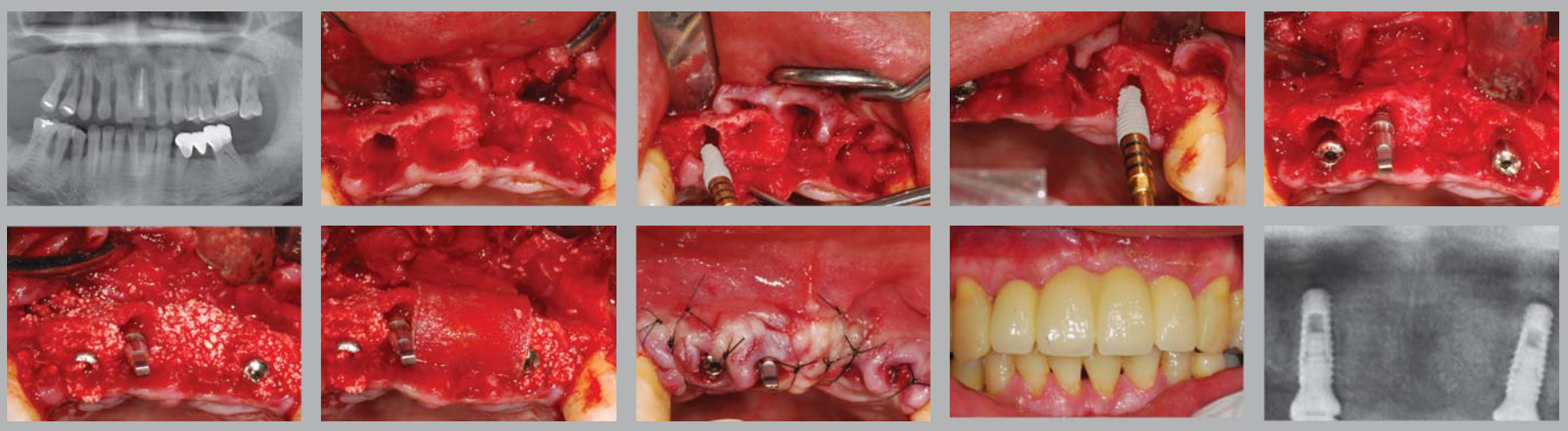
Table 1.

The radiographs showed a marginal bone level, which will be monitored through regular X-ray check-ups and occlusal equilibrations. Had a C.T. graft been performed in the pontic area, the result might have been more aesthetic than now, but the patients could not afford to undergo it. From the authors' experience, if the SLA surface is sound at the start, its long-term prognosis is much more stable than that of RBM. This may be due to the relatively high BIC ratio, and the about 20% enhanced osseointegration performance.

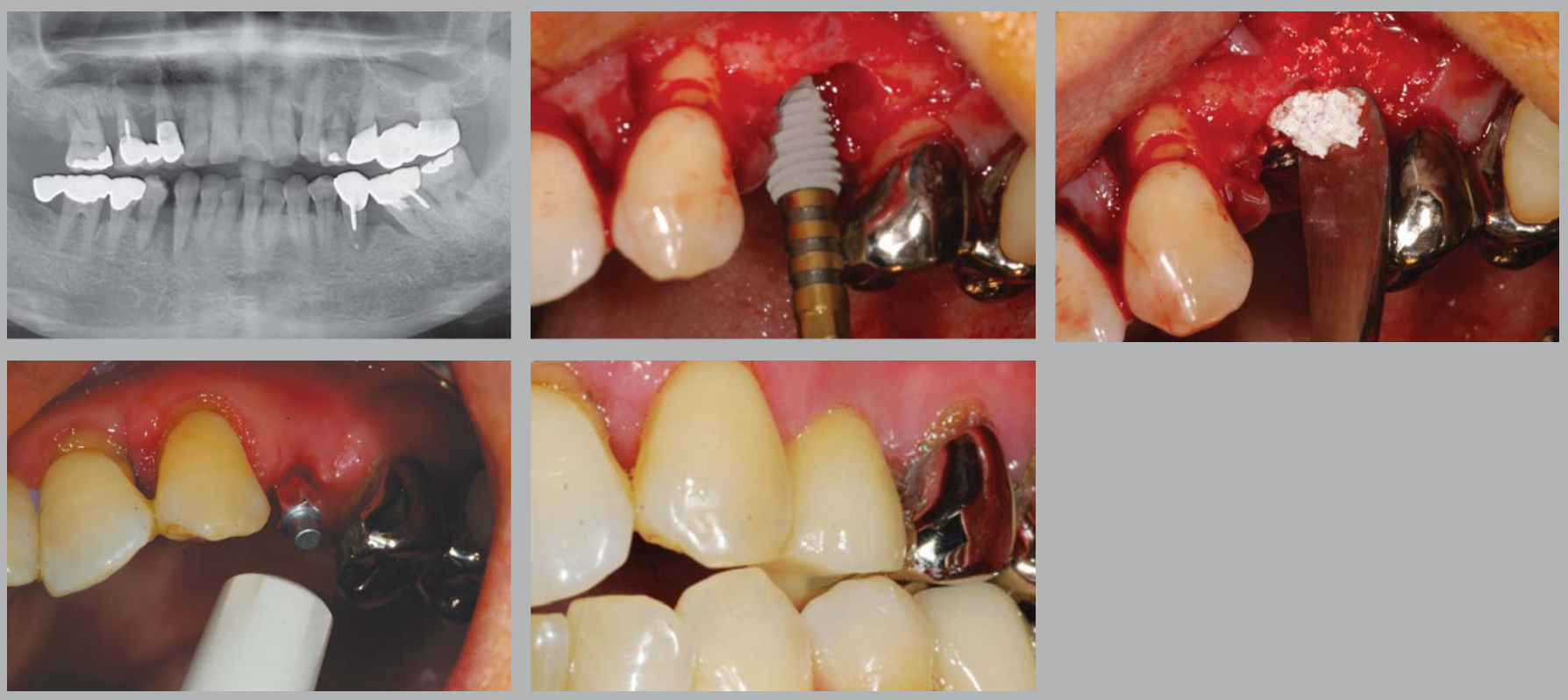
The next case is that of a patient who underwent an implant placement and an intra-socket bone graft in the maxillary premolar area immediately after tooth extraction, and loading at six months post-operatively. (Clinical Case 2)

The five-week post-operative ISQ measurement was as

Clinical Case 1



Clinical Case 2



high as 77, so an impression was obtained before the final prosthesis was completed. The INNO fixture has a hex size of 2.5 mm, a hex height of 2.5 mm, an angle (one side) of 11° and a bevel hole of Φ3.35, so it is compatible with most implants of other companies. Nevertheless, it is incompatible with long implants because its hex height is only 2.8 mm. All nonhex abutments are compatible. Of course, these measurements are two-dimensional. Three-dimensional measurements must be confirmed through micro-CT, but no problem occurred.

As described, the dental implants with the INNO hydrophilic SLA surface showed strengths not only in the general cases but also in the bone grating cases due to their unique hydrophilic property and augmented surface energy, compared with the implants with a typical hydrophobic SLA surface. More attractive results may be obtained than those from the implants with a hydrophobic SLA surface if the implants with the INNO hydrophilic SLA surface are used in cases of early loading, maxillary cavities, GBR with a bone graft, and failure.