### Contents

#### TS SYSTEM
Selected literature of published Journals

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Clinical Study</td>
<td>Subjective Satisfaction of Clinician and Short-Term Clinical Evaluation of Osstem TSIII SA Implant</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>J Korean Clinical Implant 2010;30(7):430-43</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Case Report of Guided Bone Regeneration in Dehiscence-Type Defects Using Hydrophilic Surfacd Implant (TSIII CA) and SMARTbuilder</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Scientific Poster, Osstem Meeting 2013</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Preliminary Clinical Evaluation of Customized Three-Dimensional Pre-formed Titanium Mesh for Localized Alveolar Bone Regeneration</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Scientific Poster, Osstem Meeting 2013</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Preliminary Study for Hydraulic Sinus Membrane Elevation by CAS KIT without Bone Graft</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Scientific Poster, Osstem Meeting 2013</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prospective Comparative Study of Tapered Implant with SLA Surface at Maxillary Posterior Area According to Loading Time: 3 and 6 months</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Scientific Poster, 21st Congress of EAO 2012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sinus Bone Grafting with Simultaneous Implant Placement in Case of Residual Bone Height Less Than 4mm Using TSIII SA Implant</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Scientific Poster, 22nd Congress of EAO 2013</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A Case of Rehabilitation of Oral Function with Dental Implants Following Panfacial Bone Fracture</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Scientific Poster, Osstem Meeting 2013</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Full Mouth Rehabilitation Utilizing the CAD/CAM Technology : Surgical Guide for Flapless Surgery, Provisional Restoration and Screw-Retained Fixed Complete Denture</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Scientific Poster, 21st Congress of EAO 2012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>An Implant-Supported Restoration of a Maxillary Central Incisor Using a Temporary Abutment and a Customized CAD/CAM Titanium Abutment</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Scientific Poster, 21st Congress of EAO 2012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SmartFit Abutment and Custom Healing Abutment</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Scientific Poster, 21st Congress of EAO 2012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clinical Comparative Study of Immediate Loading Using Tapered Implant with Hydroxyapatite Coating at the Partial Edentulous Ridge of Posterior Maxilla and Mandible</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Scientific Poster, 21st Congress of EAO 2012</td>
<td></td>
</tr>
<tr>
<td>● Pre-Clinical Study</td>
<td>Effect of Microthreads on Removal Torque and Bone-to-Implant Contact: an Experimental Study in Miniature Pigs</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>J Periodontal Implant Sci 2013;43:41-6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enhancement of In Vitro Osteogenesis to Chemically Activated CA Surface Compared with SA Surface</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Scientific Poster, Osstem Meeting 2013</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Effect of Photodynamic Therapy on Aggregatibacter Actinomycetemcomitans Attached on Titanium Surfaces</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Scientific Poster, Osstem Meeting 2013</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evaluation of Biomechanical Effect on Chemically Modified CA Surface in Vivo</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Scientific Poster, 21st Congress of EAO 2012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Biomechanical and Histomorphometrical Evaluation of Bone-Implant Integration at Sand Blasting with Alumina and Acid Etching (SA) Surface</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Scientific Poster, 19th Congress of EAO 2010</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experimental Study of Bone Response to Hydroxyapatite Coating Implants: BiC and Removal Torque Test</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Comparative Study on the Durability of Abutment Post According to Tightening Torque and Cantilever Volume</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Scientific Poster, Osstem Meeting 2013</td>
<td></td>
</tr>
<tr>
<td>● References</td>
<td></td>
<td>28</td>
</tr>
</tbody>
</table>
US System
Selected literature of published Journals

- **Clinical Study**
  - Success Rate and Marginal Bone Loss of Osstem USII Plus Implants: Short Term Clinical Study
    - J Korean Acad Prosthodont 2011;49(3):206-13
  - The Study of Bone Density Assessment on Dental Implant Sites
  - A Retrospective Evaluation of Implant Installation with Maxillary Sinus Augmentation by Lateral Window Technique
  - Multicenter Retrospective Clinical Study of Osstem USII Implant System in Type IV Bone
  - Multicenter Retrospective Clinical Study of Osstem USII Implant System in Complete Edentulous Patients
    - J Korean Implantology(KAOMI) 2007;11(3):12-21
  - Retrospective Multicenter Cohort Study of the Clinical Performance of 2-Stage Implants in South Korean Populations

- **Pre-Clinical Study**
  - The Effects of Surface Roughness on the Sandblasted with Large Grit Alumina and Acid Etched Surface Treatment: In Vivo Evaluation
    - Scientific Poster, 20th Congress of EAO 2011
  - Effects of Different Depths of Gap on Healing of Surgically Created Coronal Defects Around Implants in Dogs: A Pilot Study
  - The Effect of Surface Treatment of the Cervical Area of Implant on Bone Regeneration in Mini-Pig
  - Comparison of Push-in Versus Pull-out Tests on Bone-Implant Interfaces of Rabbit Tibia Dental Implant Healing Model
  - Quantitative Biomechanical Analysis of the Influence of the Cortical Bone and Implant Length on Primary Stability
  - Heat Transfer to the Implant-Bone Interface During Preparation of Zirconia/Alumina Complex Abutment
  - Fatigue Fracture of Different Dental Implant System Under Cyclic Loading
    - J Kor Acad Prosthodont 2009;47:424-34

- **References**

---

MS SYSTEM
Selected literature of published Journals

- **Clinical Study**
  - Multicentric Retrospective Clinical Study on the Clinical Application of Mini Implant System
  - Clinical Research of Immediate Restoration Implant with Mini-Implants in Edentulous Space
    - Hua Xi Kou Qiang Yi Xue Za Zhi 2010 Aug;28(4):412-6

- **References**

---

78
Objective
Recently Osstem implant released a new product line, TSIII SA, which is processed by sand blasting using alumina and acid-etching. This new implant features a tapered design, with its helix cutting edge allows self-tapping and easy adjustment of the installation direction. The apex is designed to improve probing ability into the bone tissue, and fixing ability on the bottom. The manufacturer explains the benefits of the TSIII SA as follows:
1) Excellent initial stability after loading on bone of poor quality
2) Possibility of early or immediate loading
3) Short time required for the procedure
4) Easy adjustment of cutting ability and depth
5) Easy correction of the installation direction

Materials & Methods
A total of 41 dental clinics took part in this study. 51% of the centers used the GS system from Osstem implant and 49% used implants from different manufacturers. In total, 522 TSIII implants were installed for three months from 31 August to November 2009. Maxillary and mandibular posterior regions were the most frequent implant areas, and prosthetic treatments were carried out 3 to 4 months after the installation regardless of the implant region. 262 cases were completed with prosthetic treatment upon completion of the study with the recovery of the questionnaires. The questionnaire consisted of the following questions. Users from 41 centers completed the questionnaires based on their combined experience of 522 implantations.

1) Bone quality Bone quality was classified into hard, normal, or soft bone according to the clinician's personal evaluation.
2) How effective was the cutting ability of the implant into the bone tissue?
3) Clinician’s compliance with the implantation procedure
4) Failure of the implantation in the early stage and the bone’s response
5) Overall satisfaction with TSIII and other opinions

Results
In this study, the TSIII SA implant was used in settings with various degrees of bone quality, and the success rate of implantation in the early stage was as high as 96.6%. The TSIII SA implant also showed excellent bone response, and the treatment period - from installation to prosthetic loading - was shortened by an average of 3-4 months. No significant difference was observed in initial fixing force and self-tapping ability, which indicates that the TSIII SA implants are no different to tapered implants in terms of their functionality. The compliance evaluation revealed that most of the clinicians do not follow the procedure as specified by the manufacturers. Notably, a relatively high percentage of clinicians did not use a cortical drill during normal bone implantation due to the change in the design of the TSIII system to a single thread type. However, the use of a cortical drill is recommended because torque implantation can deviate from the proper range in many cases. When a tapered implant is installed without using countersinking or cortical drilling in a cortical bone, the chances of excess torque occurring are higher, which can result in alveolar bone absorption during the healing process.

It is notable that 50% of the clinicians answered that there is no difference between the TSIII SA and previously preferred products in the overall satisfaction survey, while 25% of clinicians responded that they would wait and see before actually purchasing it for clinical application. Though the TSIII SA implant showed better results in the stimulation of initial bone conduction and bone response, most clinicians stated that they do not perceive any significant difference between the TSIII SA and previous models in terms of the design; as such, a long-term clinical evaluation of its short history since its commercial release will be necessary.

Conclusions
1. A total of 522 implants were installed, 99.6% (n=520/522) of which were successful. Most of the clinicians evaluated that the TSIII SA implants exhibited excellent bone responses.
2. About 50% of the clinicians answered that there was no significant difference between the TSIII SA and previously preferred products in terms of self-tapping ability and initial fixation.
3. The average treatment period was 3.9 months for the maxillary, and 3.4 months for the mandibular, which suggests that the TSIII SA implants can shorten the treatment period.
4. Overall satisfaction with the TSIII SA was rather high, but approximately 50% of the clinicians answered that there was no difference in terms of the satisfaction they felt with the TSIII SA compared to previously preferred products.

Objective
Most recently, Osstem implant introduced a TSIII CA implant, a chemically modified sand-blasted, large grit and acid-etched titanium surface implant, in order to enhance bone apposition. It might be hypothesized that the hydrophobic properties of TSIII CA implant surfaces may have a higher potential to support osseointegration in dehiscence-type defects. So, I would like to report the GBR case in dehiscence-type defects using hydrophilic surfaced implant (TSIII CA) and SMARTbuilder.

Materials & Methods
This case report will describe the GBR case in dehiscence-type defects using hydrophilic surfaced implant (TSIII CA) and SMARTbuilder. The study design was a feasibility study (Case Report)

Study design (Case Report)
- Age / Sex : 55Y / M
- Chief complaint : #34, 35, 36 Missing
- Past medical history : N / S
- Past dental history
  - #34 Extraction d / t chronic periodontitis 2 months ago
- Treatment plan
  - #34, 35, 36 implant placement
  - #34 GBR d / t buccal bone defect

Results
In this GBR case, the TSIII CA implant was used in settings with various degrees of bone quality, and the success rate of implantation in the early stage was as high as 96.6%. The TSIII CA implant also showed excellent bone response, and the treatment period - from installation to prosthetic loading - was shortened by an average of 3-4 months. No significant difference was observed in initial fixing force and self-tapping ability, which indicates that the TSIII SA implants are no different to tapered implants in terms of their functionality. The compliance evaluation revealed that most of the clinicians do not follow the procedure as specified by the manufacturers. Notably, a relatively high percentage of clinicians did not use a cortical drill during normal bone implantation due to the change in the design of the TSIII system to a single thread type. However, the use of a cortical drill is recommended because torque implantation can deviate from the proper range in many cases. When a tapered implant is installed without using countersinking or cortical drilling in a cortical bone, the chances of excess torque occurring are higher, which can result in alveolar bone absorption during the healing process.

It is notable that 50% of the clinicians answered that there is no difference between the TSIII SA and previously preferred products in the overall satisfaction survey, while 25% of clinicians responded that they would wait and see before actually purchasing it for clinical application. Though the TSIII SA implant showed better results in the stimulation of initial bone conduction and bone response, most clinicians stated that they do not perceive any significant difference between the TSIII SA and previous models in terms of the design; as such, a long-term clinical evaluation of its short history since its commercial release will be necessary.

Conclusions
1. A total of 522 implants were installed, 99.6% (n=520/522) of which were successful. Most of the clinicians evaluated that the TSIII SA implants exhibited excellent bone responses.
2. About 50% of the clinicians answered that there was no significant difference between the TSIII SA and previously preferred products in terms of self-tapping ability and initial fixation.
3. The average treatment period was 3.9 months for the maxillary, and 3.4 months for the mandibular, which suggests that the TSIII SA implants can shorten the treatment period.
4. Overall satisfaction with the TSIII SA was rather high, but approximately 50% of the clinicians answered that there was no difference in terms of the satisfaction they felt with the TSIII SA compared to previously preferred products.

Why hydrophilic surface in GBR?
The hydrophilic surface properties of TSIII SA implant and SMARTbuilder are the best combination for successful bone regeneration in dehiscence-type defects. In this study, the TSIII SA implant was used in settings with various degrees of bone quality, and the success rate of implantation in the early stage was as high as 96.6%. The TSIII SA implant also showed excellent bone response, and the treatment period - from installation to prosthetic loading - was shortened by an average of 3-4 months. No significant difference was observed in initial fixing force and self-tapping ability, which indicates that the TSIII SA implants are no different to tapered implants in terms of their functionality. The compliance evaluation revealed that most of the clinicians do not follow the procedure as specified by the manufacturers. Notably, a relatively high percentage of clinicians did not use a cortical drill during normal bone implantation due to the change in the design of the TSIII system to a single thread type. However, the use of a cortical drill is recommended because torque implantation can deviate from the proper range in many cases. When a tapered implant is installed without using countersinking or cortical drilling in a cortical bone, the chances of excess torque occurring are higher, which can result in alveolar bone absorption during the healing process.

It is notable that 50% of the clinicians answered that there is no difference between the TSIII SA and previously preferred products in the overall satisfaction survey, while 25% of clinicians responded that they would wait and see before actually purchasing it for clinical application. Though the TSIII SA implant showed better results in the stimulation of initial bone conduction and bone response, most clinicians stated that they do not perceive any significant difference between the TSIII SA and previous models in terms of the design; as such, a long-term clinical evaluation of its short history since its commercial release will be necessary.

Conclusions
Three important factors for bone regeneration are space making, presence of blood clot and cells (osteoblasts). The hydrophobic properties of TSIII CA implant surfaces may play an important role in blood clot stabilization and cell (osteoblast) affinity. SMARTbuilder has excellent mechanical properties for stabilization of bone materials. Its rigidity prevents contour collapse, its elasticity prevents mucosa compression, and its stability prevents graft displacement. Therefore, an essential prerequisite for bone graft integration, i.e., mechanical graft stability, could be guaranteed by SMARTbuilder.

