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Prospective Comparative Study of Tapered Implant with SA Surface at Maxillary Posterior Area According to Loading Time : 3 and 6 months

Kyo-Jin Ahn, Young-Kyun Kim

Scientific Poster, 21st Congress of EAO 2012

Objective

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

Patients & Methods

Subjects

- From November 2009 through September 2010
- Implant : TSIII 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

	Test group	Gain of alveolar bone height (mm)
Patient	18	18
Age	56.5 ± 11.9	61.7 ± 11.2
Implant	35	33
Follow up span	15.17 ± 5.4	14.48 ± 2.7

Methods

- Hard tissue evaluation : Periapical view (6 months, 12 months after loading) / - Stability : ISQ (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 ration (C/I ratio) / - Opposite occlusal arch status / Occlusal gap : Controlled by Shimstock (8㎛) and Acufilm (27㎛) articulating paper

Results

1. Additional Surgical Process

Flapless	Flapless	GBR	Sinus lift	Sinus lift with GBR	Ridge spliting
3m	5	8	6	10	0
6m	7	6	6	5	1

2. Hard Tissue Evaluation

2-1. Marginal Bone Resorption

	6 months loaded	12 months loaded
3m	0.2±0.4 mm	0.2±0.3 mm
6m	0.1±0.2 mm	0.2±0.3 mm

2-2. Stability (ISQ)

	First Operation	12 months loaded
3m	69.7±8.7	74.3±6.0
6m	67.1±9.9	72.3±6.7

3. Soft Tissue Evaluation

	AG	PI	GI	PO			
				B	M	D	P
3m	2.1	0.8	0.6	2.7	2.6	2.9	2.5
6m	2.8	0.9	0.5	2.9	3.5	3.1	3.1

4. Prosthetic Evaluation

4-1. Opposite Occlusal arch status

	Natural teeth	Implant	Occlusal gap(㎛)
3m	23	12	9.1±9.3
6m	28	5	3.2±5.4

4-2. Prosthetic type

	Single Prosthetic	Splinted Prosthetics
3m	4	31
6m	5	28

4-3. Crown to Implant ratio

3m	6m
1	1.1

5. Success rate

3m	6m
1	1.1

Conclusions

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

A Prospective comparative clinical study of Osstem® TSIII CA and Straumann® SLActive Bone level implants to early loading in case of single rehabilitation of maxillary molar

Jin-Yong Lee, Sun Kyoung Kim, Jung-Woo Lee, Soo-Hwan Byun, Jong-Sik Kim, Hosik Choi, Jae-Rim Lee, Kyungsub Lim, Bo-Yoon Chung, Min kyoo Kim, Jai-Bong Lee, Young-Jun Lim, Jong-Ho Lee

Scientific Poster, OSSTEM MEETING 2014

Purpose of study

The aim of this study was to evaluate the clinical outcome of early loading of the Osstem® TSIII Ca-SA and compared with Straumann® SLActive (Bone level).

Patients & Methods

Inclusion criteria

Sex : male or female
Age : from 20 years to 75 years
Position : the unilateral loss of one molar(FDI positions 15-17, 25-27) in the maxilla
Bone : 10mm or more the height of the residual alveolar bone (at least 3 months healing of the extraction socket)

Devices

The implants were selected according to the available bone condition of the patient.
- Osstem® TSIII Ca-SA Implant; diameters 4.5 and 5.0 mm, lengths of 10mm
- Straumann® SLActive Bone Level Implants; diameters 4.1 mm and 4.8mm, lengths of 10 mm

Assessment

Implant Stability, Radiographs, Soft tissue analysis, Implant Success Rate and the Treatment Failure.
Success of Implant should not be as follows: Persistent or irreversible discomfort, pain and paresthesia, peri-implantitis accompanied by abscess, Implant mobility, and radiolucent lesion around implants.

Results

Flow diagram of patients and implants placed

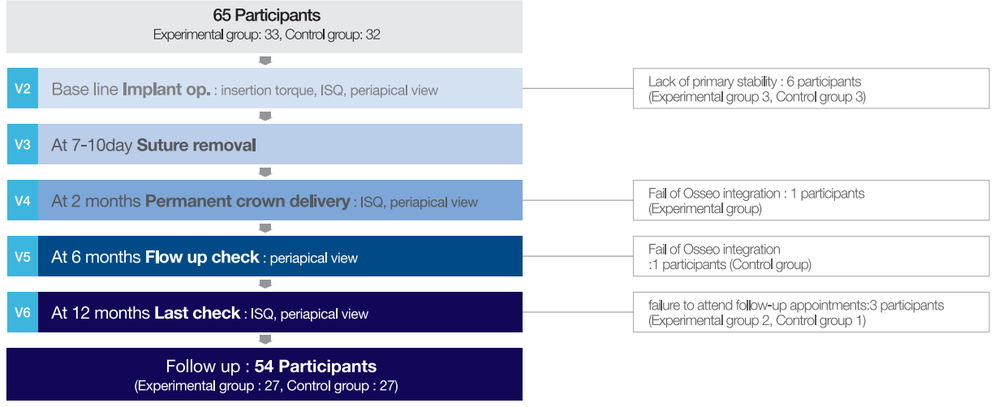
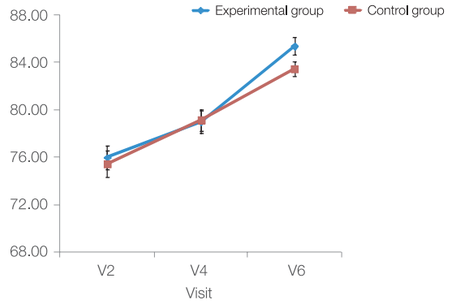


Fig 1. Flow diagram of patients and implants placed

Comparison of implant stability



		N	Mean	Std. Deviation	Min	Max
Experimental group	V2	27	75.97	1.01	68	86
	V4	27	78.97	0.95	66.75	87
	V6	27	85.34	0.73	74	89.5
Control group	V2	27	75.44	1.12	64	87
	V4	27	79.11	0.92	66	85.5
	V6	27	83.43	0.61	76.3	88.5

Fig 2. Comparison of implant stability at V2 , V4, and V5
ISQ is increased continuously from implant placement to 12-month postoperatively, the difference was statistically significant ($p < 0.05$). But there was no statistical difference between the two groups ($p > 0.05$).

Marginal bone level changes

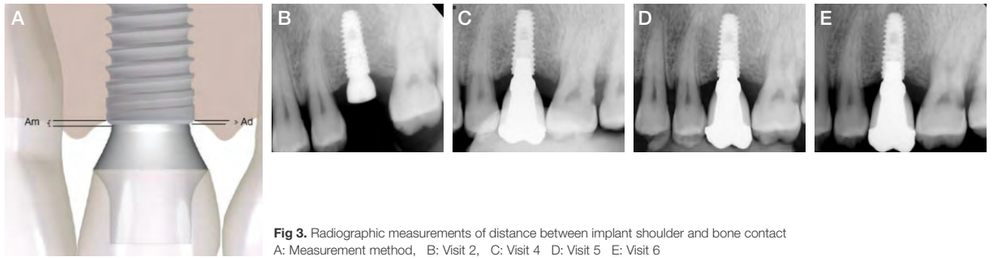
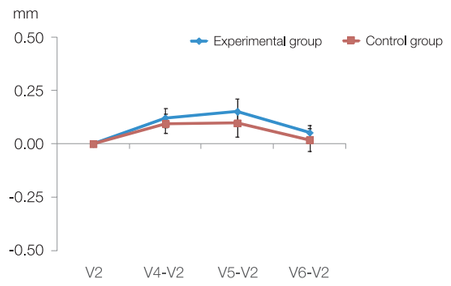


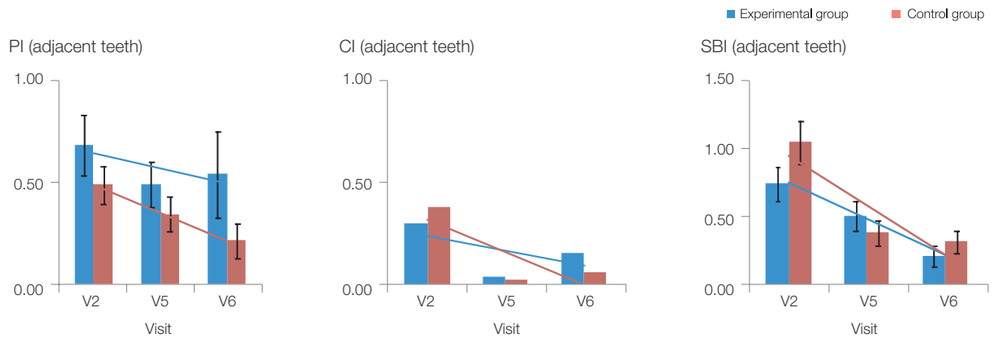
Fig 3. Radiographic measurements of distance between implant shoulder and bone contact
A: Measurement method, B: Visit 2, C: Visit 4 D: Visit 5 E: Visit 6

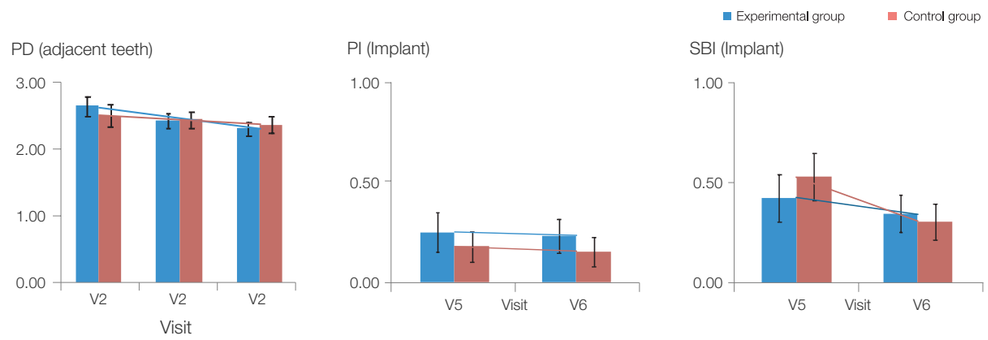


	N	Mean	Std. Deviation	Min	Max
Control group					
V2	24	0.00	0.00	0.00	0.00
V4-V2	24	0.10	0.05	-0.22	0.77
V5-V2	24	0.10	0.06	-0.64	0.56
V6-V2	24	0.02	0.05	-0.96	0.56
Experimental group					
V2	25	0.00	0.00	0.00	0.00
V4-V2	25	0.12	0.04	0.00	0.00
V5-V2	25	0.15	0.06	-0.30	1.39
V6-V2	25	0.05	0.03	-0.30	1.51

Fig 4. Comparison of marginal bone level(the distance between the implant shoulder and the first visible bone contact) changes among V2, V4, V5 and V6 Mean marginal bone loss was 0.05 ±0.03mm and 0.02 ±0.05mm after 12-month in Ca-SA and Bone level, respectively. There was no significant difference between the two groups (p>0.05).