So, it might be hypothesized that hydrophilic surfaced TSIII CA implant and SMARTbuilder are the best combination for successful bone regeneration in dehiscence-type defect.
Preliminary Clinical Evaluation of Customized Three-Dimensional Pre-formed Titanium Mesh for Localized Alveolar Bone Regeneration

Seung-Hwan Jeon, Kyung-Gyun Hwang, Chang-Joo Park
Scientific Poster, Osstem Meeting 2013

Objective

The purpose of this preliminary study is to evaluate the ability of customized three-dimensional titanium mesh (SMARTbuilder, Osstem, Korea) as a barrier membrane through investigation of clinical implant success rates and complications including crestal bone maintenance in application for localized alveolar bone regeneration.

Materials & Methods

1. Patient selection

In a total of 8 patients, dental implants (TSII CA, Osstem, Korea) were placed and SMARTbuilder, height, healing abutment or cover cap were applied for bone regeneration simultaneously (Table 1).

2. Surgical technique

Autogenous bone, which was harvested by Autobone Collector (Osstem, Korea) (Fig. 1) and mixed with allograft (Sure-Oss, HansBiomed co., Korea) 1:1 in volumetric ratio, was used as graft material (Fig. 2).

SMARTbuilder was applied as a barrier membrane (Fig. 3). As seen on the Fig. 4, SMARTbuilder provided the space maintenance. During healing period, SMARTbuilder cover cap was exposed (Fig. 5) and after 4 months from the operation, SMARTbuilder was removed (Fig. 6). New bone augmentation was achieved by the label defectheces (Fig. 7).

After uncovering operation, prosthetic procedure was performed. The complication and success rate were investigated until 6 months after the delivery of the definitive prosthesis.

Results

Several benefits of the use of titanium mesh have been suggested. Titanium mesh provides superior space maintenance, a fundamental prerequisite for any bone regeneration procedure. Furthermore, the pores within the titanium mesh are thought to play a critical role in maintaining blood supply to a grafted defect. Previous studies have suggested that a barrier membrane can exclude the ingress of blood supply to a grafted defect, resulting in flap dehiscence and membrane exposure. Furthermore, Expanded polytetrafluoroethylene (ePTFE) membranes must be removed if flap dehiscence and exposure occurs to prevent infection, because exposure in these cases will not heal spontaneously. Titanium mesh, in contrast, when exposed, might not require immediate removal, because this material does not interfere with the blood flow to the underlying tissues owing to the presence of pores within the mesh. The size of these pores could be a significant factor because small pores could block the integral vascularization process. Another advantage of titanium mesh is that it provides the most extensive space maintenance of all available materials. This results from the great plasticity of the material, which permits bending, contouring, and adaptation of the mesh to any unique bony defect. The result is the establishment of a defined space below the mesh that mimics the shape of the desired alveolar ridge.

Conclusions

SMARTbuilder showed the feasibility as the barrier membrane maximizing the merit of the existing titanium mesh, especially with the ease of application and removal during the augmentation procedures for localized alveolar bone defect.

Preliminary Study for Hydraulic Sinus Membrane Elevation by CAS KIT without Bone Graft

Kun-Soo Chang, Kyung-Gyun Hwang, Chang-Joo Park
Scientific Poster, Osstem Meeting 2013

Objective

The purpose of this preliminary study is to investigate the feasibility of no bone graft in maxillary sinus elevation during the implant treatment and to evaluate the amount of bone formation under a sinus membrane treated with implants and filled with saline or venous blood as a graft material in subalveolar area of maxillary posterior. Instead of lateral approach, CAS KIT (Osstem, Korea), which is famous for hydraulic sinus membrane elevation via crestal approach by CAS KIT, and saline or venous blood filling for space maintenance were performed (Fig. 1).

Materials & Methods

In a patient with the posterior maxillary edentulism, the placement of dental implants, hydraulic sinus membrane elevation via crestal approach by CAS KIT, and saline or venous blood filling for space maintenance were performed (Fig. 1).

Their residual alveolar bone height (RH) was over 5 mm and the length of dental implants was selected as near doubled RH. Periapical and panoramic radiographs, including cone beam computed tomography (CT), which were taken preoperatively (T0), and at postoperative 1 months (T1), 6 months (T2), and 12 months (T3), were used to evaluate the bone formation in the maxillary sinus floor.

Discussion

Several benefits of the use of titanium mesh have been suggested. Titanium mesh provides superior space maintenance, a fundamental prerequisite for any bone regeneration procedure. Furthermore, the pores within the titanium mesh are thought to play a critical role in maintaining blood supply to a grafted defect. Previous studies have suggested that a barrier membrane can exclude the ingress of blood supply to a grafted defect, resulting in flap dehiscence and membrane exposure. Furthermore, Expanded polytetrafluoroethylene (ePTFE) membranes must be removed if flap dehiscence and exposure occurs to prevent infection, because exposure in these cases will not heal spontaneously. Titanium mesh, in contrast, when exposed, might not require immediate removal, because this material does not interfere with the blood flow to the underlying tissues owing to the presence of pores within the mesh. The size of these pores could be a significant factor because small pores could block the integral vascularization process. Another advantage of titanium mesh is that it provides the most extensive space maintenance of all available materials. This results from the great plasticity of the material, which permits bending, contouring, and adaptation of the mesh to any unique bony defect. The result is the establishment of a defined space below the mesh that mimics the shape of the desired alveolar ridge.

Conclusions

SMARTbuilder showed the feasibility as the barrier membrane maximizing the merit of the existing titanium mesh, especially with the ease of application and removal during the augmentation procedures for localized alveolar bone defect.

Results

The study population comprised 20 patients, 11 men and 9 women, ranging from 21 to 70 years in age (mean age, 45 years). Sinus lift procedures were performed by CAS KIT with implant placement simultaneously. Saline or venous blood filling for space maintenance were performed in each 10 cases. No significant complications were observed in any of the patients during the healing period, except for physiologic swelling after surgery, in 1 total 35 implants (TSII CA, Osstem, Korea), 14 implants were inserted at premolar areas and 21 implants at molar areas. Of these implants, 3 were TSII CA 4.0mm x 10mm, 7 were TSII 4.0 x 11.5mm, 1 was TSII 4.5mm x 8.5mm, 3 were TSII 4.5mm x 10mm, 16 were 4.5 x 11.5mm, 1 was TSII 5.0mm x 10mm, and 3 were 5.5mm x 10mm (Table 1).

Fig. 1. Lift membrane using hydraulic lift system

< Table 1. Basic data for this prospective clinical study >

<table>
<thead>
<tr>
<th>Case number</th>
<th>Age (yr)</th>
<th>Sex</th>
<th>Implant placed</th>
<th>Residual bone height (mm)</th>
<th>Implant used</th>
<th>Filling material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>54</td>
<td>M</td>
<td>#16</td>
<td>5.4</td>
<td>TSII 4.5X10</td>
<td>S</td>
</tr>
<tr>
<td>2</td>
<td>40</td>
<td>F</td>
<td>#17</td>
<td>6.0</td>
<td>TSII 4.5X10</td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>54</td>
<td>M</td>
<td>#18</td>
<td>7.7</td>
<td>TSII 4.5X10</td>
<td>S</td>
</tr>
<tr>
<td>4</td>
<td>50</td>
<td>M</td>
<td>#19</td>
<td>9.0</td>
<td>TSII 4.5X10</td>
<td>V</td>
</tr>
<tr>
<td>5</td>
<td>40</td>
<td>F</td>
<td>#20</td>
<td>8.0</td>
<td>TSII 4.5X10</td>
<td>S</td>
</tr>
<tr>
<td>6</td>
<td>45</td>
<td>F</td>
<td>#21</td>
<td>9.0</td>
<td>TSII 4.5X10</td>
<td>S</td>
</tr>
<tr>
<td>7</td>
<td>45</td>
<td>M</td>
<td>#22</td>
<td>6.4</td>
<td>TSII 4.5X10</td>
<td>S</td>
</tr>
<tr>
<td>8</td>
<td>50</td>
<td>F</td>
<td>#23</td>
<td>8.0</td>
<td>TSII 4.5X10</td>
<td>S</td>
</tr>
<tr>
<td>9</td>
<td>50</td>
<td>F</td>
<td>#24</td>
<td>8.0</td>
<td>TSII 4.5X10</td>
<td>S</td>
</tr>
<tr>
<td>10</td>
<td>50</td>
<td>F</td>
<td>#25</td>
<td>6.9</td>
<td>TSII 4.5X10</td>
<td>S</td>
</tr>
<tr>
<td>11</td>
<td>55</td>
<td>F</td>
<td>#26</td>
<td>7.2</td>
<td>TSII 4.5X10</td>
<td>S</td>
</tr>
<tr>
<td>12</td>
<td>55</td>
<td>F</td>
<td>#27</td>
<td>7.8</td>
<td>TSII 4.5X10</td>
<td>S</td>
</tr>
<tr>
<td>13</td>
<td>55</td>
<td>F</td>
<td>#28</td>
<td>8.0</td>
<td>TSII 4.5X10</td>
<td>S</td>
</tr>
<tr>
<td>14</td>
<td>60</td>
<td>M</td>
<td>#29</td>
<td>6.9</td>
<td>TSII 4.5X10</td>
<td>S</td>
</tr>
<tr>
<td>15</td>
<td>60</td>
<td>F</td>
<td>#30</td>
<td>8.0</td>
<td>TSII 4.5X10</td>
<td>S</td>
</tr>
<tr>
<td>16</td>
<td>60</td>
<td>F</td>
<td>#31</td>
<td>8.5</td>
<td>TSII 4.5X10</td>
<td>S</td>
</tr>
<tr>
<td>17</td>
<td>60</td>
<td>F</td>
<td>#32</td>
<td>8.5</td>
<td>TSII 4.5X10</td>
<td>S</td>
</tr>
<tr>
<td>18</td>
<td>60</td>
<td>F</td>
<td>#33</td>
<td>8.5</td>
<td>TSII 4.5X10</td>
<td>S</td>
</tr>
<tr>
<td>19</td>
<td>60</td>
<td>F</td>
<td>#34</td>
<td>8.5</td>
<td>TSII 4.5X10</td>
<td>S</td>
</tr>
<tr>
<td>20</td>
<td>60</td>
<td>F</td>
<td>#35</td>
<td>8.5</td>
<td>TSII 4.5X10</td>
<td>S</td>
</tr>
</tbody>
</table>

Table 2. Measurement of average residual alveolar bone height (RH)

<table>
<thead>
<tr>
<th>Avolar bone height (mm)</th>
<th>Gain of alveolar bone height (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>0.4</td>
</tr>
<tr>
<td>6</td>
<td>0.6</td>
</tr>
<tr>
<td>7</td>
<td>0.8</td>
</tr>
<tr>
<td>8</td>
<td>1.0</td>
</tr>
<tr>
<td>9</td>
<td>1.2</td>
</tr>
</tbody>
</table>

< Table 2. Measurement of average residual alveolar bone height (RH) >

< Fig. 2. Staged CBCT image (coronal view) (a) preoperative (T0), (b) immediate postoperative, (c) postoperative 6 months (T3) >

Conclusions

Maxillary sinus membrane elevation with the simultaneous placement of implants without the use of any additional grafting material resulted in intra sinus hard tissue formation around the implants for a follow-up period of up to 12 months. According to our observations, filling of peripheral venous blood instead of a graft material can be a more viable alternative to bone substitutes and safely used in maxillary sinus augmentation than filling of saline. New bone formation was verified by the stabilization of the elevated sinus membrane from the testing effect of placement of dental implants and lots of venous blood without bone graft material. Our preliminary study shows that successful bone formation in the sinus floor by hydraulic sinus membrane elevation using CAS KIT without bone graft.
Results

1. Additional Surgical Process

<table>
<thead>
<tr>
<th>Procedure</th>
<th>GBR</th>
<th>Sinus lift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Sinus lift with GBR</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Height above 2mm</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

2. Hard Tissue Evaluation

<table>
<thead>
<tr>
<th>Method</th>
<th>Height above 2mm</th>
<th>12 months loaded</th>
</tr>
</thead>
<tbody>
<tr>
<td>6mm</td>
<td>0.2 ± 0.4 mm</td>
<td>0.2 ± 0.3 mm</td>
</tr>
<tr>
<td>6mm</td>
<td>0.1 ± 0.2 mm</td>
<td>0.2 ± 0.3 mm</td>
</tr>
</tbody>
</table>

3. Soft Tissue Evaluation

<table>
<thead>
<tr>
<th>AG</th>
<th>PI</th>
<th>B</th>
<th>M</th>
<th>D</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>3m</td>
<td>2.1</td>
<td>0.8</td>
<td>0.6</td>
<td>2.7</td>
<td>2.6</td>
</tr>
<tr>
<td>6m</td>
<td>2.6</td>
<td>0.9</td>
<td>0.5</td>
<td>2.5</td>
<td>2.8</td>
</tr>
</tbody>
</table>

4. Prosthetic Evaluation

4-1. Opposite Occlusal arch status

<table>
<thead>
<tr>
<th>Natural breadth</th>
<th>Implant</th>
<th>Occlusal plane</th>
</tr>
</thead>
<tbody>
<tr>
<td>3mm</td>
<td>23</td>
<td>12</td>
</tr>
<tr>
<td>6mm</td>
<td>30</td>
<td>5</td>
</tr>
</tbody>
</table>

4-2. Prosthetic type

<table>
<thead>
<tr>
<th>Single Prosthetic</th>
<th>Splinted Prosthetic</th>
</tr>
</thead>
<tbody>
<tr>
<td>3m</td>
<td>4</td>
</tr>
<tr>
<td>6m</td>
<td>5</td>
</tr>
<tr>
<td>6mm</td>
<td>28</td>
</tr>
</tbody>
</table>

4-3. Crown to Implant ratio

<table>
<thead>
<tr>
<th>3mm</th>
<th>6mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.1</td>
</tr>
</tbody>
</table>

5. Success rate

<table>
<thead>
<tr>
<th>3mm</th>
<th>6mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Conclusions

Within this limited form of short-term evaluation, we achieved favorable clinical results as follows that tapered implants with SLA surface can be used as which is placed at maxillary posterior area and followed 3 months loading protocol.

Objective

The aim of this study was to evaluate prospective clinical results of tapered implants with SLA surface which was installed at maxillary posterior area and loaded 3 months after implant placement.

Materials & Methods

- Subjects
  - From November 2009 through September 2010
  - Implant: TS III SA (Osstem, Seoul, Korea)
  - Site: Posterior area, Maxilla
  - Group classification: Loading time - Test group (3m), 3 months after placement - Control group (6m), 6 months after placement

Subject Information

<table>
<thead>
<tr>
<th>Test group</th>
<th>Quot of alveolar bone height (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient</td>
<td>18</td>
</tr>
<tr>
<td>Age</td>
<td>56.5 ± 11.9</td>
</tr>
<tr>
<td>Implant</td>
<td>35</td>
</tr>
<tr>
<td>Follow-up</td>
<td>35.17 ± 5.4</td>
</tr>
</tbody>
</table>

- Methods
  - Hard tissue evaluation:
    - Periapical view (6 months, 12 months after loading)
    - Stability: IQ (Osstell mentor)
  - Soft tissue evaluation:
    - AG (attached gingiva)
    - PI (Plaque index)
    - GI (Gingival index)
    - PD (Pocket depth): Buccal (B), Mesial (M), Distal (D), Palatal (P)
  - Prosthetic evaluation
    - Crown - Implant ratio (C/I ratio)
    - Opposite occlusal arch status
    - Occlusal gap: Controlled by Shimstock (8 μm) and Acufilm (27 μm) articulating paper

Table 1. Patient & Implant Information

<table>
<thead>
<tr>
<th>Bone type</th>
<th>Implant</th>
<th>Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSCI</td>
<td>TS III SA</td>
<td>80</td>
</tr>
<tr>
<td>Site: Posterior area, Maxilla</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implant: TS III SA (Osstem, Seoul, Korea)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TS SYSTEM Clinical Study
A Case of Rehabilitation of Oral Function with Dental Implants Following Panfacial Bone Fracture

Hyung-Sik Do, Young-II Song, Hwan-Yong Jang, Jin-Yong Lee, Jae-Hyung Lim, Hyun-Seok Jang, Jong-Jin Kwon, Jae-Suk Rim, Eui-Seok Lee
Scientific Poster, Osstem Meeting 2013

Objective
Panfacial fractures involve trauma to mandibular and maxillary bones. It requires a team approach for management and planned treatment plan. A functional and esthetic rehabilitation was successfully accomplished by using a partial removable dental prosthesis in the maxilla and Ramus block bone and autologous bone grafted on maxilla and mandible. We plan to use a partial removable denture for the maxilla and insert the Osstem TS system implants in the mandible.

Study design (Case Report)
1. Sex/Age: Male/31
2. C.C.: Panfacial fracture
3. Clinical history: Patient was involved in a motor-cycle collision on September 9, 2011, and pelvic bone fracture, maxillary and mandibular bone fracture, mandibular symphysis fracture, laceration on tongue and chin. He also had laceration on right nasolabial fold, loss of several teeth, and alveolar bone fracture.
4. Missing teeth: 11, 21, 22, 34, 33, 32, 31, 41, 42, 43
5. Treatment plan: Open reduction and internal fixation on fracture site. To get a sufficient depth of bone for the dental implants, we decided to use ramus block bone and autologous bone grafted on maxilla and mandible. We plan to use a partial removable denture for the maxilla and insert the Osstem TS system implants in the mandible.
6. Treatment process

Fig.3. Ramus block bone graft and autologous bone graft on maxilla and mandible.

Fig.4. Panoramic radiograph of block bone graft
1. Panoramic radiograph of dental implants after placement
2. Panoramic radiograph of dental implants with custom abutment
3. Intraoral view of dental implants with custom abutment

Fig.5. Metal framework for mandibular implant supported restoration

Fig.6. Intraoral view and Extraoral view photo

Conclusions
This clinical report describes the prosthodontics treatment after the open reduction of a panfacial fracture. After the operation of such complex trauma, the locations of the fractured segments and the occlusion are distorted and present a challenge to us, resulting in problems such as facial deformation, inefficient mastication, and mal-function of the TMJ. In 2013, restoration was completed with final prosthodontics. In the upper jaw, we treated the patient with removable partial denture because of the alveolar bone and tissue deficiency.

Fig.7. Three-dimensional CT and Skull x-ray photo showing panfacial fracture. Maxilla and mandibular teeth were missing.

Fig.8. Preoperative Skull x-ray photo showing open reduction and internal fixation on panfacial fracture
1. RL lateral oblique mandibular x-ray photo
2. Mandibular PA view x-ray photo
3. LL lateral oblique mandibular x-ray photo

Full Mouth Rehabilitation Utilizing the CAD/CAM Technology: Surgical Guide for Flapless Surgery, Provisional Restoration and Screw-Retained Fixed Complete Denture

Choon-Mo Yang
Scientific Poster, 21st Congress of EAO 2012

Objective
The ideal treatment planning, accurate placement, and functional restoration of dental implants for the completely edentulous patient can be challenging. Anatomical limitations can make implant location difficult to determine. The use of CT scans and surgical planning software to produce a CAD/CAM surgical guide, as well as the use of a flapless surgical technique, can make implant placement more predictable, safer, and easier for patients. Furthermore, CAD/CAM-guided fabrication of an provisional restoration and screw-retained definite prosthesis can result in predictable and successful full mouth reconstruction.

Study design (Case Report)
1. Immediate Removable Complete Denture
2. CAD/CAM Surgical Guide: OsstemGuide
3. CAD/CAM Provisional restoration
4. Convertible Abutment: Lateral fixation screw
5. CAD/CAM Full Zirconia prosthesis

Conclusions
The advantages of this procedure, for the completely edentulous arch, include (1) shorter surgery times, (2) shorter treatment times, (3) less invasive, flapless surgery and, therefore, less chance of swelling, pain, and faster healing.

Fig.9. A) Panoramic radiograph of block bone graft B) Panoramic radiograph of dental implants after placement C) Panoramic radiograph of dental implants with custom abutment D) Intraoral view of dental implants with custom abutment

Fig.10. Pre-surgical Procedure: Extraction and Immediate Removable Complete Denture

Fig.11. Pre-surgical Procedure: CAD/CAM Planning and Fabrication of Surgical Guide and Surgical Index

Fig.12. Surgical Procedure: Flapless Implantation

Fig.13. Prosthetic Procedure: CAD/CAM Provisional Restoration

Fig.14. Study design (Case Report)

Fig.15. Conclusions

Fig.16. Conclusions

Fig.17. Conclusions
An Implant-Supported Restoration of a Maxillary Central Incisor Using a Temporary Abutment and a Customized CAD/CAM Titanium Abutment

Hwee-Woong Park
Scientific Poster, 21st Congress of EAO 2012

Objective

Maxillary central incisors play a critical role in esthetics. One of the most difficult factors for an esthetic implant restoration is the natural profile of the cervical area in which the tooth emerges from inside the gingiva. Many procedures including bone augmentation and soft tissue graft have been suggested to solve this problem. More recently, techniques using CAD/CAM customized abutments are drawing attentions as promising solutions. The author describes a clinical case with a missing upper central tooth restored using an Osstem TS Implant and a customized CAD/CAM (Osstem SmartFit) abutment.

Study design (Case Report)

- Patient age: 29Y, male
- C/C: Teeth fracture due to trauma
- Clinical findings:
  - Crown fracture of maxillary anterior teeth
  - Root fracture of Lt. central incisor
  - Apical radiolucency and fistula

Provisional Restoration

A provisional restoration supported by a temporary abutment was placed 10 weeks after implant placement.

Final Restoration

A metal-ceramic restoration was fabricated on a stone cast taken directly using silicone rubber impression material.

Conclusions

Customized CAD/CAM abutment system (Osstem SmartFit Abutment) is a promising technique to overcome many shortcomings of conventional readymade abutments or manual milling abutments.

SmartFit Abutment and Custom Healing Abutment

Ki-Seong Kim
Scientific Poster, 21st Congress of EAO 2012

Objective

The latest CAD/CAM technology for patient-specific abutments is now gaining ground on the Korean dental market. Many implant companies are introducing CAD/CAM solution for customized abutment. With CAD/CAM abutments, the clinician can use high-quality, customized abutments with less time and effort. Fixture placement in undesirable conditions must be overcome with restorative procedures. Usually, in such cases, cast-gold UCLA abutments have been used to make customized abutments. Note, however, that cast-gold UCLA abutments have limitations such as increased expenses, casting detects, variable quality depending on the technician’s experience, and biocompatibility. These limitations will be overcome with SmartFit abutments for Osstem implants to which CAD/CAM technology was applied. Moreover, clinicians can control the emergence profile and subgingival contour of implant prostheses with customizable healing abutment. Custom healing abutment can be a new option for successful implant prosthetics. In this poster, I would like to introduce two clinical cases of patient-specific SmartFit abutment and Custom healing abutment.

Study design (Case Report)

- Patient-specific SmartFit abutment was manufactured by milling process in the Osstem CAD/CAM Center. By using the transfer jig, finished abutment was positioned on the working model and checked. Then provisional restoration was made on the model.
- Custom healing abutment was connected in the fixture. Well-formed, oval-shape subgingival contour was made with soft tissue sculpting using Custom healing abutment.

Conclusions

SmartFit abutment and Custom healing abutment provide an anatomically optimal emergence profile for implant prosthesis, maximizing long-term aesthetics and function. As the biggest advantages of SmartFit abutment, it overcomes the limitations of stock abutment and is a useful adjunctive tool for producing restorations that approximate natural teeth in various bad conditions. With Custom healing abutment and SmartFit abutment for Osstem implant systems, clinicians can improve profitability by eliminating time and cost that have been spent on making cast-gold UCLA abutments. Furthermore, they provide patients with patient-specific, customized, well-fitting abutment and brings about win-win results for both clinicians and patients.
Clinical Comparative Study of Immediate Loading Using Tapered Implant with Hydroxyapatite Coating at the Partial Edentulous Ridge of Posterior Maxilla and Mandible

Ji-Young Lee, Young-Kyun Kim
Scientific Poster, 21st Congress of EAO 2012

Objective
The aim of this study is to compare the clinical outcome after the immediate loading of two types of implants with a hydroxyapatite coat for patients with missing molar teeth.

Materials & Methods

Subject:
- Group I: Osstem TSIII HA (Male 12, Female: 15, Total: 27)
- Group II: 2mmmer (Male 18, Female: 5, Total: 23)
- Group I and group II were assigned randomly and operator was informed about the study group the day of operation
- Patients who undertook loading within 48 hours of implant installation were included in this study

Implant distribution:
- Group I: maxilla 22, mandible 32, total: 54
- Group II: maxilla 24, mandible 22, total: 46

Average Age
- Group I: 51.40 (11.30) years
- Group II: 49.73 (14.23) years

Evaluation factor
- Marginal bone loss: 1 years after loading
- Soft tissue condition around implant
- Primary and 2nd implant stability (Osstell Mentor device)

Results
1. There were no implant failures in both group and survival rate was 100% 12 months after immediate loading. The number of cases showing the bone loss more than 1 mm was 3 in group I, 5 in group II. Implant success rate of group I was 94.4%, group II 89.1%.

2. Mean marginal bone loss was 0.06 mm in group I, 0.44 mm in group II after 1 year. Marginal bone loss of group I was significantly lower than group II (P < 0.05).

3. There were no significant differences in peri-implant indices such as calculus, pocket depth, and width of nonkeratinized mucosa of both groups except plaque index. Peri-implant tissue condition was stable in both groups.

4. As implant primary and 2nd stability, there was no significant differences between two groups (P > 0.05). And also there was no significant differences when comparing the each arch between groups (P > 0.05).

Conclusions
The marginal bone loss of implant after immediate loading of two types of study implants with hydroxyapatite coat in patients with missing molar teeth was insignificant. And TSIII HA implant showed more stable result on the aspect of marginal bone status around implant after immediate loading.

Effect of Microthreads on Removal Torque and Bone-to-Implant Contact: an Experimental Study in Miniature Pigs

Yee-So Kwon, Hee Namgong, Jung-Hoon Kim, In-Hee Cho, Myung-Duk Kim, Tae-Gwan Eom, Ki-Tae Koo
J Periodontal Implant Sci 2013;43:41-6

Objective
The objective of this study was to evaluate the effect of microthreads on removal torque and bone-to-implant contact (BIC).

Materials & Methods
Twelve miniature pigs for each experiment, a total of 24 animals, were used. In the removal torque analysis, each animal received 2 types of implants in each tibia, which were treated with sandblasting and acid etching but with or without microthreads at the marginal portion. The animals were sacrificed after 4, 8, or 12 weeks of healing. Each subgroup consisted of 4 animals, and the tibias were extracted and removal torque was measured. In the BIC analysis, each animal received 3 types of implants. Two types of implants were used for the removal torque test and another type of implant served as the control. The BIC experiment was conducted in the mandible of the animals. The P1-M1 teeth were extracted, and after a 4-month healing period, 3 each of the 2 types of implants were placed, with one type on each side of the mandible, for a total of 6 implants per animal. The animals were sacrificed after a 2-, 4-, 8-, and or 12-week healing period. Each subgroup consisted of 4 animals. The mandibles were extracted, specimens were processed, and BIC was analyzed.

Results
No significant difference in removal torque value or BIC was found between implants with and without microthreads. The removal torque value increased between 4 and 8 weeks of healing for both types of implants, but there was no significant difference between 8 and 12 weeks. The percentage of BIC increased between 2 and 4 weeks for all types of implants, but there was no significant difference between 4 and 6 weeks.

Conclusions
The existence of microthreads was not a significant factor in mechanical and histological stability.
Objective

The aim of study was to evaluate the effect of chemically surface modification with hydrophilicity on various physiochemical parameters which involved with in vitro osteogenesis.

Materials & Methods

1. Preparation of titanium disks

Two types of commercially pure titanium (Grade 3) disks with 12 mm in diameter and 1 mm in thickness were prepared.

1) SA surface: Hydrophobic surface by sandblasting with Al2O3 and acid etching with HCl/H2SO4.

2) CA surface: Super-hydrophilic SA by reducing atmospheric carbon contamination and storing in a solution of calcium.