Soft tissue analysis; plaque index, calculus index, sulcus bleeding index, probing depth





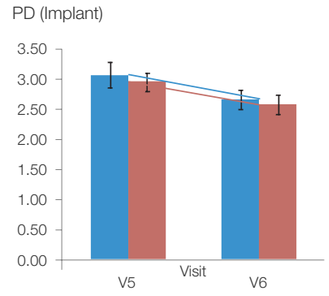


Fig 5. Comparison mean soft tissue analysis among postoperative visit(V4, V5 and V6) PI, CI, SBI, and PD of adjacent teeth showed a gradual decrease, especially at 6-month (V5) after implantation CI and SBI is significantly decreased in both groups (P<0.05). PI of the implant did not change at 6-12 months postoperatively, but SBI and PD showed a decreasing trend. In particular the reduction of PD showed a decreasing trend. In particular the reduction of PD showed significant difference in group of control group (P<0.05). Overall, the two groups did not differ significantly in soft tissue analysis of adjacent teeth (P<0.05).

Conclusions

There were no significant differences in the clinical outcomes between the two groups at 12-month after early loading. At the time of implant placement, subjects for available early loading are 90.9% and 90.6% in the test and control group. In early loading implant, the success rate after 1 year of follow-up was 96.4% for both implant systems except loss of follow up. "This study was supported by a grant of the Korea Healthcare technology R&D Project, Ministry for Health, Welfare & Family Affairs, Republic of Korea. (A120092)"

Case Report of Guided Bone Regeneration in Dehiscence-Type Defects Using Hydrophilic Surfaced Implant (TSIII CA) and SmartBuilder

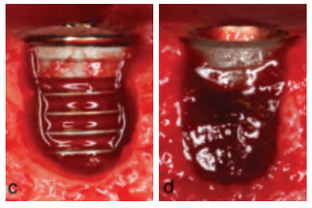
Yong-Jin Kim, Young-Jin Park, Kyung-Tae Park

Scientific Poster, Osstem Meeting 2013

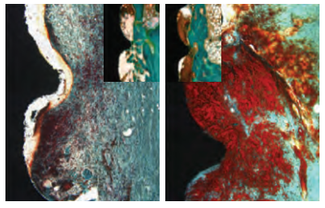
Objective

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 hydrophilic 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 ehiscence-type defects using hydrophilic surfaced implant (TSIII CA) and SmartBuilder.

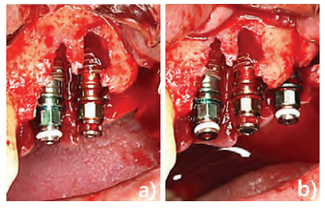
Why Hydrophilic Surface in GBR ?



NanoTite Collapsed Clot SLActive Stabilized Clot



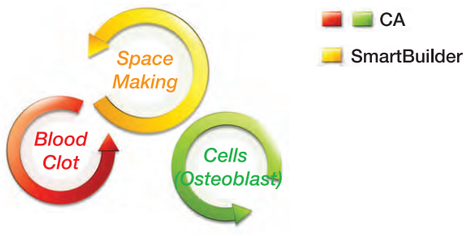
SLA Collapsed Clot SLActive Stabilized Clot



a: Situation at 3 min. b: Situation at 5 min.

TSIII SA Collapsed Clot / TSIII CA Stabilized Clot

THREE Important Factors for Bone Regeneration



Study Design (Case Report)

Age / Sex : 55Y / M
Chief complain : #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

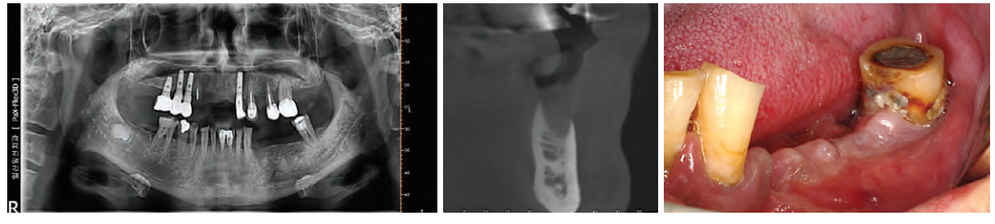


Fig. 1~3. Pre-operative radiograph & Intra-operative view

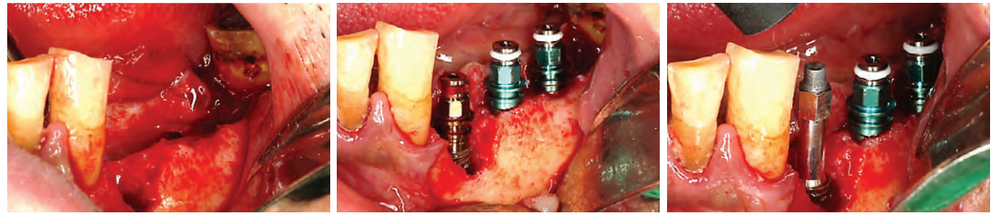


Fig. 4~6. Full thickness mucoperiosteal flap was elevated with crestal incision and one vertical incision on the buccal side of the residual alveolar ridge mesially. Buccal bone defect of #34 extraction socket was observed. TSIII CA implant 4.0x11.5mm was installed at #34 extraction socket. Insertion torque was 30NCm and ISQ value was 71.

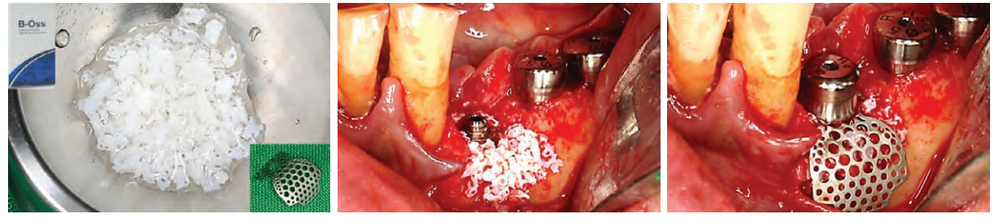


Fig. 7~9. B-Oss was soaked with normal saline and SmartBuilder (2 wall augmentation)was trimmed with Iris scissors. B-Oss was grafted on the exposed TSIII CA implant and SmartBuilder was placed. Healing abutment for SmartBuilder was connected.
The mucoperiosteal flap was closed using 4-0 Blue Nylon.

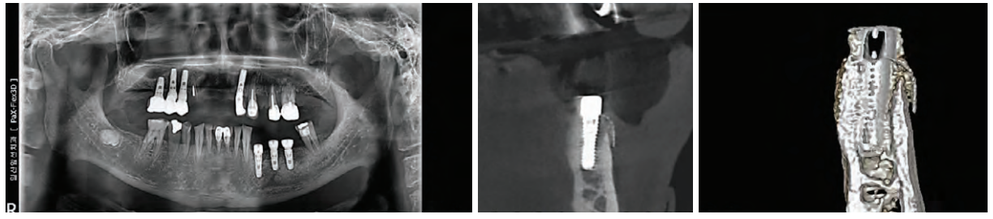


Fig. 10~12. Post-operative radiograph
It was observed that bone graft material was well maintained under SmartBuilder. In addition, the contour of bone graft was also well maintained because of the rigidity of SmartBuilder.

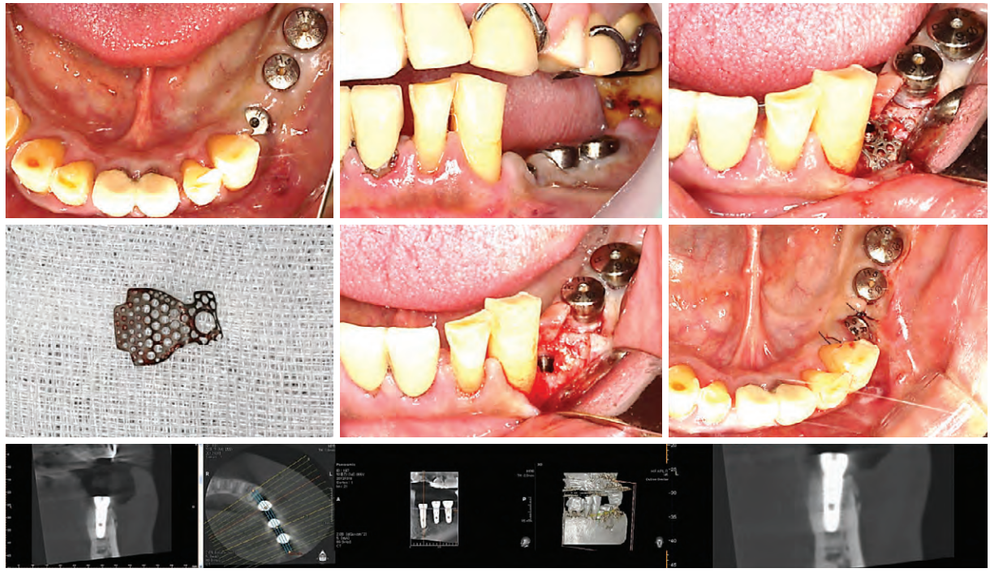


Fig. 13~21. 2nd-operative radiograph & Intra-operative view
2nd stage surgery was done 14 weeks after implant placement. During the healing period, SmartBuilder was not exposed. Mucoperiosteal flap was elevated with crestal incision and SmartBuilder was removed. Bone regeneration around the TSIII CA implant was observed. Healing abutment (5x5mm) was connected and the mucoperiosteal flap was closed using 4-0 Blue Nylon.

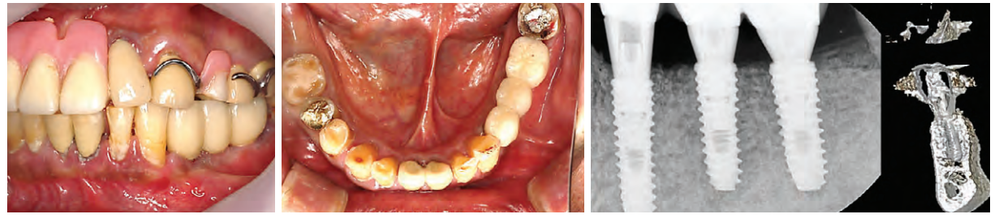


Fig. 22~24. Final prosthetic treatment was done 16 weeks after implant placement. Gingival condition around implants looks healthy.

Conclusions

Three important factors for bone regeneration are space making, presence of blood clot and cells (osteoblasts). The hydrophilic 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 graft materials. Its rigidity prevents contour collapse, its elasticity prevents mucosa compression, and its stability prevents graft displacement. Thereby, an essential prerequisite for bone graft integration, ie, 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

Retrospective clinical study of new tapered design implants(TSIV) in maxillary posterior areas

Moon-Jung Jang, Pil-Young Yun, Young-Kyun Kim

Oral Biology Research 2013;37(2):105-111

Purpose

The aim of the present study was to evaluate the clinical outcome of new tapered design implants installed in maxillary posterior areas.

Materials & Methods

From Jun 2011 through October 2012, 17 patients (14 men, 3 women) treated with tapered implants (Osstem TS IV) were considered. Thirty-eight implants (6 premolar and 32 molar) were placed in maxillary posterior areas. Implant stability and crestal bone loss were measured.