2. Surface characterization and in-vitro evaluation

After surface treatment, we verified the surface topography, chemical composition and blood-wettability between two surfaces by SEM, EDS, contact angle measurement. The biological efficiency of chemically activated surface is evaluated by various in-vitro tests such as protein adsorption, platelet activity, osteoblastic cell behavior.

Conclusions

In this study, we verified the chemistry and wettability of titanium surface were important variables in determining protein and osteoblastic cell response. Albumin adsorption, platelet adsorption and activation on chemically activated CA surface was dramatically enhanced compared with hydrophobic SA surface. Also, these super-hydrophilic CA surface showed higher osteoblastic response such as cell adhesion, proliferation, ALP activity, mineralization. Therefore, chemically activated and hydrophilic CA surface may play roles in stimulating the bone formation and ultimately enhanced bone-implant contact compared with hydrophobic SA surface.

Results

1. Protein and platelet response on CA is much higher than SA

2. Hydrophilic CA surface enhances the cell spreading behavior.

3. Hydrophilic CA surface accelerate ALP activity and Mineralization

Effect of Photodynamic Therapy on Aggregatibacter Actinomycetemcomitans Attached on Titanium Surfaces

Eul-Rak Song, Kyung-Won Cho, Jae-Kwan Lee, Heung-Sik Um, Beom-Seok Chang, Si-Young Lee
Scientific Poster, Osstem Meeting, 2013

Objective

Peri-implantitis is an inflammatory process affecting the tissues around an osseointegrated implant. As the need of finding more safe and proper treatment for peri-implantitis arise, more attention is focused on noninvasive photodynamic therapy (PDT) in the treatment of peri-implantitis.

The purpose of this study is to assess the efficacy of PDT using erythrosine and green color light emitting diode (LED) light source to the biofilm of Aggregatibacter actinomycetemcomitans attached on resorbable blasted media (RBM) and sand blasted, large grit, acid etched (SLA) titanium surface in vitro.

Materials & Methods

A. actinomycetemcomitans ATCC 33384 was cultivated in tryptone soy broth under anaerobic conditions for 72 hours. After incubating, all disks were rinsed twice with phosphate buffered saline (PBS). RBM and SLA surface of disks were examined by scanning electron microscope (SEM, x 10,000, x 30,000) used to examine the bacteria attached on titanium disks. RBM and SLA disks were subdivided into four groups including one control group and three test groups (E0, E30, E60) for PDT examination for each surface.

Results

Imidazolium salt is light emitting diode (Photron Co. Ltd., Seoul, Korea) with a spectrum of emission ranging from 520 ~ 530 nm for 30 seconds (150 mW/cm², 4.5 J/cm²). As photosensitizer, 500 μg of 20 μM erythrosine was used for 60 seconds.

The disks were put into test tube and agitated with PBS and glass bead for 60 seconds. After casting, 200 μL of solution with detached bacteria was spread directly on brucella blood agar plates. The plates were incubated in anaerobic conditions on brucella blood agar plates for 72 hours at 37°C. Survival rate of bacteria was determined by counting the colony forming units (CFU) after incubation. Additionally, a time-resolved fluorescence confocal microscope was used to observe the distribution of live/dead microorganisms on disk surface.

Conclusions

Our results demonstrate that association of erythrosine and a green LED, with wavelength 520 ~ 530 nm, light intensity 150 mW/cm², 4.5 J/cm² was effective in reducing the viability of A. actinomycetemcomitans attached to RBM and SLA titanium surfaces in vitro.
**Objective**
The aim of the study was to evaluate the effect of chemically modified hydrophilic CA surface compared with conventional SA surface in various animals.

**Materials & Methods**
A total of 20 implants were divided into two groups. Group 1, implants treated with SA were used as control group. Group 2 retained chemically modified hydrophilic CA surface. All implants were placed in the tibiae of 3 female New Zealand white rabbits and in the mandible of 2 male miniature pigs. Removal torque was measured 16 days after placement.

**Results**
In tibiae of rabbit, group 1 had a mean removal torque of 50 Ncm versus 72 Ncm for group 2 after 16 days of healing time. In mandible of miniature pig, group 1 had a mean removal torque of 68 Ncm versus 75 Ncm for group 2 after 2 weeks of healing time. Group 2 was measured more stable anchorage than group 1 in both animals.

**Conclusions**
It is concluded that modified hydrophilic CA surfaces were more effective for biomechanical properties of bone-implant contact from conventional SA surface in rabbits and miniature pigs.

---

**Evaluation of Biomechanical Effect on Chemically Modified CA Surface in Vivo**

Hee Jin Gu, Su-Kyoung Kim, Hong-Young Choi, Myung-Duk Kim, Yong-Seok Cho, Tae-Gwan Eom

Scientific Poster, 21st Congress of EAO 2012

**Objective**
The implant surface feature and roughness have been proposed as a potential factor affecting bone integration and marginal bone loss. The aim of the present study was to evaluate the difference between SA and RBM surface for osseointegration and marginal bone loss in the mandible of beagle dogs.

**Materials & Methods**
All mandibular premolars and first molars were extracted bilaterally in 10 beagles. After 8 weeks of extraction, 48 implants (22 SA surface implants and 26 RBM surface implants) were implanted in the mandible of beagle dogs. After 12 weeks of healing, the implants were evaluated marginal bone levels, histomorphometric analysis and removal torque. 36 implants were used for the removal torque test. 12 implants were processed for histomorphometric analysis. For statistical analysis, t-tests were performed (p < .05).

**Results**
There were no statistically significant differences in relation to histomorphometric evaluations between RBM and SA surfaces. Marginal bone loss was 0.83 ± 0.51 mm (RBM surface) and 0.96 ± 0.43 mm (SA surface). No differences could be observed between the two surfaces of implants. After 12 weeks healing period, BIC and BA of SA surface were similar to the RBM surface. There were no significant differences in the BIC and BA between the two groups (p > .05). The mean removal torque value was higher for a SA surface (127.2 ± 57.0 Ncm) than for a RBM surface (81.9 ± 34.5 Ncm). The differences between RBM and SA surfaces were significant (p < .001).

**Conclusions**
It can be concluded that the SA surface was more effective than RBM surface in enhancing the biomechanical interlocking between the new bone and implant.
Objective
The objective of this study was to evaluate the early osseointegration of hydroxyapatite (HA) coated implant versus resorbable blast media (RBM) and sand-blasted with alumina and acid etched (SA) surface tapered implants.

Materials & Methods
Twelve adult male miniature pigs (Medi Kinetics Micropigs, Medi Kinetics Co., Ltd., Korea) were used in this study. The removal torque of implants placed in the tibia of miniature pigs was measured. For implants placed in the mandible, histomorphometric evaluation was performed for the evaluation of the bone-implant contact (BIC) ratio.

Results
After 4, 8, and 12 weeks, removal torque values were increased. Among the 3 groups, the HA coated group showed the highest value (p < .05). When the HA surface, RBM, and SA surface group were compared at each time point, the HA group showed statistically significantly high removal torque value (RTV) values (p < .05). At 2 weeks, in comparison with RBM, SA showed an 11 % increase, and HA showed a 42 % increase; nonetheless, they were not statistically significant. At 4 weeks, the BIC ratio of HA was significantly higher than that of SA (p < .05). Nonetheless, RBM and SA were not significantly different (p > .05). At 8 weeks, the BIC of HA was shown to be significantly higher than RBM or SA (p < .05). Nonetheless, RBM and SA were not significantly different (p > .05).

Conclusions
The early osseointegration of HA coated implants was found to be excellent, and HA coated implants will be available in poor quality bone.

Objective
This study sought to do a comparative evaluation of the abutment post’s fatigue life experimentally according to the tightening torque and cantilever volume, thereby emphasizing the importance of tightening torque specified by the manufacturer and suggesting a guide to designing prostheses with excellent long-term stability so that it can be applied correctly to actual clinical cases.

Materials & Methods
1. Materials
   1) Specification
      - Fixture TSII SA Fixture: 4.0 X 11.5mm
      - Abutment TS Transfer Abutment: G/H 2mm, H5.5mm, Screw: Ebony, Gold Screw, Regular screw
   2) Test group VS. control group
      - Test group: 20Ncm, 25Ncm, 35Ncm, 40Ncm
      - Control group: 30Ncm

2. Test equipments
   1) Fatigue tester: Instron 8841
   2) Torque Gage: Mark-10’s MGT12

3. Methods
   1) Fatigue tester: Instron 8841
   2) Torque Gage: Mark-10’s MGT12

Conclusions
As can be seen from the comparative test of fatigue life according to the tightening torque and cantilever volume, connecting with torque beyond or below the manufacturer-specified value shortens the fatigue life, requiring periodic checks of instruments as well as caution during actual use. Moreover, since greater cantilever volume results in shorter fatigue life, occlusal prosthesis should be considered from the fixture’s procedure level. Occlusal strength and antagonist tooth should also be considered when manufacturing the prosthesis to produce one with outstanding fatigue fracture performance.
Clinical Study

Clinical Implant 2010;307:430-43
3. Yong-Jin Kim, Young-Jin Park, Kyung-Tae Park. Case report of Guided Bone regeneration in deinsertence-type defects using hydrophilic surface (implantTSIII CA) and SMARTBuilder. Scientific Poster, Osstem Meeting 2013
6. Kyu-Jin Ahn, Young-Kyun Kim. Comparative study of tapered implant with SLA surface at maxillary posterior area according to loading time. 3 and 6 months. Scientific Poster, 21st Congress of EAO 2012
7. Yong-Jin Kim, Young-Jin Park, Kyung-Tae Park. Sinus bone grafting with simultaneous implant placement in case of residual bone height less than 4mm using TSIII SA implant. Scientific Poster, 22nd Congress of EAO 2013
9. Kwang-Heung Han, Min-Suk Heo. Vertical ridge augmentation with SMARTBuilder in poor bone condition. Scientific Poster, Osstem Meeting 2013
22. Ki-Seong Kim. SmartFit Abutment and Smart Healing Abutment. Scientific Poster, 21st Congress of EAO 2012

Pre-Clinical Study

Biology

2. Hong-Young Choi, Jae-June Park, Su-Kyung Kim, Tae-Gwan Eom. Enhancement of in vitro osteogenesis to chemically activated CA surface compared with SA surface. Scientific Poster, Osstem Meeting 2013
3. Eui-Rae Song, Kyung-Won Cho, Jee-Kwan Lee, Heung-Suk Um, Beom-Seok Chang, Si-Young Lee. Effect of photodynamic therapy on aggregatibacter actinomycetemcomitans attached on titanium surfaces. Scientific Poster, Osstem Meeting 2013
5. Hae-Jin Gu, Su-Kyung Kim, Hong-Young Choi, Myung-Duk Kim, Yong-SaeK Cho. Tae-Gwan Eom. Evaluation of biomechanical effect on chemically modified CA SA surface in vivo. Scientific Poster, 21st Congress of EAO 2012

Biomechanics

3. Eui-Rae Song, Kyung-Won Cho, Jee-Kwan Lee, Heung-Suk Um, Beom-Seok Chang, Si-Young Lee. Effect of photodynamic therapy on aggregatibacter actinomycetemcomitans attached on titanium surfaces. Scientific Poster, Osstem Meeting 2013
5. Hong-Young Choi, Jae-June Park, In-Hae Cho, Tae-Gwan Eom. The Effects of Surface Roughness on the Sandblasted with Large Grit Alumina and Acid Etched Surface Treatment: In Vivo Evaluation. Scientific Poster, Osstem World Meeting 2011
Clinical Implant 2010;307:430-43
A Multicenter Prospective Study in Type IV Bone of a Single Type of Implant

Objective
To analyze the success and survival rates of the Osstem GSII (Osstem, Seoul, Korea) implant in type IV bone.

Materials & Methods
A prospective, multicenter (5 centers) study was conducted by examining the relationship between implant success and survival rates, and several patient and surgical parameters. The implants were placed in 82 patients who visited several nationwide dental hospitals and clinics between 2007 and 2008, followed by clinical and radiographic analyses.

Table 1. General Conditions and Smoking Habit
| Diabetes mellitus | 13 |
| Cardiovascular disease | 13 |
| Hypertension | 1 |
| Liver disease | 2 |
| Heart disease | 2 |
| Smoking habit | 17 |

Results
In type IV bone, the implant success and survival rates were 93.23% and 90.43%, respectively. The maxillary premolar and mandibular anterior tooth areas showed success rates of 100%. The most widely used implant diameter and length were 5.0 and 13 mm, respectively, but the diameter and length had no effect on success rates. However, success rates appeared to decrease with age.

Conclusions
The results indicated that the Osstem GSII implant is highly effective in poor-quality type IV bone.

Comparison of Clinical Outcomes of Sinus Bone Graft with Simultaneous Implant Placement: 4-Month and 6-Month Final Prosthetic Loading

Objective
The aim of this study was to compare the survival rate and surrounding tissue condition of sinus bone grafts with simultaneous implant placement between 4-month and 6-month occlusal loading after implantation.

Materials & Methods
Twenty-seven patients (61 implants) who were treated with sinus bone grafts (sinus lateral approach) and simultaneous Osstem GSII implant placement from July 2007 to June 2008 were included in this study. Of these patients, 14 (31 implants) were in the 4-month loading group, and 13 (30 implants) were in the 6-month loading group. We investigated the implantation type (submerged or nonsubmerged), sinus membrane perforation, type of prostheses, opposed tooth type, primary and secondary stability of implants, and crestal bone loss around implant and surrounding tissue conditions.

Results
The amounts of crestal bone loss at the final recall time (12.56 ± 5.96 mm after loading of the 4-month and 6-month loading groups were 0.19 ± 0.33 mm and 0.39 ± 0.86 mm, respectively. However, the difference between groups was not statistically significant (P = 0.21). The width of keratinized mucosa, gingival index, plaque index, and pocket depth of the 4-month and 6-month loading groups were 2.50 ± 1.69 mm and 1.73 ± 1.40 mm (P = 0.01), 0.72 ± 0.83 and 0.59 ± 0.69 (P = 0.67), 1.11 ± 0.96 and 0.76 ± 0.79 (P = 0.42), 3.56 ± 0.98 mm and 3.65 ± 1.06 mm (P = 0.75), respectively. The primary stabilities of implants in the 4-month and 6-month loading groups were 61.96 ± 9.96 and 66.51 ± 11.28 (P = 0.26), respectively. The secondary stability of the 4-month group was significantly higher than that of the 6-month group. There was no statistical difference (P = 0.56) between the 4-month and 6-month loading groups regarding the implantation type (submerged or nonsubmerged), sinus membrane perforation, type of prostheses, or opposed tooth type. In the 4-month and 6-month groups, all of the implants survived until the final recall time.