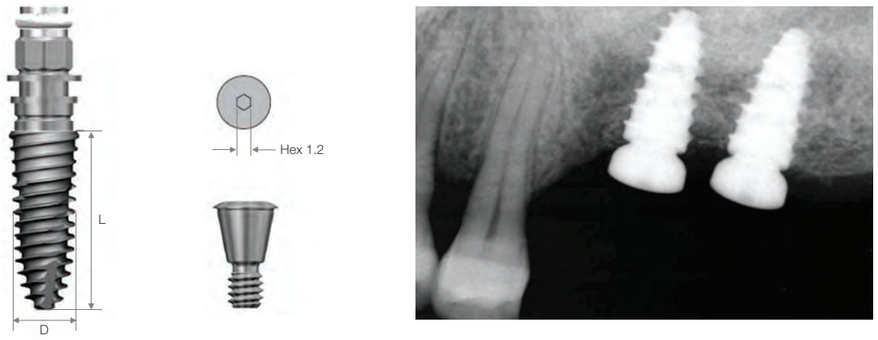


Fig.1. Osstem TS IV implant. A: Diagram of Osstem TS IV implant; D: diameter, L: length. B: Periapical view of Osstem TS IV impant.

Results

The implant stability quotient value was 59.9 at implant placement and 70.5 at the second surgery, indicating a significant difference. Mean crestal bone loss was 0.15±0.15 mm (no sinus elevation group: 0.10±0.13 mm; sinus elevation and simultaneous group: 0.16±0.15 mm; sinus elevation and delayed group: 0.20 ±0.19 mm). There was no significant difference according to sinus elevation or between the simultaneous group and delayed group. The success rate was 97.4%, and the survival rate was 97.4%.

Table 1. Number of Implant according to Implant Length and Diameter

Length (mm)	Diameter (mm)			
	4	4.5	5	Total
8.5			3	3
10.0	2	3	13	18
11.5	2		14	16
Total	4	3	30	37

Values are presented as number.

Table 2. Initial Stability

Initial Stability (ISQ)	Value
≤39	5
40-49	4
50-59	3
60-69	8
70-79	11
≥80	1
Total	32

Values are presented as number. ISQ : implant stability quotient.

Table 3. Secondary Stability

Secondary Stability (ISQ)	Value
≤59	1
60-69	5
70-79	7
≥80	1
Total	14

Values are presented as number. ISQ : implant stability quotient.

Table 4. Crestal bone Loss according to Surgical Procedure

Surgical procedure	Value
No sinus elevation	7 (0.10±0.13)*
Sinus elevation	28 (0.17±0.16)*

Values are presented as number or mean±standard deviation (mm).
* No statistically significant difference by surgical procedurer (p=0.196).

Table 5. Crestal bone Loss according to Timing of Implant Placement

Timing of implant placement	Value
Sinus elevation+Immediate	22 (0.16±0.15)*
Sinus elevation+Delayed	6 (0.20±0.20)*

Values are presented as number or mean±standard deviation (mm).
* No statistically significant difference by timing of Implant Placement (p=0.690).

Conclusion

New tapered design implants should be applied to maxillary posterior areas.

TSIII SA implant installation accompanying sinus lift with lateral approach; a case report

Gi-Young Seo, Jae-Kook Cha, Jae-Hong Lee, Jung-Seok Lee, Ui-Won Jung, Seong-Ho Choi, Kyoo-Sung Cho, Jung-Kiu Chai, Chang-Sung Kim

Scientific Poster, Osstem Meeting 2015

Introduction

Loss of maxillary molar teeth leads to rapid resorption of bone in the alveolar process below the maxillary sinus floor. The sinus floor augmentation procedure is one of the most predictable grafting procedures available for placing dental implants in the severely atrophic posterior maxilla. Sinus augmentation is classified according to residual alveolar bone height. When the residual bone height is 3~4 mm, 1-step lateral approach is recommended.

Purpose

This clinical case report presents patient subjected to a maxillary sinus lift (Lateral approach) and immediate implant placement (TSIII®) with synthetic bone grafting.

Materials & Methods

Right maxillary molar and premolar teeth (Teeth number 17, 16, 15, 14) were missing state. In pre-surgical computed tomographic scan images, residual bone height was about 3.3 mm. First stage implant surgery was performed using TSIII® with sinus lift. Lateral approach for the open-window method using round bur and for sinus lifting with placement of alloplast (Osteon II®) was carried out. Second stage surgery was performed after 4 months of healing.

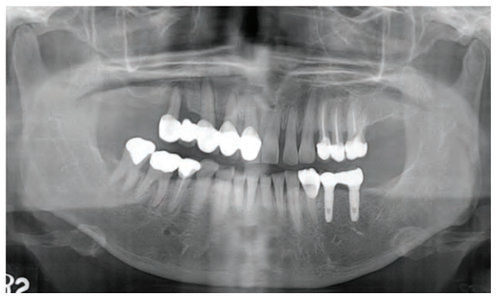


Fig. 1. Pre-operative panoramic view.

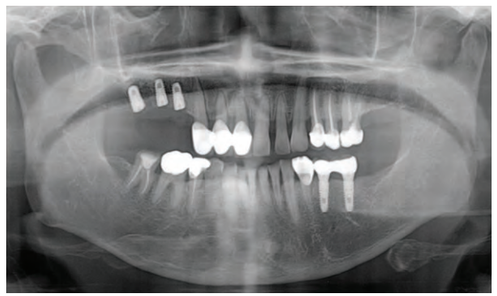


Fig. 2. Implant fixture installation on panoramic view.

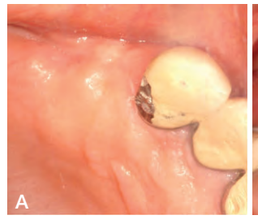


Fig. 3. Pre-operative clinical photo. A: Occlusal view. B: Lateral view.

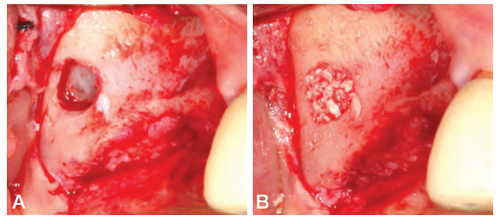


Fig. 4. Sinus lift with lateral approach. A: Right sinus window opening. B: Bone grafting

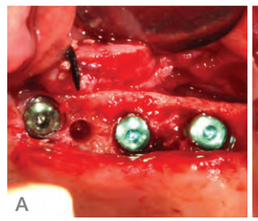


Fig. 5. TSIII · Implant installation. A: Occlusal view. B: Lateral view.

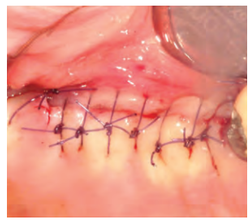


Fig. 6. Suture

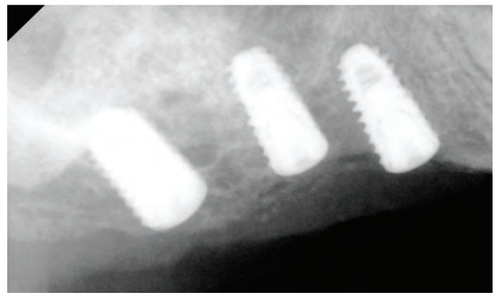


Fig. 7. Implant installation on peri-apical X-ray view.

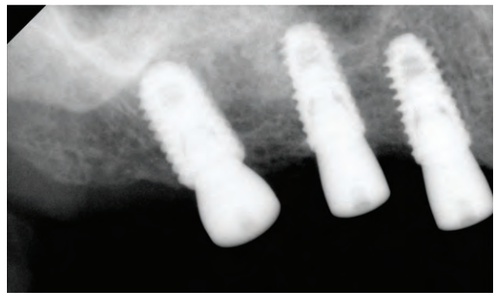


Fig. 8. Second stage surgery after 4 months.

Results

There were no surgical complications such as sinus membrane perforation. Achieving initial implant stability and maintaining parallelism are major concerns in implant placement, especially when implants are placed in less than 5 mm of bone. The case report demonstrates that TSIII® implant installation on augmented ridge showed competent initial stability (30N). In addition, periotest value (PTV=-6.8) measured during second surgery reflected successful osteointegration.

Conclusions

Sinus augmentation with simultaneous implantation (1-step lateral approach) was a predictable technique with low surgical morbidity that allows shorter healing times in patient with reduced bone height.

Sinus Bone Grafting with Simultaneous Implant Placement in Case of Residual Bone Height Less Than 4mm Using TSIII SA Implant

Yong-Jin Kim, Young-Jin Park, Kyung-Tae Park

Scientific Poster, 22nd Congress of EAO 2013

Objective

Sinus bone grafting and implant placement are predictable treatment options for pneumatized maxillary sinus and severely resorbed maxillary posterior reconstruction. A minimum of 4~5 mm of residual bone height is traditionally recommended for the one-stage surgical procedure of sinus bone grafting and implant placement to ensure initial stability from preexisting residual bone. I would like to report the survival rates of the TSIII SA implants simultaneously placed into grafted maxillary sinus where the residual alveolar bone height was less than 4mm.

Materials & Methods

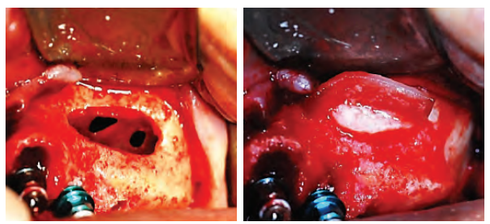
- From Jan. 2010 through Sep. 2012
- Average follow-up : 15.8 ±7.1months after the implant placement (Min. 188 day~Max. 1,003 day)
- Implant / Bone graft material : TSIII SA / OsseOss
- Site : Posterior maxillary bone deficiency / Residual alveolar bone height 1~4 mm
- Medical History : Those with controlled medical conditions

Table 1. Patient & Implant Information

	Male	Female	SUM
Patient	48	32	80
Age	54.6±8.4	59.0±11.1	55.7±9.7 (29y~79y)
Implant	110	58	168

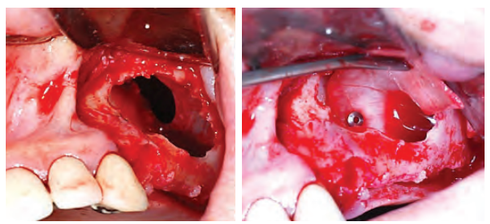
Perforation management

- Perforation size<5mm



Bovine collagen membrane
(Lyoplant ®, B.Braun Surgical GmbH, Germany) was used.

- Perforation size>5mm



Bovine collagen membrane
(Lyoplant ®, B.Braun Surgical GmbH ,Germany) was fixed to sinus medial wall with titanium pin (TruTACK®, ACE Surgical Supply, USA) to obtain membrane security.

Time Schedule for Second Surgery and Prosthodontic Treatment

2nd stage surgery was performed about 5.57 months (Min. 112 ~ Max. 409day) after implant placement. Marginal bone level, implant mobility, and presence of fistula were examined. Final impression was taken 1 or 2 weeks after 2nd stage surgery.

In other words, final prosthetic performed about 6.23 months (Min. 139 ~ Max. 423 day) after implant placement. All patients were treated with a fixed implant-supported prosthesis for final restoration. The final tightening torque of abutment was 30Ncm. The screw-retained porcelain fused metal or gold crown was fabricated for definitive restorations.

Results

Table 2. Systemic disease, 80 patients 20 (25%)

Controlled DM	HTN	Rheumatoid and depression	Prostatic hypertrophy and hyperlipidemia
6	14	1	1

Table 3. Smoking status, 80 patients 16 (20%)

Diameter	1~2 Pack	2 Pack~
8	7	1

Table 4. Site distribution

Diameter	4.0	4.5	5.0	6.0	7.0		SUM
Length			11.5				
#14	1	-	-	-	-	1	80
#15	4	4	1	1	-	10	
#16	-	12	21	5	1	39	
#17	-	6	16	7	1	30	
#24	2	-	-	-	-	2	88
#25	4	4	-	2	-	10	
#26	-	13	28	4	-	45	
#27	-	5	22	4	-	31	
SUM	11	44	88	23	2		168

Table 5. Residual alveolar bone height (mm)

0~1mm	1~2mm	2~3mm	3~4mm
12 (7%)	46 (28%)	61 (37%)	47 (28%)

Table 6. Implantation types / Bone Density

Non -Submerged	Submerged	Normal	Soft
13 (8%)	155 (92%)	124 (74%)	44 (26%)

Table 6. Implantation types / Bone Density

Non -Submerged	Submerged	Normal	Soft
13 (8%)	155 (92%)	124 (74%)	44 (26%)

Table 7. Insertion Torque

~10Ncm	11~20Ncm	21~30Ncm	30~40Ncm
17(10%)	59 (35%)	83 (49%)	9 (6%)

Table 8. Placement of site conditions (Perforations)

Good	Incomplete healing	Immediate Extraction
124 (10, 8%)	34 (10, 29.4%)	10 (4, 25%)

Table 9. Sinus membrane perforations during the operation 80 patients 10 (12.5%) / 168 sites 24 (14.2%)

< 5mm	> 5mm
8 patients 20 sites	2 patients 4 sites

Table 10. Cumulative survival rates (Mean F/up 15.8±7.1months)

Survival	Fail
167 (99.4%)	1 (0.6%)

Conclusions

Sinus bone grafting with simultaneous implant placement can be used to treat the atrophic maxilla in patients irrespective of residual bone when careful surgical methods and taper designed implants are used. Immediate sinus bone grafting with simultaneous implant placement can reduce the number of surgeries and overall treatment time. Membrane perforation did not have an adverse effect on implant success if the membrane was properly repaired.

In this study, even a short period of time, but the cumulative survival rates were 99.4% with an average follow-up of 15.8 ±7.1 months. So, it is concluded that sinus bone grafting with simultaneous implant placement in case of residual bone height less than 4mm could be considered as a predictable procedure.

Subjective Satisfaction of Clinician and Short-Term Clinical Evaluation of Osstem TSIII SA Implant

Young-Kyun Kim, Ji-Hyun Bae

J Korean Cilnical Implant 2010;30(7):430-43

Objective

Recently Osstem implant released a new product line, TSIII SA, which is processed by sand blasting using alumina and acidetching.
This new implant features a tapered design, with an open thread equipped on top to minimize necrosis of the alveolar bone, while 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
Therefore, the authors investigated the clinical benefits of this brand-new implant by evaluating the subjective satisfaction of clinicians and the short-term clinical outcome after the installation of TSIII SA implants in 41 medical centers that are actively involved with dental implantation nationwide, and we are reporting the results.

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 frequently implanted areas, and prosthodontic treatments were carried out 3 to 4 months after the installation regardless of the installation region. 262 cases were completed with prosthodontic 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 questionnaire 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 easy was it to secure the initial fixation?
(3) How effective was the cutting ability of the implant into the bone tissue?
(4) Clinician's compliance with the implantation procedure
(5) Failure of the implantation in the early stage and the bone's response
(6) 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 99.6%. 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 installation 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 response.
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 maxillar, 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.

Alveolar bone reconstruction using TSIII and Titanium mesh : a case report

Ki-Ho Kim, Hyun-Woo Kim, Hwa-Sun Lee, Byung-Ok Kim, Sang-Joun Yu

Scientific Poster, Osstem Meeting 2015

Introduction

Reconstruction of the bone defect is an important factor in implant installation. Of the many techniques that are introduced, GBR(Guided bone regeneration) is most commonly used.
Wang et al. proposed a PASS principle for the predictable GBR, of which 'space creation / maintenance' is a difficult principle to fulfill in large bone defects.
GBR using titanium(Ti)-mesh has the advantage of 'space creation / maintenance' in the reconstruction of large bone defects due to the firmness of Ti-mesh.
In this case report, GBR using Ti-mesh technique and its follow-up of a patient with a large vertical and horizontal bone defect is presented.

Case Description

A 53 year-old male patient was referred for multiple implant in the lower jaw (#36,37,46,47) and upper jaw (#17,16,12,22,23,25,26,27).

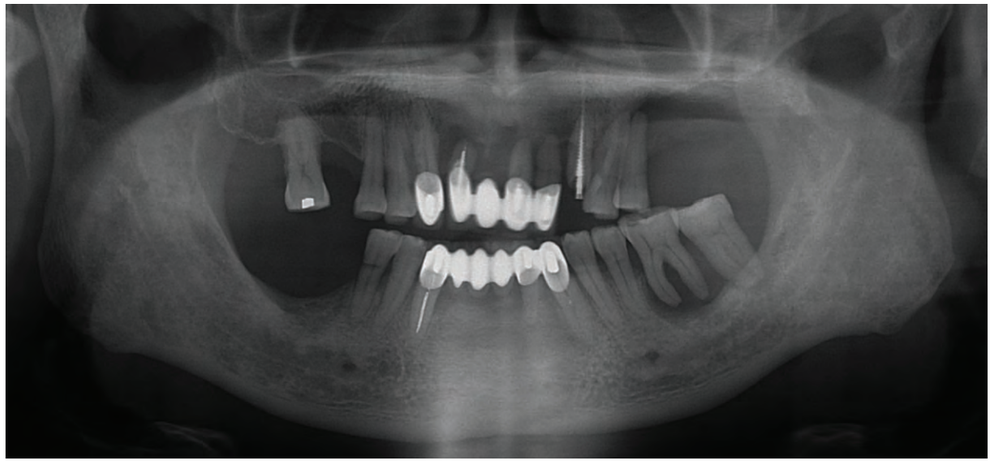


Fig.1. Panoramic radiograph at initial examination
Alveolar bone loss is observed in multiple teeth and the post is exposed at #23 due to crown fracture.

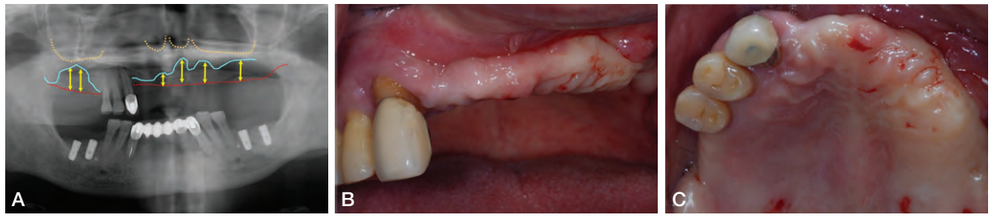


Fig.2. Extraction of teeth and implant installation at the lower jaw
The planned pre-implant area of the upper jaw shows severe vertical and horizontal bone loss.

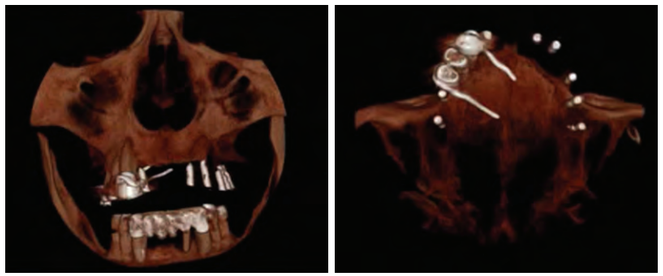
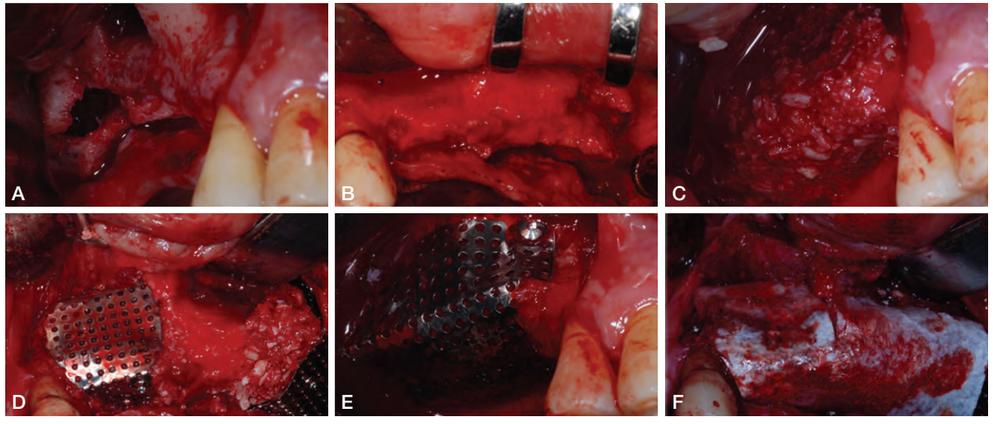


Fig.3. 3D model using computerized tomography after placing upper stent
A large vertical and horizontal bone reconstruction is needed for implant.

For the reconstruction of the large bone defect of the upper jaw, GBR with maxillary sinus lift was performed on each side. Allograft(Allo-Oss, CG Bio, South Korea) was used for bone graft.



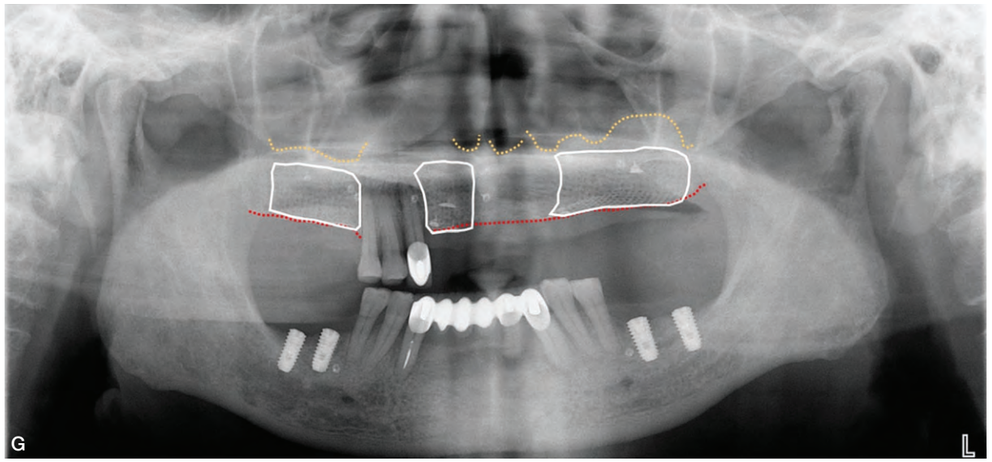


Fig. 4. Maxillary sinus lift and GBR #16,17 (A,C,E). #12,22,23,25,26,27 (B,D,F)
A~B: Bone defect before surgery
C: Repair of bone defect using Allograft-PRF mixture
D~E: Fixation of Ti-mesh with bone tack after repair with graft material
F: Fixation with bone tack after applying an absorbable membrane on the Ti-mesh
G: Panoramic radiograph after maxillary sinus lift and GBR

Based on the CT analysis at 6 months post-operation, a vertical bone augmentation of 4.1-7mm and a horizontal bone augmentation of 5.7-12.4mm was shown. For the horizontal bone augmentation, a maximum of 2mm of graft resorption was observed.