Conclusions
For the cases in which the residual bone was 3 mm and primary implant stability could be obtained, we conclude that loading is possible 4 months after the sinus bone graft and simultaneous implant placement.
Prospective Study of Tapered RBM Surface Implant Stability in the Maxillary Posterior Area

Soo-Yeon Kim, Young-Kyun Kim

Objective
The purpose of this study was to evaluate the stability of tapered resorbable blasting media (RBM) surface implants in the posterior maxilla.

Materials & Methods
From September 2008 through January 2010, 20 patients (9 male, 11 female) who were treated with tapered GSIII implants at Seoul National University Bundang Hospital were identified. Thirty-eight implants (14 premolar and 24 molar) were placed in maxillary posterior areas.

Results
In this study, 38 taper-shaped implants were placed in 20 patients who were followed up for 1 year. The following conclusions were obtained:
1. Regarding implant stability, the average ISQ value at the time of placement was 63.6 and was 74.4 at the time of the 2nd surgery, which was a significant increase. The cumulative survival rate of 12 months after prostheses placement was 97.4%, and the success rate was 94.7%.
2. The resorption rate of marginal bones 12 months after prostheses was an average of 0.19 mm, and stable results were shown. Significant differences according to the diameter and length of implants were not shown.
3. The group that received maxillary sinus bone graft was compared with the group that did not receive the procedure. The ISQ value and the marginal bone resorption rate were not significantly different.

Conclusions
There was no significant difference in crestal bone loss according to implant diameter or length or sinus bone graft. This study showed the favorable clinical outcome of tapered implants that were placed in the maxillary posterior area.

Table 1. ISQ (Implant stability quotient) value change

![Table 1](image)

Table 2. CBL (crestal bone loss) according to time

![Table 2](image)

Table 3. Implant survival rate of GSIII implants

![Table 3](image)

Table 4. CBL 12 month after final prosthesis delivery according to diameter and length

![Table 4](image)

Table 5. Comparison between implants with and without sinus grafts

![Table 5](image)
A Relaxed Implant Bed: Implants Placed After Two Weeks of Osteotomy with Immediate Loading: A One Year Clinical Trial

Bansal DJ, Kedige DS, Bansal DA, Anand DS

Objective
A waiting period of two weeks after osteotomy increases the surrounding tissue activity to its maximum level as collagen formation and neoangiogenesis represents a relaxed and acceptable implant bed configuration. The aim of the present study was a clinical and radiological evaluation of early osteotomy with implant placement delayed for two weeks with immediate loading in the anterior and premolar region with minimally invasive approach.

Materials & Methods
A total of seven GSII implants (Osstem) were placed in six patients. Osteotomy was done followed by flap closure without the placement of implant. After approximately waiting for a period of two weeks, implant placement was done which were loaded immediately with provisional crown in implant protected occlusion. It was replaced by definitive restoration after 6-8 weeks which was considered as baseline. Implant stability and marginal bone levels were assessed with clinical and radiological parameters at baseline, 6th and 12th month intervals.

Results
None of the implants were found mobile during the one year period. The amount of average mean marginal bone loss was 0.4 mm over the one year follow up period.

Conclusions
In the present study, early osteotomy with delayed implant placement showed negligible crestal bone loss with no mobility.

Evaluation of Sinus Bone Resorption and Marginal Bone Loss After Sinus Bone Grafting and Implant Placement

Young-Kyun Kim, Pil-Young Yun, Su-Gwan Kim, Bum-Soo Kim, Joo L Ong

Objective
The objective of this study was to evaluate the sinus bone graft resorption and marginal bone loss around the implants when allograft and xenograft are used.

Materials & Methods
Sinus bone grafting and implant placement (Osstem, Korea) were performed on 28 patients from September 2003 to January 2006. In group I, a total of 49 implants were placed in 23 maxillary sinus areas of 16 patients together with bone graft using xenograft (Bio-Oss®) and a minimal amount of autogenous bone. In group II, 24 implants were placed in 13 maxillary sinus areas of 12 patients together with bone graft using a minimal amount of autogenous bone and equal amounts of allograft (Regenaform®) and Bio-Oss® in group II.

Results
Early osseointegration failures of 3 implants in 3 patients (group I: 1 patient, 1 implant; group II: 2 patients, 2 implants) were observed, and revisions were performed for these 3 implant sites, followed by complete prosthetic treatments. The average height of the remaining alveolar bone before the surgery, immediately after the surgery, and 1 year after the surgery was 4.9 mm, 19.0 mm, and 17.2 mm, respectively, in group I. In group II, the average height of the remaining alveolar bone was 4.0 mm, 19.2 mm, and 17.8 mm before the surgery, immediately after the surgery, and 1 year after the surgery, respectively. The average marginal bone loss 1 year after prosthetic loading and after 20.8 months’ follow-up was 0.6 mm and 0.7 mm, respectively, in group I. A 90.9% success rate was observed for group I, with 3 implants showing bone resorption of >1.5 mm within 1 year of loading. For group II, the average marginal bone loss 1 year after prosthetic loading and after 19.7 months’ follow-up was 0.7 mm and 1.0 mm, respectively. An 83.3% success rate was observed for group II, with 4 implants showing bone resorption of >1.5 mm within 1 year of loading.

Conclusions
Based on the observations in this study, it was concluded that mixed grafting with demineralized bone matrix for maxillary sinus bone grafting has no significant short-term merit regarding bone healing and stability of implants compared with anorganic bovine bone alone.
Objective
The purpose of this study was to evaluate the responses of peri-implant tissue in the presence of keratinized mucosa.

Materials & Methods
A total of 276 implants were placed in 100 patients. From the time of implant placement, the average follow-up observation period was 13 months. The width of keratinized mucosa was compared and evaluated through the gingival inflammation index (GI), plaque index (PI), the pocket depth, mucosal recession, and marginal bone resorption.

Results
The GI, PI, and pocket depth in the presence or absence of the keratinized gingiva did not show statistically significant differences. However, mucosal recession and marginal bone resorption experienced statistically significant increases in the group of deficient keratinized mucosa. Based on implant surface treatments, the width of keratinized gingiva and crestal bone loss did not show a significant difference.

Conclusions
In cases with insufficient keratinized gingiva in the vicinity of implants, the insufficiency does not necessarily mediate adverse effects on the hygiene management and soft tissue health condition. Nonetheless, the risk of the increase of gingival recession and the crestal bone loss is present. Therefore, it is thought that from the aspect of long-term maintenance and management, as well as for the area requiring esthetics, the presence of an appropriate amount of keratinized gingiva is required.

---

Morphogenesis of the Peri-Implant Mucosa: A Comparison Between Flap and Flapless Procedures in the Canine Mandible

Objective
Although it has been shown that the exclusion of the mucoperiosteal flap can prevent postoperative bone resorption associated with flap elevation, there have been only a few studies on the peri-implant mucosa following flapless implant surgery. The purpose of this study was to compare the morphogenesis of the peri-implant mucosa between flap and flapless implant surgeries by using a canine mandible model.

Materials & Methods
In six mongrel dogs, bilateral edentulated flat alveolar ridges were created in the mandible. After 3 months of healing, 2 implants were placed in each side by either the flap or the flapless procedure. Three months after implant insertion, the peri-implant mucosa was evaluated by using clinical, radiologic, and histometric parameters, which included the gingival index, bleeding on probing, probing pocket depth, marginal bone loss, and the vertical dimension of the peri-implant tissues.

Results
The height of the mucosa, length of the junctional epithelium, gingival index, bleeding on probing, probing depth, and marginal bone loss were all significantly greater in the dogs that had the flap procedure than in those that had the flapless procedure (p < .05).

Conclusions
These results indicate that gingival inflammation, the height of junctional epithelium, and bone loss around nonsubmerged implants can be reduced when implants are placed without flap elevation.
**Influence of Premature Exposure of Implants on Early Crestal Bone Loss: An Experimental Study in Dogs**

Je-Hyeon Yoo, Byung-Ho Choi, Jingyu Li, Han-Sung Kim, Chang-Yong Ko, Feng Xuan, Seung-Mi Jeong

**Objective**
Several studies have reported on spontaneous early exposure of submerged implants, suggesting that exposed implants have greater bone loss than nonexposed implants. The purpose of this study was to compare the effects of implant-abutment connections and partial implant exposure on crestal bone loss around submerged implants.

**Materials & Methods**
Bilateral, edentulated, flat alveolar ridges were created in the mandible of 6 mongrel dogs. After 3 months of healing, 2 fixtures were placed on each side of the mandible following a commonly accepted 2-stage surgical protocol. The fixtures on each side were randomly assigned to 1 of 2 procedures. In the first, a cover screw was connected to the fixture, and the incised gingiva was partially removed to expose the cover screw (partially exposed group). In the second, a healing abutment was connected to the fixture so that the coronal portion of the abutment remained exposed to the oral cavity (abutment-connected group). After 8 weeks, micro-computed tomography (micro-CT) at the implantation site was performed to measure the bone height in the peri-implant bone. Data were analyzed by Wilcoxon’s signed rank test.

**Results**
The average bone height was greater for the abutment-connected fixture (9.8 ± 0.5 mm) than for the partially exposed fixture (9.3 ± 0.5 mm; p < .05).

**Conclusions**
These results suggest that when implant exposure is detected, the placement of healing abutments may help limit bone loss around the submerged implants.

---

**Microleakage of Different Sealing Materials in Acess Holes of Internal Connection Implant Systems**

Sung-Do Park, Yoon Lee, Yu-Lee Kim, Sang-Hui Yu, Ji-Myung Bae, Hye-Won Cho
J Prosthet Dent 2012(108);173-80

**Objective**
The purpose of this study was to evaluate the levels of microleakage through the access holes of screw-retained implant prostheses sealed with different materials.

**Materials & Methods**
An implant with an internal hexagonal configuration was connected to a temporary abutment with an acrylic resin crown. The apical 6.5 mm of the access hole was filled with 1 of the following materials: cotton pellet, silicone sealing material, vinyl polysiloxane, or gutta-percha. The remaining coronal 3 mm was sealed with composite resin. Cyclic loading with 21 N at 1 Hz was applied. The specimens were evaluated by spectrophotometer at 540 nm to quantify the degree of microleakage. The results were statistically analyzed with 1-way ANOVA and the Tukey HSD test.

**Results**
From greatest to least, the levels of microleakage were in the following order: cotton pellet, silicone sealing material, vinyl polysiloxane, and gutta-percha. The microleakage associated with gutta-percha was not significantly different from that of vinyl polysiloxane.

**Conclusions**
When sealing the access holes of screw-retained implant prostheses, gutta-percha or vinyl polysiloxane would help reduce microleakage.
Fatigue Characteristics of Five Types of Implant-Absutment Joint Designs

Il-Song Park, Sang-Yong Won, Tae-Sung Bae, Kwang-Yeob Song, Cham-Woon Park, Tae-Gwan Eom, Chang-Mo Jeong

Objective
This study evaluated the fatigue limit of five implant-abutment combinations (Osstem Implant, Korea). The fatigue tests were performed to evaluate the impact of fatigue on the effectiveness of dental implant-abutment assemblies with different joint designs and with different abutment materials, with a special emphasis on the pattern of the dental implant fixture and the abutment, as well as the effect of the abutment material on the stability of the joint area.

Materials & Methods
Each implant-abutment system (EXTNTS: USII-TiN Coated, EXANTS: USIII-Safe, EXZRTS: BioTapered Double Thread-ZirAce, INTIWS: GSII-GS Transfer, INTICS: SSI-Solid) was tightened with a closing torque of 32 Ncm. The test specimen was loaded at an incline of 30 degrees toward the loading direction after fixing it 11 mm away from the fixed point. A cyclic compression load was applied at loading cycles of 10 Hz using a hydraulic dynamic testing machine (Model 8516, Instron, USA).

Results & Conclusions
The mean static strength of the EXZRTS group was largest at 1772.2 N and that of the INTIWS group was smallest at 893.8 N. Turkey analysis showed that the group with the abutment joint with the external hexagonal structure pattern had a significantly higher mean static strength than the group with the internal hexagonal structure pattern (p < .05). The fatigue limit that guarantees a 5 × 10^6 cycle life according to the condition established by the ISO/FDIS 14801:2003(E) in all experiment groups was shown to be 300~800 N. The fatigue limit that was compared with the static strength was found to be relatively high in the cases with a tapered shape than an external hexagonal shape. In the cases where the shape of the screw joint was an external hexagonal structure, the fatigue limit was relatively higher in cases using the zirconia abutment than the titanium abutment. The fatigue fracture of the zirconia abutment was initiated in the margin with a subsequent sudden unstable fracture.

The Effect of Various Thread Designs on the Initial Stability of Taper Implants

Ju-Hee Park, Yungsun Lim, Myung-Joo Kim, Ho-Beom Kwon

Objective
Primary stability at the time of implant placement is related to the level of primary bone contact. The level of bone contact with implant is affected by thread design, surgical procedure and bone quality, etc. The aim of this study was to compare the initial stability of the various taper implants according to the thread designs, half of which were engaged to inferior cortical wall of type IV bone (Group 1) and the rest of which were not engaged to inferior cortical wall (Group 2) by measuring the implant stability quotient (ISQ) and the removal torque value (RTV).

Results
In this study, we found the following results. 1. In Group 1 with fixtures engaged to the inferior cortical wall, there was no significant difference in RTV and ISQ value among the 6 types of implants. 2. In Group 2 with fixtures not engaged to the inferior cortical wall, there was significant difference in RTV and ISQ value among the 6 types of implants (p < .05). There was significant difference in RTV and ISQ value according to whether fixtures were engaged to the inferior cortical wall or not (p < .05). 4. Under-drilling made RTV and ISQ value increase significantly in the NT implants which had lower RTV and ISQ value in Group 2 (p < .05).