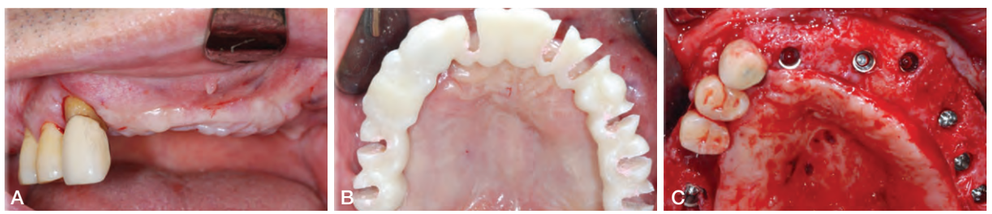


Fig. 5. 1st surgery after Ti-mesh removal after 6 months
A: Vertically reconstructed alveolar ridge can be observed
B: All the stent holes are placed within the reconstructed arch
C: Implant(Osstem TSIII, Osstem Implant, South Korea) installation after Ti-mesh removal. All implants were installed at 1-1.5mm below the crest with more than 3mm of bone at the buccal side

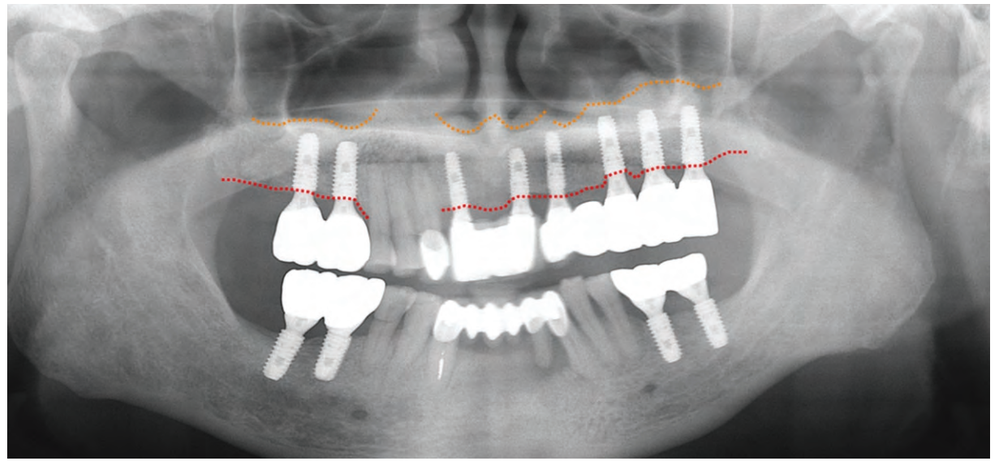


Fig. 6. Final prosthesis
Final prosthesis was placed after using temporary teeth for 8 months while no change in the alveolar crest level was observed.
The patient is currently being follow-up for 4 months after placing final prosthesis.

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.

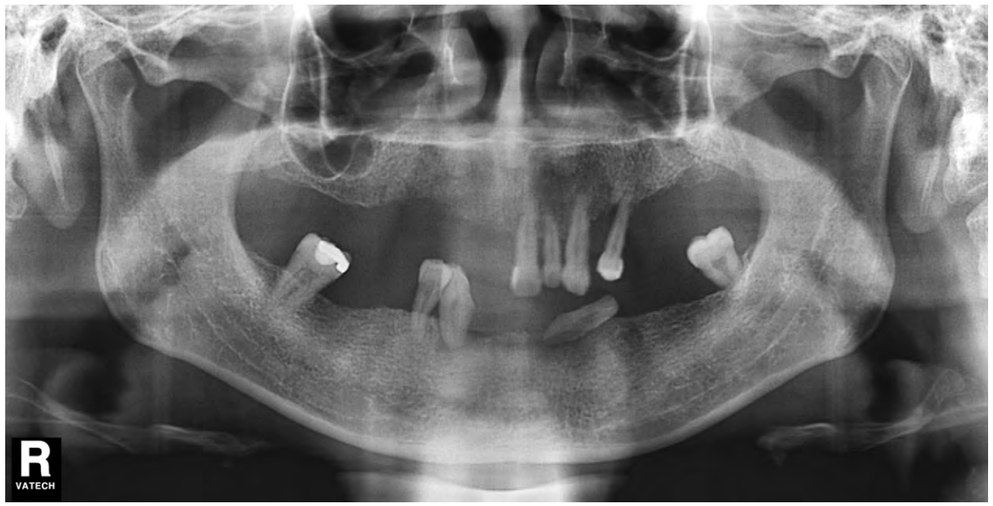
Study Design (Case Report)

- Immediate Removable Complete Denture
- CAD / CAM Surgical Guide : OsstemGuide
- CAD / CAM Provisional restoration
- Convertible Abutment, Lateral fixation screw
- CAD / CAM full Zirconia prosthesis

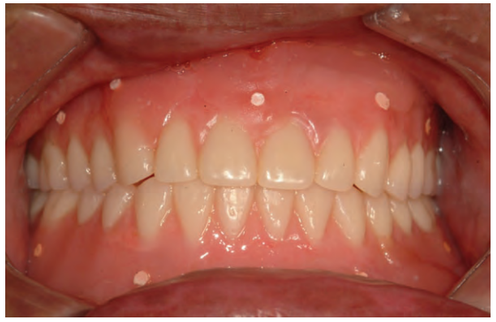
Conclusions

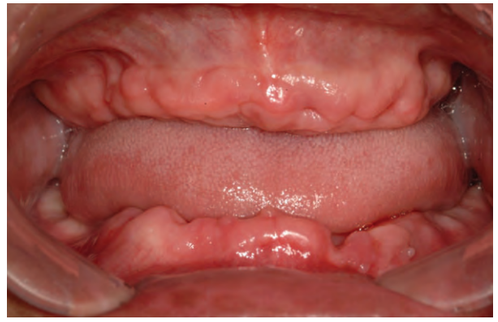
The advantages of this procedure, for the completely edentulous arch, include (1) shorter surgery times, (2) shorter treatment times, (3) less invasive, flapless surgery and, therefore, less chance of swelling, less pain, and faster healing

Pre-surgical Procedure :
Extraction and Immediate Removable Complete Denture

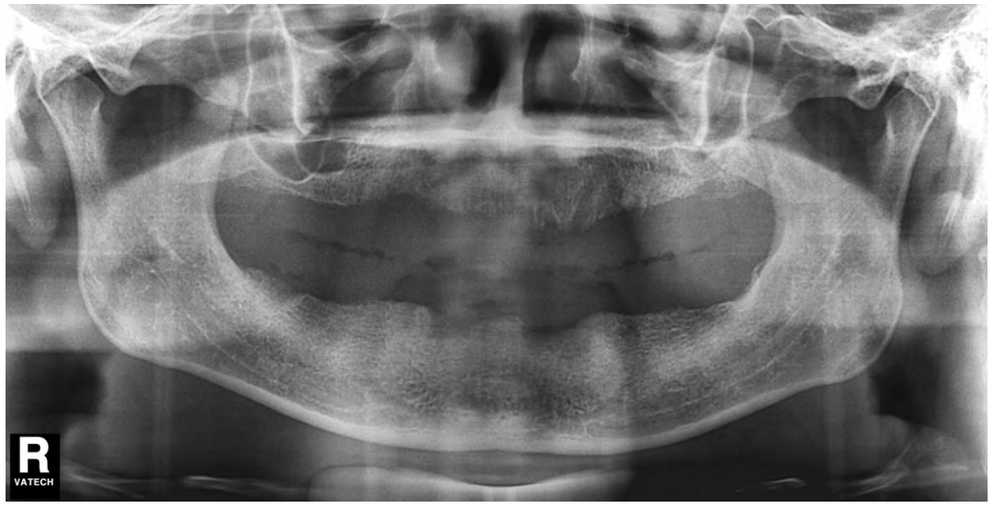


Before extracting the teeth, removable complete dentures are prefabricated on the teeth-removed-stone model.





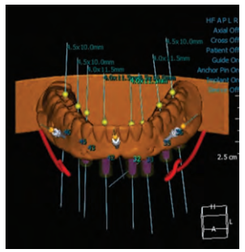
Patient with upper and lower immediate complete dentures for 2 months of healing period. Dentures were used as radiographic guide with radio-opaque markers randomly positioned at different levels for double CT scan .

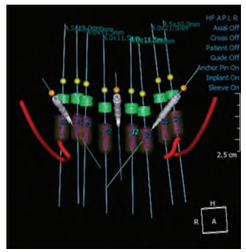


2 months after extraction.

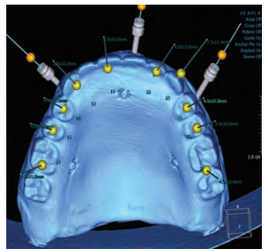
Pre-surgical Procedure:
CAD/CAM Planning and Fabrication of Surgical Guide and Surgical Index

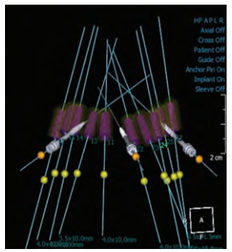
CAD/CAM planning for mandible.





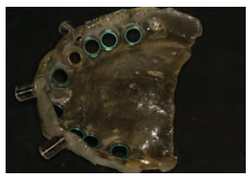
CAD/CAM planning for maxilla.

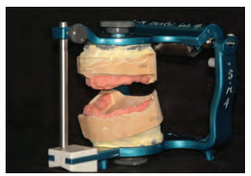


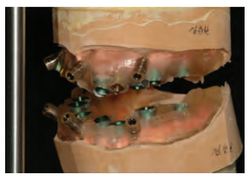


Osstem Guide software Planning Program allows for prosthetic guided implant positioning.

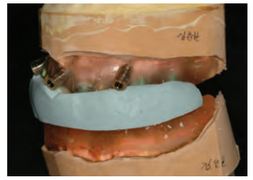
CAD/CAM manufactured surgical guides

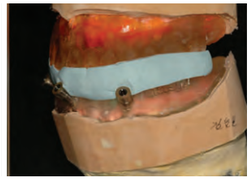






Upper and Lower Surgical Index

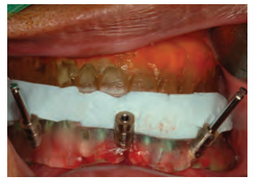


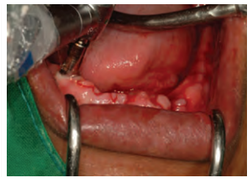


Using the surgical guides and radiographic guide duplications, stone casts are mounted on the semi-adjustable articulator. Then surgical indexes are made on the mounted casts.

Surgical Procedure: Flapless Implantation

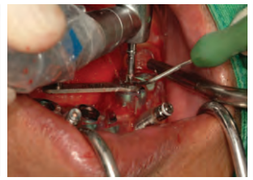
Flapless Tissue Punch

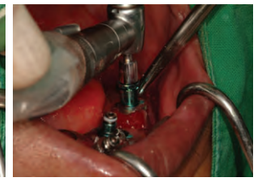




Surgical Guide oriented in the mouth using a surgical index fitted to the opposing radiographic duplication and stabilized with anchor screws.

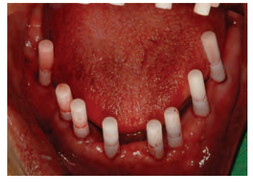
Installation of Osstem TSIII SA implants

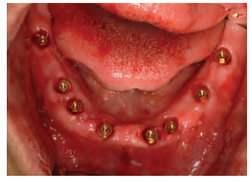




8 fixtures positioned and seated correctly on the sleeve of surgical guide.

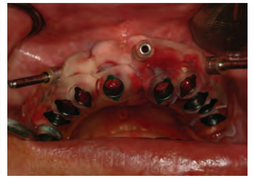
Convertible Abutments

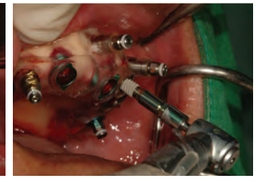




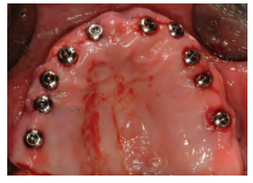
Minimally invasive guided surgery results in minimal postsurgical trauma of periimplant soft tissue.

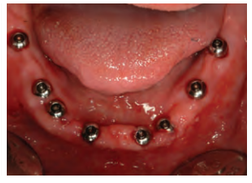
10 fixtures in maxilla



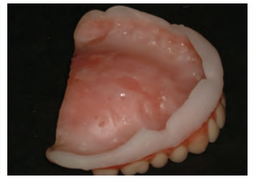


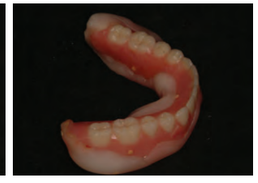
Precise osteotomy by Osstem Guide



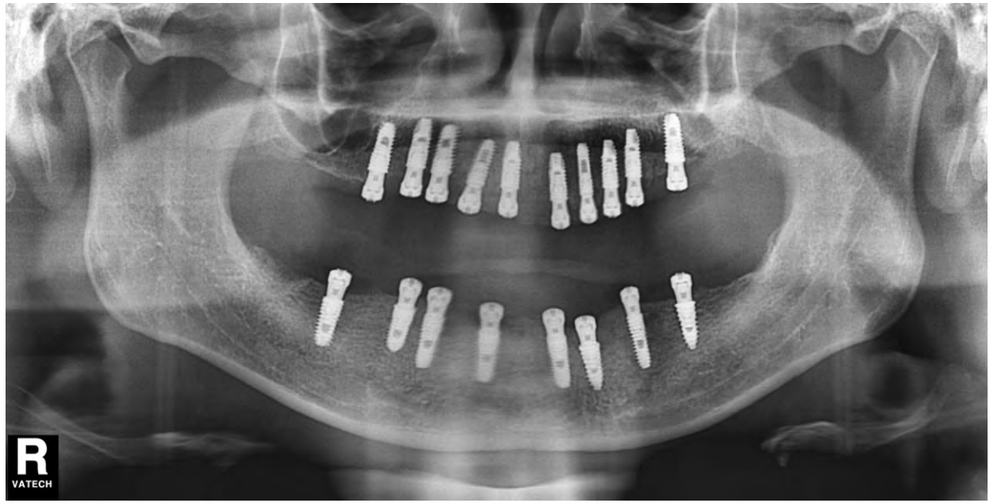


Healing Caps screwed into convertible abutments



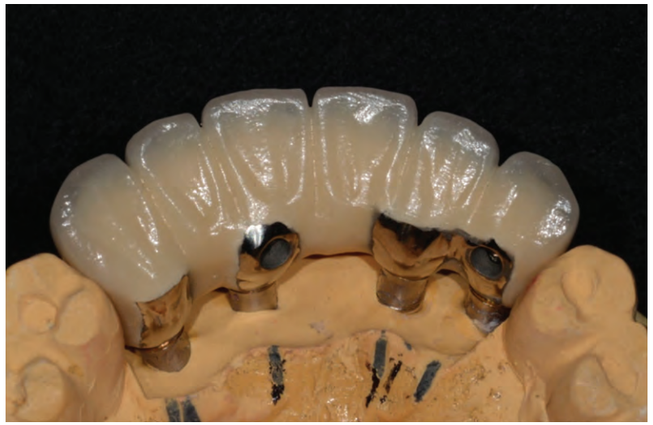


Relining of dentures with soft tissue conditioner

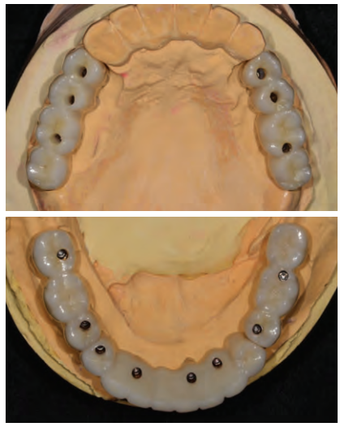


18 implants installed at the time of surgery

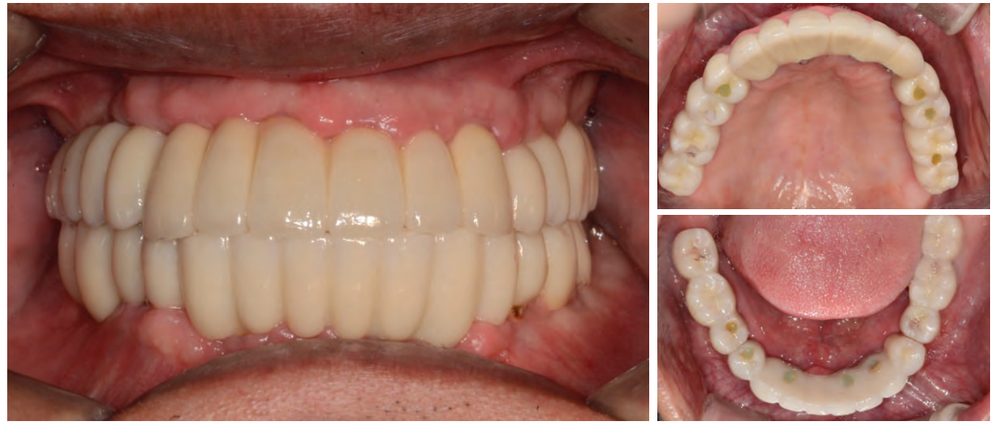
Prosthetic Procedure : CAD/CAM Provisional Restoration



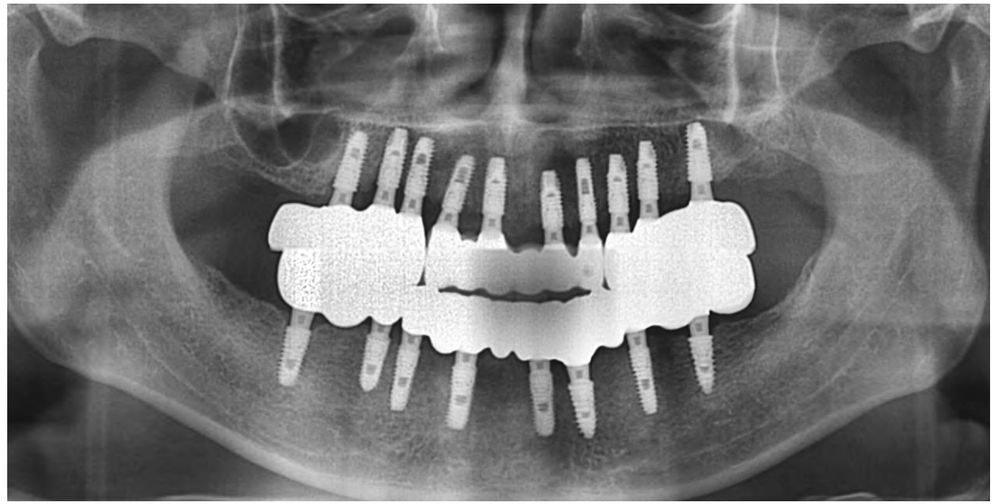
Lingual-screw-retained PFM bridge for Maxillary anterior implants



Screw-retained CAD/CAM full zirconia bridges



Screw-retained full mouth implant rehabilitation



Final radiograph

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

Hwee-Woong Park

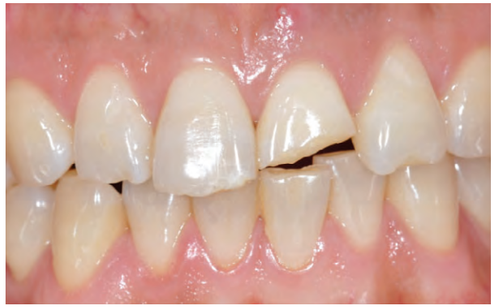
Scientific Poster, 21st Congress of EAO 2012

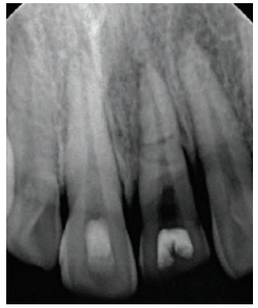
Objective

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)

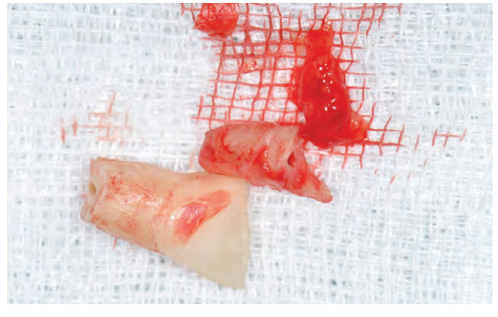
Patient age / sex : 28Y / male
C / C : Teeth fracture due to trauma
Clinical findings
- Crown fracture of maxillary anterior teeth
- Root fracture of Lt. central incisor
- Apical radiolucency and fistula



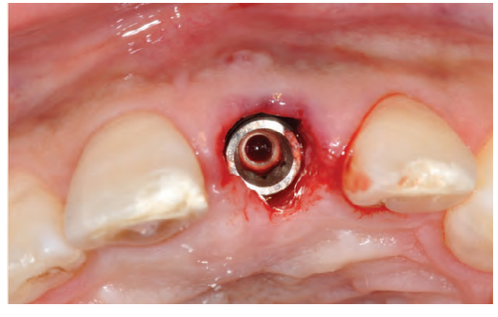


Surgery

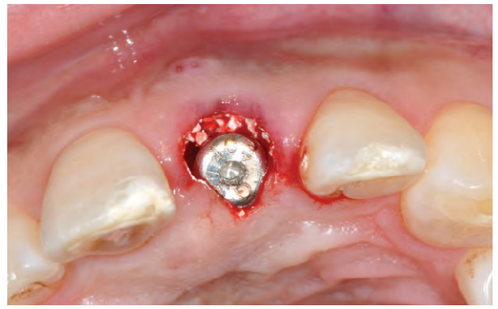
- #21 tooth was extracted with minimal trauma and the granulation tissue was removed.
- After careful drilling, a TSIII SA implant (4.0X13mm) was installed.
- Insertion torque was 25Ncm.
- The gap between the implant and the labial alveolar plate was filled with synthetic bone graft material (biphasic calcium phosphate).
- A short healing abutment was connected and a bonded temporary restoration was placed.