Conclusions
Without being engaged to the inferior cortical wall fixtures had initial stability affected by implant types. Also in poor quality bone, under-drilling improved initial stability.

---

### Table. 1. Implant systems used in this study

<table>
<thead>
<tr>
<th>Group</th>
<th>Fixture</th>
<th>Abutment</th>
<th>Screw</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTNTS</td>
<td>USII-TiN Coated</td>
<td>Zirconia (ZAR535C)</td>
<td>ASR200</td>
</tr>
<tr>
<td>EXANTS</td>
<td>USIII-Safe</td>
<td>Safe (SFAR542C)</td>
<td>SFSR2S</td>
</tr>
<tr>
<td>EXZRTS</td>
<td>BioTapered Double Thread-ZirAce</td>
<td>Zirconia (ZAR535C)</td>
<td>ASR200</td>
</tr>
<tr>
<td>INTIWS</td>
<td>GSII-GS Transfer</td>
<td>GS Transfer (GSTA5430S)</td>
<td>GSASR</td>
</tr>
<tr>
<td>INTICS</td>
<td>SSI-Solid</td>
<td>SSI-Solid</td>
<td>-</td>
</tr>
</tbody>
</table>
Pre-Clinical Study


Objective

Given that the orientation of the transducer (mesiodistal or buccolingual) affects the data obtained from a piezoelectric resonance frequency analysis (RFA), this study evaluated whether it is necessary to use measurements taken in two different directions (mesiodistal and buccolingual) when using magnetic RFA to assess changes in the stiffness of dental implants.

Materials & Methods

A prospective clinical trial was completed, in a total of 53 patients, on 71 non-submerged dental implants that were inserted to replace the unilateral loss of mandibular molars. All of the implants were of the same diameter (4.1 mm), length (10 mm), and collar height (2.8 mm). The implant stability quotient (ISQ) was measured during the surgical procedure, and at 4 and 10 weeks after surgery. Measurements were taken twice in each direction: in the buccolingual direction from the buccal side and in the mesiodistal direction from the mesial side. The average of two measurements in each direction was regarded as the representative ISQ of that direction. The higher and lower values of the two ISQs (buccolingual and mesiodistal) were also classified separately. In addition, the variation in ISQ was quantified by subtracting the lower value from the higher value, and the implants were classified into two groups according to this variation: one with ISQ variation of 3 or more and the other with a variation of <3.

Results

There were no differences between the two ISQs when measured from different directions, but there were significant differences between the higher and lower values of the ISQs at each measurement point. A significant difference was also observed between the two ISQ variation groups in the pattern of change of the lower value for the period from immediately after surgery to 10 weeks after surgery.

Conclusions

Acquisition of two directional measurements and classification of the higher and lower values of the two directional ISQs may allow clinicians to detect patterns of change in ISQ that would not be identified if only one directional measurement was made.

Table 1. The change in implant stability quotient (ISQ) discrepancy measured from two different directions at each measurement time point

<table>
<thead>
<tr>
<th>Diameter</th>
<th>ISQ discrepancy* (mean ± SD)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straumann (N=25)</td>
<td>During surgery</td>
<td>1.1 ± 2.7</td>
</tr>
<tr>
<td></td>
<td>Post-operative week 10</td>
<td>0.42 ± 1.46</td>
</tr>
<tr>
<td>Osstem SSII (N=28)</td>
<td>During surgery</td>
<td>0.36 ± 3.8</td>
</tr>
<tr>
<td></td>
<td>Post-operative week 10</td>
<td>0.14 ± 1.54</td>
</tr>
</tbody>
</table>

* ISQ discrepancies were calculated by subtracting the ISQ of the latter from the ISQ of the former at each time point.
 ** P-values were calculated for differences between two time points (during surgery and postoperative week 10) using a Wilcoxon’s signed ranks test.

Fig. 1. The comparison of the pattern of change in the implant stability quotient (ISQ) obtained from the four measures from surgery to 10 weeks after surgery.

3+Group=the group with ISQ variation of 3 or more. 3-Group, the group with ISQ variation of <3. (a) Pattern of change of MN. (b) Pattern of change of MX. (c) Pattern of change of BL. (d) Pattern of change of MD.

Table 1. Statistical Rate of Change Date for ISQ Values for Different Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maxilla/Mandible</td>
<td>0.6141 &gt; 0.05</td>
</tr>
<tr>
<td>Sex</td>
<td>0.9918 &gt; 0.05</td>
</tr>
<tr>
<td>Anterior/Posterior</td>
<td>0.8408 &gt; 0.05</td>
</tr>
<tr>
<td>Length</td>
<td>0.6317 &gt; 0.05</td>
</tr>
<tr>
<td>Diameter</td>
<td>0.0092 &lt; 0.05</td>
</tr>
<tr>
<td>Age</td>
<td>0.3836 &gt; 0.05</td>
</tr>
<tr>
<td>Graft</td>
<td>0.9635 &gt; 0.05</td>
</tr>
<tr>
<td>Bone type</td>
<td>0.8354 &gt; 0.05</td>
</tr>
<tr>
<td>Insertion torque</td>
<td>0.0675 &gt; 0.05</td>
</tr>
</tbody>
</table>

* Statistically significant effective factor for rate of change between surgery and 3 months (P < 0.05)

Conclusions

These findings suggest that the factor related to implant diameter may affect the variance of implant stability, and ISQ value of implant was stable enough for proved stability level during initial healing period.
Objective
The objective of this study was to evaluate the peri-implant’s hard and soft tissue response associated with the 1-stage, nonsubmerged, endosseous dental implant.

Materials & Methods
A multicenter retrospective clinical evaluation was performed on 339 nonsubmerged implants placed in 108 patients at 5 clinical centers between January 2003 and December 2007.

Results
After a mean follow-up period of 30 months, the mean crestal bone resorption in 339 implants was 0.43 mm. The survival and success rates were observed to be 99.1% and 95.1%, respectively. The mean calculus, inflammatory, and plaque indices were 0.13, 0.37, and 0.73, respectively, and the mean width of buccal keratinized mucosa was observed to be 2.43 mm.

Conclusions
The short- to intermediate-term evaluation of the 1-stage, nonsubmerged, endosseous implant yields relatively high survival and success rates.

Table 1. Comparison of marginal bone loss between the two implants

<table>
<thead>
<tr>
<th>Duration</th>
<th>Area</th>
<th>Standard Struuman Dental Implant system</th>
<th>Osstem SSII Implant system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD (mm)</td>
<td>N</td>
<td>Mean ± SD (mm)</td>
<td>N</td>
</tr>
<tr>
<td>During the 10 weeks after surgery</td>
<td>Proximal</td>
<td>0.96 ± 0.64</td>
<td>26</td>
</tr>
<tr>
<td>Distal</td>
<td>0.63 ± 0.44</td>
<td>26</td>
<td>0.60 ± 0.51</td>
</tr>
<tr>
<td>Av.</td>
<td>0.79 ± 0.51</td>
<td>26</td>
<td>0.67 ± 0.43</td>
</tr>
<tr>
<td>One year follow-up</td>
<td>Proximal</td>
<td>1.21 ± 0.57</td>
<td>26</td>
</tr>
<tr>
<td>Distal</td>
<td>0.93 ± 0.39</td>
<td>26</td>
<td>0.65 ± 0.37</td>
</tr>
<tr>
<td>Av.</td>
<td>1.07 ± 0.46</td>
<td>26</td>
<td>0.70 ± 0.42</td>
</tr>
</tbody>
</table>

*The p values were calculated using Mann-Whitney test.
†Also means the radiographic measurement area for calculation of marginal bone loss.
‡Av means the average value of proximal and distal bone loss.
Implant-supported fixed and removable prostheses provide a proper treatment modality with reliable success. The SSII implants is a one-stage nonsubmerged threaded titanium implants with Resorbable Blasting Media (RBM) surface developed by Osstem implant (Seoul, Korea) in October of 2002.

This study is to evaluate the survival rate of the SSII implants for 4 years using radiographic parameters and to review the retrieved implants by the cytotoxicity tests.

Since September 2003, 439 SSII implants had been used for 173 patients at Ewha Women University Medical Center in Korea. Patients consisted of 91 females (52.6 %) and 82 males (47.4 %). The patients' mean age was 42 ± 16 years, ranging from 21 to 83 years. The follow-up period ranged from 9 to 46 months (mean F/U 24.2 ± 10.2 months).

The results are as follows:
1. Of 439 implants, 17 implants were removed and 4-year cumulative survival rate was 96.1%.
2. 82.3% of 17 failed implants were founded during healing phase, and 94.1% of failed fixtures were removed within 5 months after implantation.
3. Crestal bone around the implants was resorbed to 1 mm in 89.0%, to 1-2 mm loss of the marginal bone in 8.3%, and the bone loss over 2 mm was occurred in 2.7%.
4. Microscopic examination of the retrieved implants disclosed Grade 0 cytotoxicity in 4 and Grade 1 cytotoxicity in 2 of 6 groups divided according to lot numbers. Inhibition rate with optical density was acceptable as low as ISO standard.

Objective
Spontaneous early implant exposure is believed to be harmful, resulting in early crestal bone loss around submerged implants. The purpose of this study was to examine the influence of abutment connections and plaque control on the initial healing of prematurely exposed implants in the canine mandible.

Material & Methods
Bilateral, edentulated, flat alveolar ridges were created in the mandible of 10 mongrel dogs. After 3 months of healing, two implants were placed on each side of the mandible following a commonly used two-stage surgical protocol. Implants on each side were randomly assigned to one of two procedures: 1) connection of a cover screw to the implant and removal of the gingiva to expose the cover screw; and 2) connection of a healing abutment to the implant so that the coronal portion of the abutment remained exposed to the oral cavity. In five dogs (plaque control group), meticulous plaque control was performed. In the other five dogs (no plaque control group), plaque was allowed to accumulate. At 8 weeks post-implantation, microcomputed tomography was performed at the implantation site to measure bone height in the peri-implant bone.

Results
The plaque control group had greater vertical alveolar ridge height (9.7 ± 0.5 mm) than the group without plaque control (7.4 ± 0.7 mm; p < .05). In the plaque control group, the average bone height was greater with the abutment- connected implant (10.1 ± 0.5 mm) than with the partially exposed implant (9.3 ± 0.5 mm; p < .05). In the group without plaque control, the average bone height was greater with the partially exposed implant (9.2 ± 0.6 mm) than with the abutment-connected implant (8.5 ± 0.7 mm; p < .05).

Conclusions
These results suggest that the placement of healing abutments and meticulous plaque control may limit bone loss around submerged implants when implants are partially exposed.
Peri-Implant Bone Reactions at Delayed and Immediately Loaded Implants: An Experimental Study

Se-Hoon Kim, Byung-Ho Choi, Jingxu Li, Han-Sung Kim, Chang-Yong Ko, Seung-Mi Jeong, Feng Xuan, Seoung-Ho Lee

Objective
The aim of this study was to compare the peri-implant bone reactions of implants subjected to immediate loading with those subjected to delayed loading.

Materials & Methods
In 6 mongrel dogs, bilateral edentulated flat alveolar ridges were created in the mandible. After 3 months of healing, 1 implant was placed in each side. On one side of the mandible, the implant was loaded immediately with a force of 20N that was applied at a 120° angle from the tooth's longitudinal axis at the labial surface of the crown for 1,800 cycles per day for 10 weeks. On the opposite side, after a delay of 3 months to allow osseointegration to take place, the implant was loaded with the same force used for the immediately loaded implant. Ten weeks after loading, microcomputerized tomography at the implantation site was performed. Osseointegration was calculated as the percentage of implant surface in contact with bone. Bone height was measured in the peri-implant bone.

Results
The mean osseointegration was greater (65.5%) for the delayed-loading implants than for the immediately loaded implants (60.9%; p < .05). The mean peri-implant bone height was greater (10.6 mm) for the delayed-loading implants than for the immediately loaded implants (9.6 mm; p < .05).

Conclusions
The results indicate that when implants are immediately loaded, the immediate loading may decrease both osseointegration of dental implants and bone height.

<table>
<thead>
<tr>
<th>Flapless group</th>
<th>Flap group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone-implant contact (%)</td>
<td>70.4 ± 6.3</td>
</tr>
<tr>
<td>Bone height (mm)</td>
<td>10.1 ± 0.5</td>
</tr>
</tbody>
</table>

Flapless Implant Surgery: An Experimental Study

Seung-Mi Jeong, Byung-Ho Choi, Jingxu Li, Han-Sung Kim, Chang-Yong Ko, Jae-Hyung Jung, Hyeon-Jung Lee, Seoung-Ho Lee, Wilfried Engelke

Objective
The purpose of this study was to examine the effect of flapless implant surgery on crestal bone loss and osseointegration in a canine mandible model.

Materials & Methods
In 6 mongrel dogs, bilateral, edentulated, flat alveolar ridges were created in the mandible. After 3 months of healing, 2 implants in each side were placed by either flap or flapless procedures. After a healing period of 8 weeks, microcomputerized tomography at the implantation site was performed. Osseointegration was calculated as percentage of implant surface in contact with bone. Additionally, bone height was measured in the peri-implant bone.

Results
The mean osseointegration was greater (70.4%) than at sites with flaps (59.5%) (p < .05). The mean peri-implant bone height was greater at flapless sites (10.1 mm) than at sites with flaps (9.0 mm; p < .05).

Conclusions
Flapless surgery can achieve results superior to surgery with reflected flaps. The specific improvements of this technique include enhanced osseointegration of dental implants and increased bone height.

<table>
<thead>
<tr>
<th>Flapless group</th>
<th>Flap group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone-implant contact (%)</td>
<td>70.4 ± 6.3</td>
</tr>
<tr>
<td>Bone height (mm)</td>
<td>10.1 ± 0.5</td>
</tr>
</tbody>
</table>
The Effect of Internal Implant-Abutment Connection and Diameter on Screw Loosening

Objective
One of the common problems of dental implant prosthesis is the loosening of the screw that connects each component, and this problem is more common in single implant-supported prostheses with external connection and in males.