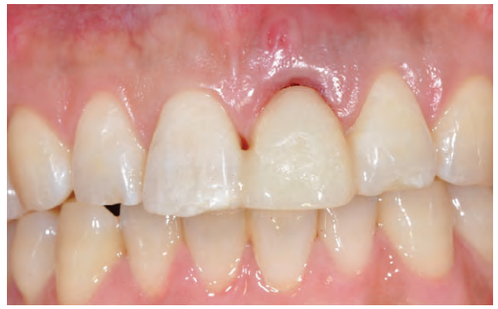
Extraction and curettage



Implant placement



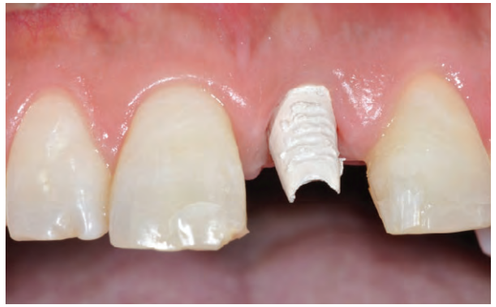
Gap filling with syhnthetic bone



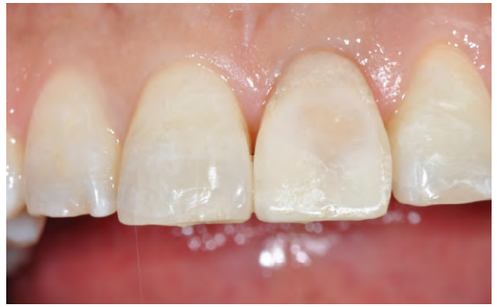
Temporary restoration

Provisional Restoration

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



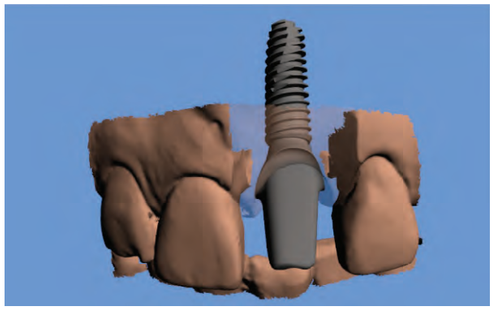
Temporary abutment

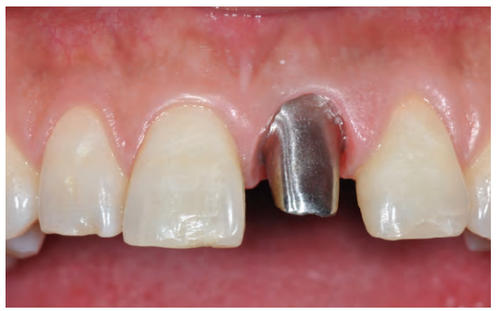


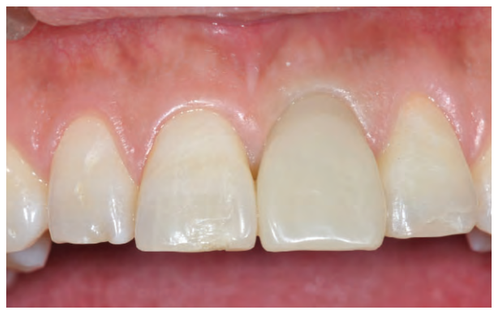
Provisional restoration

CAD/CAM Abutment

A SmartFit abutment was fabricated with a fixture-level impression and a cast.





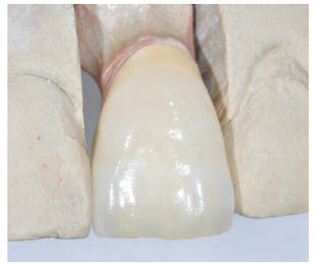


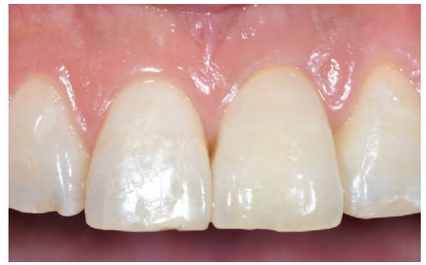
Abutment connection

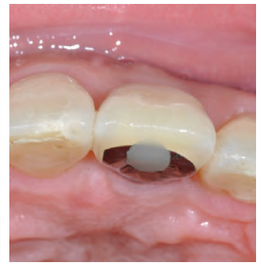
A new provisional

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

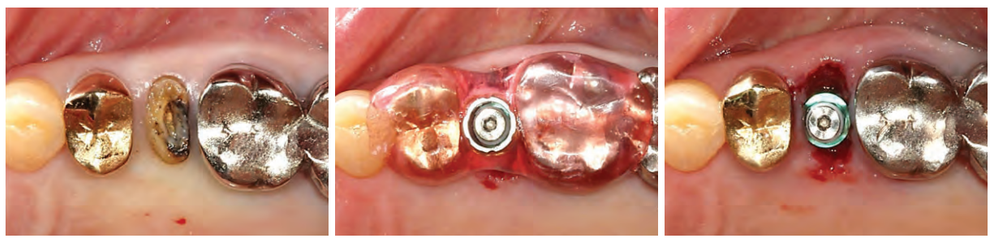
Objective

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.

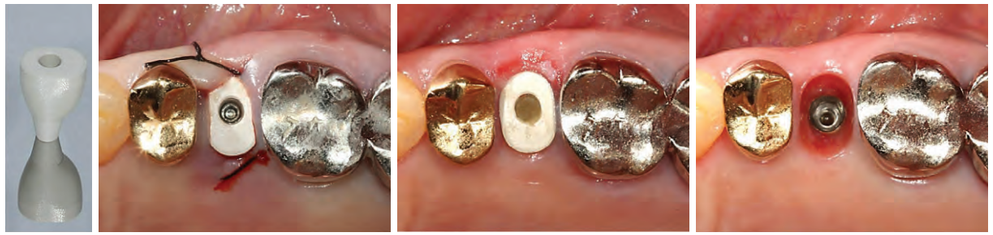
Usually, in such cases, cast-gold UCLA abutments have been used to make customized abutments. Note, however, that cast-gold UCLA abutments have limitations such as increased expenses, casting defects, variable quality depending on the technician's experience, and biocompatibility. These limitations will 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.

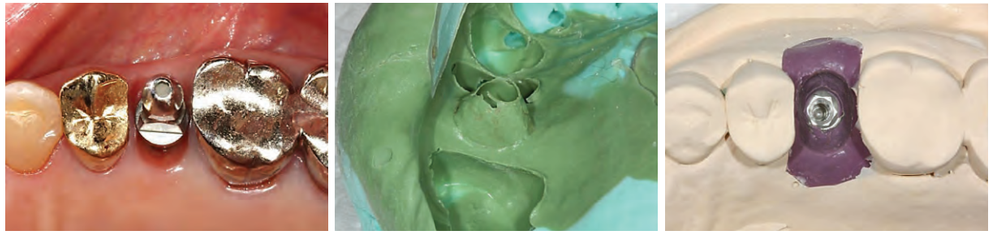
Study Design (Case Report)



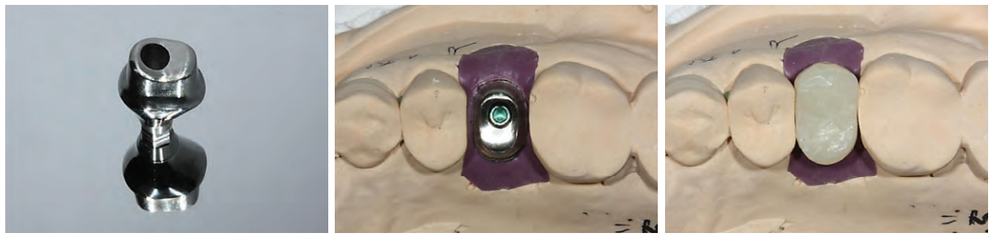
Maxillary premolar tooth with retained root was extracted. By using surgical guide, TSIII SA fixture (4X11.5) was placed in #25 missing area.



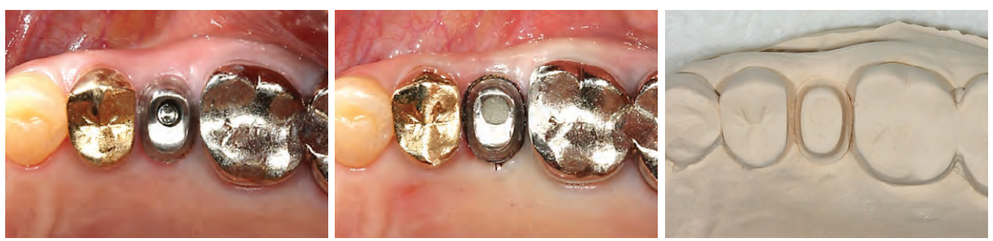
Custom healing abutment was connected in the fixture. Well-formed, oval-shape subgingival contour was made with soft tissue sculpting using Custom healing abutment.



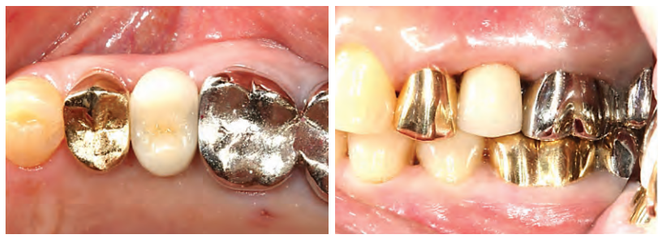
Fixture-level impression with transfer impression coping was taken very quickly for preventing slumping of formed soft tissue contour.
Subgingival contour was duplicated in the impression body. And Oval shape subgingival contour over #25 fixture was shown in working model.



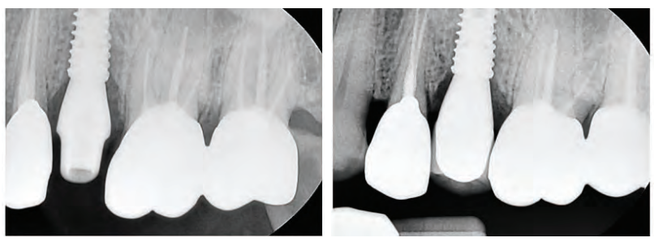
Patient-specific SmartFit abutment was manufactured by milling process in the Osstem CAD/CAM Center.
By using the transfer jig, delivered abutment was positioned on the working model and checked. Then provisional restoration was made on the model.