The purposes of this study were:
1. to compare the initial abutment screw de torque values of the different six implant-implant interface designs,
2. to compare the detorque values of the six different implant-abutment interface designs after cyclic loading,
3. to compare the detorque values of regular and wide diameter implants and (4) to compare the initial detorque values with the detorque values after cyclic loading.

Material & Methods
Six different implant-implantation connection systems were used. The cement retained abutment and titanium screw of each system were assembled and tightened to 32 Ncm with digital torque gauge. After 10 minutes, initial detorque values were measured. The custom titanium crown were cemented temporarily and a cyclic sine curve load (30 to 320 N, 14 Hz) was applied. The detorque values were measured after cyclic loading of one million times by loading machine. One-way ANOVA test, scheffe’s test and Mann-Whitney U test were used.

Results & Conclusions
The results were as follows:
1. The initial detorque values of six different implant-abutment connections were not significantly different (p > .05).
2. The detorque values after one million dynamic cyclic loading were significantly different (p < .05).
3. The SSII regular and wide implant both recorded the higher detorque values than other groups after cyclic loading (p < .05).
4. Of the wide the initial detorque values of Avana Self Tapping Implant, MIS and Tapered Screw and the detorque values of MIS implant after cyclic loading were higher than their regular counterparts (p < .05).
5. After cyclic loading, SSII regular and wide implants showed higher de torque values than before (p < .05).

SS SYSTEM References
Pre-Clinical Study

### Biomechanics


19. Joo-Hoon Yoon, Chang-Mo Jeong, Tae-Gwon Eom, Mi-Hyun Cheon. Effect Joint Design on Static and Dynamic Strength. Scientific Poster, 14th Congress of AEO 2005


22. Byung-Soo Bae, Joo-Ho Ryu. Investigation of the Resin Adhesion and Task Convenience for Surface Shape. Scientific Poster, Kor Dent Technician Associate 2005 Conference
Objective
The aim of this study was to evaluate the clinical value of Osstem USII Plus system implants. Clinical and radiographic data were analyzed for 88 implants placed and functionally loaded for a 12 month period at the Yonsei University Dental Hospital.

Materials & Methods
Based on the patient’s medical records, clinical factors and their effects on implant marginal bone resorption, distribution and survival rate were analyzed. The marginal bone loss was evaluated at implant placement and during a 6 to 12 months functional loading period. The independent sample t-test was used to evaluate the interrelationship between the factors (p > 0.05), and one way repeated measures ANOVA was used to compare the amount of marginal bone resorption.

Results
The cumulative survival rate for 88 implants was 100%. The marginal bone resorption from implant placement to prosthetic loading was 0.24 mm and the average marginal bone resorption from prosthetic delivery to 12 months of functional loading was 0.19 mm. The total average bone resorption from implant placement to 12 months of functional loading was 0.43 mm. There were no statistically differences in the amount of marginal bone resorption when implants were placed in the maxilla or the mandible (p>0.05), however, implants placed in the posterior areas showed significantly more marginal bone loss than those placed in the anterior areas (p<0.05).

Conclusions
Based on these results, the short term clinical success rate of RBM surface treated external connection domestic implants showed satisfactory results and the marginal bone loss was in accord with the success criteria of dental implants.

Table 1. Marginal bone loss around implants according to observation period

<table>
<thead>
<tr>
<th>Site</th>
<th>Number of implants</th>
<th>Marginal bone loss (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maxillary anterior</td>
<td>23</td>
<td>7.4 ± 171.2</td>
</tr>
<tr>
<td>Maxillary premolar</td>
<td>14</td>
<td>2.4 ± 154.4</td>
</tr>
<tr>
<td>Maxillary molar</td>
<td>8</td>
<td>7.4 ± 164.9</td>
</tr>
<tr>
<td>Mandibular anterior</td>
<td>12</td>
<td>4.1 ± 173.8</td>
</tr>
<tr>
<td>Mandibular premolar</td>
<td>8</td>
<td>14.3 ± 173.8</td>
</tr>
<tr>
<td>Mandibular molar</td>
<td>5</td>
<td>7.4 ± 173.8</td>
</tr>
</tbody>
</table>

Table 2. Distribution of implants by bone resorption

<table>
<thead>
<tr>
<th>Amount of bone resorption (mm)</th>
<th>Number of implants</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;0.2</td>
<td>40</td>
</tr>
<tr>
<td>0.3</td>
<td>10</td>
</tr>
<tr>
<td>0.4</td>
<td>3</td>
</tr>
<tr>
<td>0.5</td>
<td>9</td>
</tr>
<tr>
<td>0.6</td>
<td>5</td>
</tr>
<tr>
<td>0.7</td>
<td>3</td>
</tr>
<tr>
<td>0.8</td>
<td>2</td>
</tr>
<tr>
<td>0.9</td>
<td>1</td>
</tr>
<tr>
<td>1.0</td>
<td>2</td>
</tr>
<tr>
<td>1.2</td>
<td>7</td>
</tr>
<tr>
<td>1.5</td>
<td>4</td>
</tr>
<tr>
<td>2.0</td>
<td>1</td>
</tr>
<tr>
<td>3.0</td>
<td>1</td>
</tr>
</tbody>
</table>

The highest HU values were found in the mandibular anterior site (726.3 ± 151.4), followed by the mandibular premolar site (753.8 ± 171.2), maxillary anterior site (726.3 ± 154.4), maxillary premolar site (656.7 ± 173.8) and maxillary molar site (621.5 ± 164.9). The ISQ value was the highest in the mandibular premolar site (81.5 ± 2.4) followed by the mandibular molar site (80.0 ± 5.7), maxillary anterior site (77.4 ± 4.1), mandibular anterior site (74.2 ± 14.3) and maxillary molar site (73.7 ± 7.4).

Conclusions
Based on these results, the short term clinical success rate of RBM surface treated external connection domestic implants showed satisfactory results and the marginal bone loss was in accord with the success criteria of dental implants.
A Retrospective Evaluation of Implant Installation with Maxillary Sinus Augmentation by Lateral Window Technique

Se-Il Ki, Mi-Gi Yu, Young-Joon Kim, Min-Suk Kook, Hong-Ju Park, Uttom Kumar Seth, Hee-Kyun Oh

Objective
The aim of this study was to evaluate the clinical results of implants which were installed with maxillary sinus elevation by using lateral window technique.

Materials & Methods
We performed the maxillary sinus elevation by lateral window technique to 87 patients who visited Dept. of Oral & Maxillofacial Surgery, Chonnam National University Hospital from January, 2003 to January, 2007. When the residual bone height was from 3 mm to 7 mm, the sinus elevation and simultaneous implant installation was mostly performed. When the residual bone height was less than 3 mm, the sinus elevation was performed and the delayed implant installation was done after 5 or 6 months. No artificial membranes were used for coverage of the lateral bony window site and freeze dried ilotin sealant was applied to the grafted bone. The mean follow-up period was 28.5 months (ranged from 10 months to 48 months).

Results
1. Unilateral sinus elevations were performed in 51 patients and bilateral sinus elevations were performed in 36 patients. And the total number of sinus elevation procedure was 123 cases.

2. The sinus elevation and simultaneous implant installation was performed in 89 sinuses and 249 implants were installed. The sinus elevation and delayed implant installation was performed in 44 sinuses and 141 implants were installed. The total number of implants were 390 in 133 sinuses. The average healing period after sinus elevations was 6.1 months in delayed implant installation.

3. Only autogenous bone, autogenous bone mixing with allografts or autogenous bone mixing with xenografts were used as graft materials.

4. The average period from first surgery to second surgery was about 7.2 months.

5. Some patients complications, such as perforation of sinus membrane, swelling, infection and exposure of cover screw. Two implants were removed in the infected sinus.

6. The survival rate of implants with maxillary sinus elevation by lateral window technique was 99.5% and the success rate of implants was 95.1%.

Conclusions
These results indicated that the implants which were installed with maxillary sinus elevation by lateral window technique showed high survival and success rates.

Multicenter Retrospective Clinical Study of Osstem USII Implant System in Type IV Bone

Su-Gwan Kim, Chul-Min Park, Young-Kyun Kim, Hee-Kyun Oh, Gab-Lim Choi, Young-Hak Oh
J Korean Implantology(KAOMI) 2007;11(3):22-9

Table 1. Distribution of operation methods

<table>
<thead>
<tr>
<th>Operation method</th>
<th>No. of implants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional method</td>
<td>54</td>
</tr>
<tr>
<td>SL via lateral window</td>
<td>114</td>
</tr>
<tr>
<td>SL via osteotome technique</td>
<td>9</td>
</tr>
<tr>
<td>GBR</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 2. Distribution of implants by type of prostheses

<table>
<thead>
<tr>
<th>Prosthesis</th>
<th>No. of implants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>3</td>
</tr>
<tr>
<td>Fixed partial</td>
<td>136</td>
</tr>
<tr>
<td>Fixed complete</td>
<td>33</td>
</tr>
<tr>
<td>Others</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 3. Distribution of implants by bone resorption

<table>
<thead>
<tr>
<th>Amount of bone resorption (mm)</th>
<th>No. of implants</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>160</td>
</tr>
<tr>
<td>0-0.9</td>
<td>2</td>
</tr>
<tr>
<td>1.0-2.0</td>
<td>5</td>
</tr>
<tr>
<td>&gt;2.0</td>
<td>0</td>
</tr>
</tbody>
</table>
In this study, we analyzed data for edentulous patients from multiple centers after installation of the Osstem USII system in a retrospective study of patient gender, age, implant area, additional surgery, type of prosthesis, and the implant survival and success rates. We then analyzed the success rate after prosthetic restoration using implants in completely edentulous patients to validate the usefulness of the USII system.

Between 1997 and 2005, of the patients who visited regional dental clinics and private clinics nationwide (Department of Oral and Maxillofacial Surgery, Chosun University Dental College; Department of Oral and Maxillofacial Surgery and dental clinics, Seoul National University Bundang Hospital; Department of Oral and Maxillofacial Surgery, Chonnam University Dental School; dental clinics, Daedong Hospital; All Dental Private Office) and underwent the Osstem USII system implant procedure, our multicenter retrospective study examined 44 completely edentulous patients (mean age 63.3 years) who received 276 implants. The following results were obtained.

1. Eight of the 44 patients had systemic diseases, including 3 patients with diabetes, 2 patients with cardiovascular disease, and 1 patient each with cerebral infarction, hypertension, bronchial asthma, and Parkinson’s disease.

2. The oral hygiene of the 44 patients was classified as good in 36 patients, somewhat poor in 7 patients, moderately poor in 1 patient, and very poor in 0 patients.

3. Of the implants installed, 80 were 20 mm long, 65 were 11.5 mm long, 64 were 13 mm long, and 37 were 15 mm long; 175, 52, and 23 implants had diameters of 4.0, 3.75, and 3.3 mm, respectively.

4. When opposing teeth were encountered, 60 were natural teeth, 13 were porcelain, 40 had gold crowns, 7 were resin teeth, 90 were total dentures, and 66 were implant-repaired opposing teeth.

5. After implant installation, no bone resorption of the alveolar crest occurred in 181 cases, and more than 1 mm of bone loss took place in 44 cases.

6. The mean calculus index for the soft tissues near the implants in 215 cases was 0.11, and the gum inflammation index assessed in 226 cases averaged 0.34. The plaque index measured in 225 cases averaged 0.55, and the width of the attached gingiva measured in 222 cases averaged 2.06 mm.

7. For implant surgery, no additional surgery was performed in 161 cases (58.3%); maxillary sinus elevation via a lateral window was performed in 45 cases (16.3%); guided bone regeneration (GBR) was performed in 42 cases (15.2%); simultaneous maxillary sinus elevation and GBR were performed in 6 cases (2.1%); and veneer grafting was performed in 10 cases (0.6%).

8. According to the implant method, two implants installed with sinus lifting via a lateral window failed, for a survival rate of 95.55% (43/45). Temporary complications developed with the other procedures, but were resolved in all cases, giving good results.

9. Of the 276 implants installed, two failed and were removed for a final survival rate of 99.27%.

Table 1. Distribution of implants by bone resorption

<table>
<thead>
<tr>
<th>Amount of bone loss (mm)</th>
<th>No. of implants</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>181</td>
</tr>
<tr>
<td>0-0.9</td>
<td>6</td>
</tr>
<tr>
<td>1.0-2.0</td>
<td>35</td>
</tr>
<tr>
<td>&gt;2.0</td>
<td>9</td>
</tr>
</tbody>
</table>

Table 2. Survival rate on total implant

<table>
<thead>
<tr>
<th>Implant status</th>
<th>No. of implants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survival count</td>
<td>276</td>
</tr>
<tr>
<td>Fail count</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>278</td>
</tr>
</tbody>
</table>

Survival percentage: 99.27%
The Effects of Surface Roughness on the Sandblasted with Large Grit Alumina and Acid Etched Surface Treatment: In Vivo Evaluation

Hong-Young Choi, Jae-June Park, In-Hee Cho, Tae-Kwan Eom
Scientific Poster, 20th Congress of EAO 2011

Objective
The aim of the present study was to evaluate the effect of roughness on the sandblasted with large grit alumina and acid etched surface, which were involved with the in-vivo removal torque test.

Materials & Methods
Three kinds of implants with different surface topographies were made by properly changing the blasting and acid-etching process. This involved changing things like the blasting material, media size, blowing pressure, and acid-etching time. In ten micro-pigs, three submerged implants were placed in the tibia. Groups were divided into three groups: RBM (Ra 1.5 μm), Small SA (Ra 1.5 μm), and SA (Ra 2.8 μm). The micro-pigs were sacrificed following a 2 and 4 week healing period. After 2 and 4 weeks of healing, the micro-pigs were sacrificed and all implants were evaluated by removal torque testing.

Results
There were no statistically significant differences between the groups. The RBM surface and SA with small roughness (Ra 1.5 μm) had relatively similar removal torque values at both 2 weeks and 4 weeks, but the SA surface with higher roughness (Ra 2.8 μm) showed a higher removal torque value than small Ra SA in 4 weeks (p < .05).

Conclusion
The contribution of macro and micro topography to the anchorage of SA implants was determined. For the SA implant surface, the macro-topography with high surface roughness is more effective in a removal torque test than micro-topography in the acid etching process. The SA implant presented a higher removal torque than the RBM surface.

Effects of Different Depths of Gap on Healing of Surgically Created Coronal Defects Around Implants in Dogs: A Pilot Study

Hong-Choel Yoon, Juung-Yoo Choi, Ui-Won Jung, Eun-Kyung Bae, Seong-Ho Choi, Ho-Yong Lee, Chong-Kwan Kim, June-Sung Shim
J Periodontol 2008;79: 355-61

Objective
This study investigated the bone growth pattern in surgically created coronal defects with various depths around implants in dogs.

Materials & Methods
Four mongrel dogs were used. All mandibular premolars were extracted under general anesthesia and left to heal for 2 months. After ostectomy, bony defects were prepared in test sites, using a stepped drill with a diameter of 6.3 mm and two depths: 2.5 mm (test sites 1 [T1]) and 5.0 mm (test sites 2 [T2]). In the control sites, the implants were placed after ostectomy without any coronal defects. T1, T2, and control sites were prepared in the right and left sides of the mandible. Six implants, 3.3 mm in diameter and 10 mm in length, were placed in each dog; the implants were submerged completely. Two dogs were sacrificed 8 weeks after surgery, and the other two dogs were sacrificed 12 weeks after surgery. The stability of all implants was measured with a resonance frequency analyzer after placement and after sacrifice. All sites were block-dissected for ground sectioning and histologic examination.

Results
After 12 weeks of healing, only T2 were not filled fully with bone. At week 8, the mean bone-to-implant contact (BIC) was 47.7% for control, 43.6% for T1, and 22.2% for T2. At week 12, the control BIC was 56.7% and the 2.5 mm defect had a greater BIC (58.8%). However, in the 0.5 mm defect, the BIC was 35.1%. At insertion, stability was reduced at sites with a greater defect depth. Similar stability was noted in all specimens after 8 and 12 weeks of healing.

Conclusions
Bone healing between an implant and marginal bone was compromised at sites with a deeper defect when the width of the bone defect was 1.5 mm.
Objective
The present study was performed to evaluate the effect of surface treatment of the cervical area of implant on bone regeneration in fresh extraction socket following implant installation.

Materials & Methods
The four minipigs, 18 months old and 30 kg weighted, were used. Four premolars of the left side of both the mandible and maxilla were extracted. ∅3.3 mm and 11.5 mm long USII Plus implants (Osstem Implant, Korea) with resorbable blasting media (RBM) treated surface and USII implants (Osstem Implant, Korea) with machined surface at the top and RBM surface at lower portion were installed in the socket. Stability of the implant was measured with Osstell™ (Model 6 Resonance Frequency Analyser: Integration Diagnostics Ltd., Sweden). After 2 months of healing, the procedures and measurement of implant stability were repeated in the right side by same method of left side. At four months after first experiment, the animals were sacrificed after measurement of stability of all implants, and biopsies were obtained.

Results
Well healed soft tissue and no mobility of the implants were observed in both groups. Histologically satisfactory osseointegration of implants was observed with RBM surface, and no foreign body reaction as well as inflammatory infiltration around implant were found. Furthermore, substantial bone formation and high degree of osseointegration were exhibited at the marginal defects around the cervical area of USII Plus implants. However, healing of USII implants was characterized by the incomplete bone substitution and the presence of the connective tissue zone between the implant and newly formed bone. The distance between the implant platform (P) and the most coronal level of bone-to-implant contact (B) after 2 months of healing was 2.66 ± 0.11 mm at USII implants group and 1.80 ± 0.13 mm at USII Plus implant group. The P-B distance after 4 months of healing was 2.29 ± 0.13 mm at USII implants group and 1.25 ± 0.10 mm at USII plus implants group. The difference between both groups regarding the length of P-B distance was statistically significant (p < .001).

Conclusions
The current results suggest that implants with rough surface at the cervical area have an advantage in process of bone regeneration on defect around implant placed in a fresh extraction socket.

Comparison of Push-in Versus Pull-out Tests on Bone-Implant Interfaces of Rabbit Tibia Dental Implant Healing Model

Objective
This study aimed to investigate whether push-in and pull-out tests measure mechanical properties of the bone-implant interface differently, and which test is more sensitive to changes over the healing period.

Materials & Methods
Two identical self-threading dental implants (∅3.3 x 8.5 mm) were placed in medial surface of the proximal condyles of left and right tibias of 20 rabbits (40 implants total). Five rabbits each were sacrificed after 1, 4, 8, and 12 weeks of healing. Push-in test was performed on one side’s tibia implant and pull-out on the other side’s implant, at a rate of 6 mm/min. Primary and secondary implant stabilities and tibia weight were measured on all implants.

Results
The push-in test generated significantly higher failure load (p = .0001; 530 N vs 279 N), lower displacement at failure (p = .0003; 0.436 mm vs 0.680 mm), and higher interface stiffness (p = .0001; 1.641 N/mm vs 619 N/mm) than pull-out test. Failure load, stiffness, and secondary implant stability were significantly higher for longer compared with shorter healing periods, while displacement, tibia weight, and primary stability were not. Failure load and stiffness differed significantly for four healing times for the push-in but not pull-out test. Failure load was significantly correlated with secondary implant stability for both push-in (r = 0.68) and pull-out (r = 0.48) tests, but stiffness was significantly correlated with secondary stability only for the push-in test (r = 0.72; pull-out test r = 0.40).

Conclusions
The push-in test appeared more sensitive than pull-out to changes in mechanical properties at bone-implant interfaces during healing in rabbit tibia model.
Jongrak Hong, Young-Jun Lim, Sang-Oh Park

Objective
The aim of the study was to investigate the influence of cortical bone and increasing implant fixture length on primary stability. Further investigation considered the correlation between the presence of cortical bone at the marginal bone and implant stability measured by insertion torque (IT) and resonance frequency analysis (RFA), as well as implant length, were determined.

Materials & Methods
Two different types of polyurethane bone models were compared. (Group 1: with cortical and cancellous bone; Group 2: with cancellous bone only). A total of 60 external type implants (∅ 4.1, Osstem, USII) with different lengths (7, 10, and 13 mm) were used. IT was recorded automatically by a computer which was connected to the implant fixture installation device during the placement. RFA was conducted to quantify the primary implant stability quotient (ISQ). All two measurements were repeated 10 times for each group.

Results
All these differences were statistically significant between the two groups (P < 0.001) and intragroups (P < 0.001). Upon comparing the IT, cortical bone appears to have a greater influence on implant stability than implant lengths, whereas the RFA value strongly affects implant length rather than the presence of the cortical bone.

Conclusions
The quantitative biomechanical evaluations clearly demonstrated that primary implant stability seems to be influenced by the presence of a cortical plate and total surface area of the implant fixture appears to be the decisive determinant for ISQ value.

Objective
Excessive heat at the implant-bone interface may compromise osseointegration. This study examined heat generated at the implant surface during preparation of zirconia/alumina complex abutment in vitro.

Material & Methods
Sixty zirconia/alumina complex abutments (ZioCera, Osstem, Seoul, Korea) were randomized to twelve experiment groups. The abutments were connected to implant (USII, Osstem, Seoul, Korea) and were embedded in an acrylic-resin block in a 37°C water bath. Abutments were reduced horizontally 1 mm height over a period of 1 minute with highspeed handpiece and polished for 30 seconds with lowspeed handpiece with "air/water coolant" and "without coolant." Temperatures were recorded via thermocouples at the cervical, middle, and apical part of the implant surface. The Mann-Whitney rank-sum test was used to assess the statistical significance of difference of temperature between with coolant and without coolant.

Table 1. Temperatures at each location of implant during preparation of five abutments using each handpiece type accompanied with coolant and without coolant

<table>
<thead>
<tr>
<th>Group</th>
<th>Handpiece Type</th>
<th>Location</th>
<th>Temperature</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low</td>
<td>Cervical</td>
<td>38.52</td>
<td>0.009</td>
</tr>
<tr>
<td>2</td>
<td>Low</td>
<td>Middle</td>
<td>37.50</td>
<td>0.834</td>
</tr>
<tr>
<td>3</td>
<td>Low</td>
<td>Apical</td>
<td>37.50</td>
<td>0.754</td>
</tr>
</tbody>
</table>

Conclusions
Preparation of zirconia/alumina complex abutment caused an increase in temperature within the implant but this temperature increase did not reach critical levels described in implant literature.
Fatigue Fracture of Different Dental Implant System Under Cyclic Loading

Won-Ju Park, In-Ho Cho
J Kor Acad Prosthodont 2009;47:424-34

Objective
Implant has weak mechanical properties against lateral loading compared to vertical occlusal loading, and therefore, stress analysis of implant fixture depending on its material and geometric features is needed.

Materials & Methods
Total 28 of titanium alloy implants were divided into 7 of 4 groups: Group A (3i, FULL OSSEOIT) Implant, Group B (Nobelbiocare, Branemark System Mk III) Implant, Group C (Nobelcare, SinusQuick™ Ed) Implant, Group D (Osstem, USII). The type III gold alloy prostheses were fabricated using adequate UCLA gold abutments. Fixtured, abutment screw, and abutment were connected and cross-sectional vertically.

Hardness was tested using MHT-XR. For fatigue fracture test, with MTS 810, the specimens were loaded to the extent of 60 - 600 N until fracture occurred. The fracture pattern of abutment screw and fixture was observed under scanning electron microscope. A comparative study of stress distribution and fracture area of abutment screw and fixture was carried out through infinite element analysis.

Results
1. In Vicker’s hardness test of abutment screw, the highest value was measured in group A and lowest value was measured in group D.
2. In all implant groups, implant fixture fractures occurred mainly at the 3 - 4th fixture thread valley where tensile stress was concentrated. When the fatigue life was compared, significant difference was found between the group A, B, C, and D (p < .05).
3. The fracture patterns of group A and group D showed complex failure type, a fracture behavior including transverse and longitudinal failure patterns in both fixture and abutment screw. In Group A and C, however, the transverse failure of fixture was only observed.
4. The finite element analysis infers that a fatigue crack started at the fixture surface.

Conclusions
The maximum tensile stress was found in the implant fixture at the level of cortical bone. The fatigue fracture occurred when the dead space of implant fixture coincides with the stress pattern where the maximum tensile stress was generated. To increase implant durability, prevention of surrounding bone resorption is important. However, if the bone resorption progresses to the level of dead space, the frequency of implant fracture would increase. Thus, proper management is needed.

US System References

Clinical Study

24. Uttom Kumar Shet, Min-Suk Kook, Hong-Ju Park, Hae-Kyun Oh. Comparison of Bone Resorption Between Autogenous Bone Graft and Distraction Osteogenesis with Other Treatment Outcome. Scientific Poster, J Kor Oral Maxillofac Surg 2008; 34 (Suppl)


32. Sun-Hee Oh, Taek-Ga Kwon, Young-Kyun Kim, Jung-Won Hwang. Retrospective Study of Osstem Dental Implants; Clinical and Radiographic Results of 2.5 Years. Scientific Poster, 15th Congress of EAO 2006


Objective
Mini-implant system is applicable to areas of narrow space and area requiring temporary loading support. The purpose of this study was to evaluate the clinical outcome of a mini-implant system as well as the application of mini-implant system in the dental clinical field.

Materials & Methods
The patients who had been operated from Jan 2007 to Dec 2007 in the four dental facility including Seoul National University Bundang Hospital were enrolled. To evaluate the factors associated with the clinical outcome, the patients were classified according to gender, age, area of surgery, type of implant, diameter and length of the implant, and the purpose of the mini-implant system application.

Table 1. Patients’ characteristics (n=69)

<table>
<thead>
<tr>
<th>Variables</th>
<th>The number of cases (Implants)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
</tr>
<tr>
<td>0-19</td>
<td>1 (4)</td>
</tr>
<tr>
<td>20-29</td>
<td>4 (4)</td>
</tr>
<tr>
<td>30-39</td>
<td>7 (11)</td>
</tr>
<tr>
<td>40-49</td>
<td>9 (20)</td>
</tr>
<tr>
<td>50-59</td>
<td>23 (98)</td>
</tr>
<tr>
<td>60-69</td>
<td>18 (51)</td>
</tr>
<tr>
<td>70-79</td>
<td>7 (19)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>38 (56)</td>
</tr>
<tr>
<td>Female</td>
<td>31 (74)</td>
</tr>
<tr>
<td>Medical history</td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>49 (78)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>10 (16)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>8 (12)</td>
</tr>
<tr>
<td>Cerebrovascular attack</td>
<td>2 (3)</td>
</tr>
<tr>
<td>Asthma</td>
<td>3 (5)</td>
</tr>
<tr>
<td>Alcoholism</td>
<td>2 (3)</td>
</tr>
<tr>
<td>Thyroid Disease</td>
<td>10 (15)</td>
</tr>
<tr>
<td>Smoking</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>13 (24)</td>
</tr>
<tr>
<td>No</td>
<td>56 (100)</td>
</tr>
<tr>
<td>Results</td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>66 (146)</td>
</tr>
<tr>
<td>Failure</td>
<td>3 (0)</td>
</tr>
<tr>
<td>Complications</td>
<td></td>
</tr>
<tr>
<td>Osseointegration failure</td>
<td>6 (12)</td>
</tr>
<tr>
<td>Infection</td>
<td>3 (0)</td>
</tr>
</tbody>
</table>
Clinical Study


2. Yong-Jin Kim, Young-Jin Park, Kyung-Tae Park. Mandibular anterior single tooth replacement using the MS implant system. Scientific Poster, Osstem Meeting 2013


The “OSSTEM IMPLANT Research Project” for the promotion of implantology may support clinical and laboratory research at the discretion of its research committee.

Further information concerning conditions can be obtained from the following address:

Clinical Oriented Research Team for Implantology
Implant R&D Center of OSSTEM IMPLANT Co., Ltd.
#38-44, Geoje 3-dong, Yeonje-gu, Busan, Korea. Zip. 611-801
Tel. 82-70-7016-4745
Fax. 82-70-4394-0404
project@osstem.com
http://www.osstem.com