Through a transfer jig, finished SmartFit abutment was positioned onto implant.
After the provisional period, the abutment margin was exposed using the retraction cord, and then direct abutment level impression was made.



A Porcelain-veneered metal crown was made as final prosthesis.
Emergence profile of #25 final prosthesis is similar to that of adjacent natural tooth restoration.



Periapical radiographs of abutment and final prosthesis.

Conclusions

SmartFit abutment with Custom healing abutment provides 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.

A Case of Rehabilitation of Oral Function with Dental Implants Following Panfacial Bone Fracture

Hyung-Sik Do, Young-Il 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 maxillar 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 allogenic bone graft with dental implants to support fixed dental prosthesis in the mandible.

Study Design (Case Report)

1. Sex / Age : Male / 31
2. C.C : Panfacial fracture Missing teeth due to trauma
3. Clinical history : Patient was involved in a motor-cycle collision on september 9, 2011, and pelvic bone fracture, malar and maxillary bones fracture, mandibular symphysis fracture, laceration on tongue and chin. He also had laceration on right nasolabial fold, loss of several teeth, 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 allogenic bone graft 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

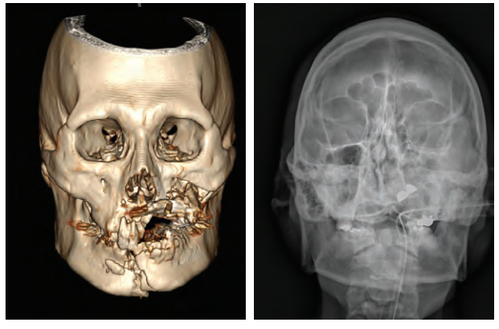


Fig. 1. Three-dimensional CT and Skull x-ray photo showing panfacial fracture. Maxilla and mandibular teeth were missing.

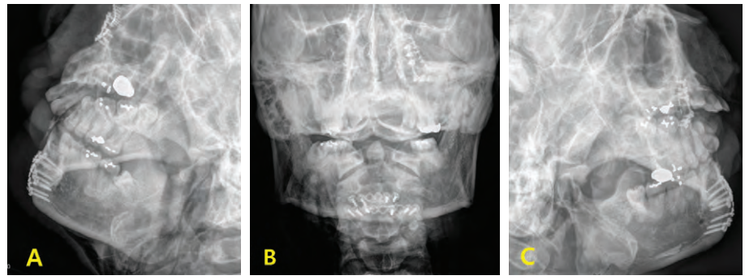


Fig. 2. Postoperative Skull x-ray photo showing open reduction and internal fixation on panfacial fracture.
A: Rt. lateral oblique mandibular x-ray photo B: Mandibular PA view x-ray photo C: Lt. lateral oblique mandibular x-ray photo

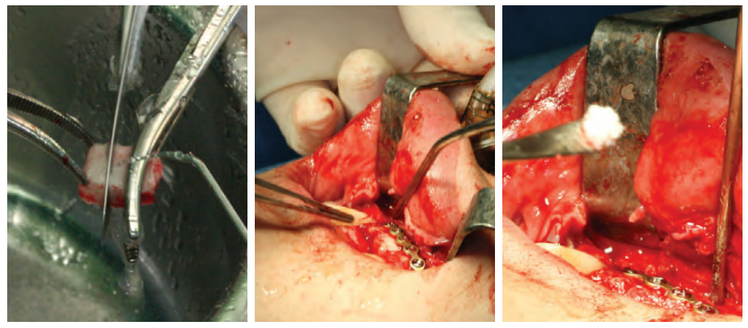


Fig. 3. Ramus block bone graft and allogenic bone graft on maxilla and mandible.

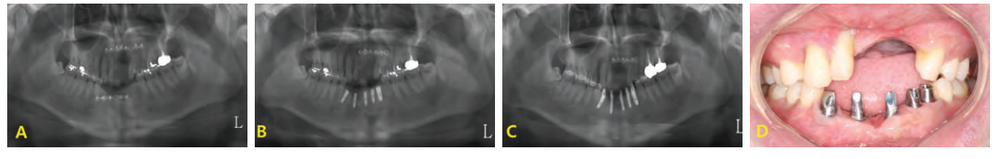


Fig. 4. A: Panoramic radiograph of block bone graft
B: Panoramic radiograph of dental implants after placement
C: Panoramic radiograph of dental implants with custom abutment
D: Intraloral view of dental implants with custom abutment

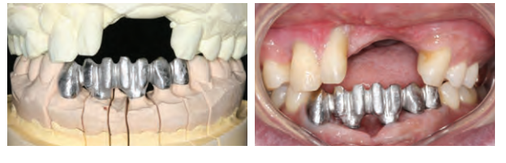


Fig. 5. Metal framework for mandibular implant supported restoration

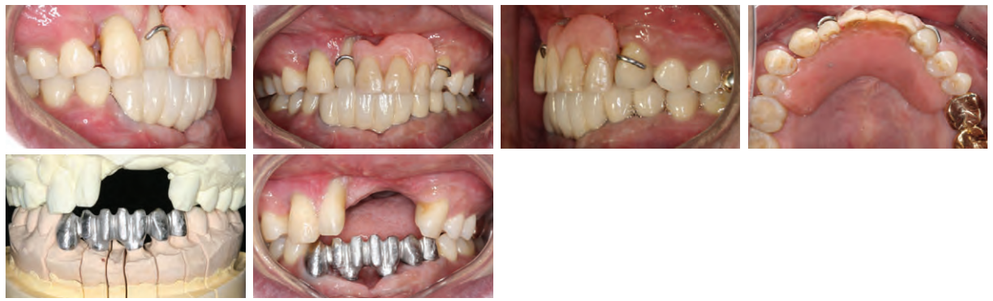


Fig. 6. Intraoral view and Extraoral view photo

Conclusions

This clinical report describes the prosthodontics treatment after the open reduction of a panfacial fracture. After the operation of such complex traumas, 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 upper jaw, we treated the patient with removable partial denture because of the alveolar bone and tissue deficiency.

A randomized controlled clinical trial of two types of tapered implants(TSIII HA) on immediate loading in the posterior maxilla and mandible.

Young-Kyun Kim, Jong-Ho Lee, Ji-Young Lee, Yang-Jin Yi

Int J Oral Maxillofac Implants 2013;28:1602-1611

Purpose

The aim of this study was to compare clinical outcomes and stability following immediate loading of two types of tapered implants in the partially edentulous posterior maxilla and mandible.

Materials & Methods

A randomized controlled trial with 1 year of follow-up was performed on participants missing two consecutive teeth in a posterior quadrant with tapered implants with a hybrid textured surface. Group 1 received Osstem TSIII HA implants, and group 2 received Zimmer TSV implants. Group 1 implants were 4.5 or 5.0 mm in diameter, and group 2 implants were 4.7 mm in diameter; all implants were 10 mm long.

Subjects received provisional restorations within 48 hours. Definitive restorations were provided 3 months (mandible) or 6 months (maxilla) later. Outcome measures were survival and success rates, marginal bone level change, implant stability quotient, and peri-implant soft tissue indices.

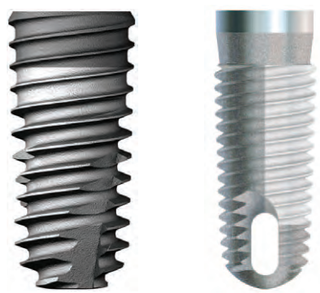


Fig. 1. Comparison of two implant systems with respect to collar design, thread design, and surface treatment. (Left) Osstem TSIII HA with hybrid surface treatment(group 1); (Right) Zimmer TSV(group2).

Results

Fifty participants completed the trial (group 1: 52 implants in 26 patients; group 2: 48 implants in 24 patients). The success rates were similar-98.1% in group 1 and 97.9% in group 2-at 12 months after immediate loading, but marginal bone loss was significantly different according to the implant design. Implant stability increased significantly in both arches. There were no significant differences in soft tissue indices between implant systems.

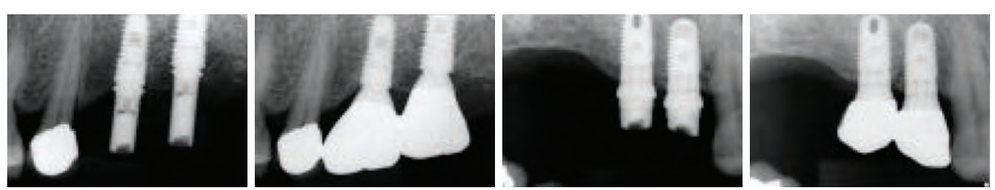


Fig. 2. Periapical radiographs taken(left) at the time of provisional crown connection and (right) at 1year after immediate loading in the maxilla. (Above) Group1 implants; (below) group2implants.

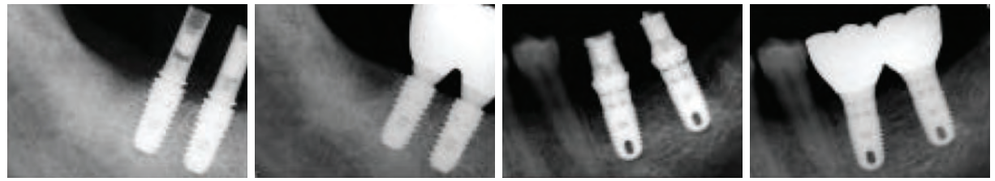


Fig. 2. Periapical radiographs taken(left) at the time of provisional crown connection and (right) at 1year after immediate loading in the maxilla. (Above) Group1 implants; (below) group2implants.

Table 1. Mean MBL (in mm) in Groups 1 and 2 at 1 Year After Immediate Loading

	Group 1 (n= 52)	Group 2 (n= 48)
MBL	0.05 (0.67)	1.25 (0.69)*
MBL†	-	0.63 (0.61)*

* *P*< .05 (Mann-Whitney *U* teat). † After placement depth adjustment (group 2 implants only).

Table 2. Mean MBL (in mm) in Groups 1 and Groups 2 by Arch 1 Year After Immediate Loading

Location	Group 1	Group 2
Maxilla	0.32 (0.67) (n= 22)	1.50 (0.76) (n= 24)*
Maxilla†		0.80 (0.73) (n= 24)*
Mandible	-0.16 (0.60) (n= 30)	1.00 (0.52) (n= 24)*
Mandible†		0.46 (0.41) (n= 24)*

* *P*< .05 (Mann-Whitney *U* teat). † After placement depth adjustment (group 2 implants only).

Table 2. Mean MBL (in mm) in Groups 1 and Groups 2 by Arch 1 Year After Immediate Loading

Location	Group 1	Group 2
Maxilla	0.32 (0.67) (n= 22)	1.50 (0.76) (n= 24)*
Maxilla†		0.80 (0.73) (n= 24)*
Mandible	-0.16 (0.60) (n= 30)	1.00 (0.52) (n= 24)*
Mandible†		0.46 (0.41) (n= 24)*

* *P*< .05 (Mann-Whitney *U* teat). † After placement depth adjustment (group 2 implants only).

Table 3. Mean ISQs of Groups 1 and Groups 2 in the Maxilla

	Group 1(n= 22)			Group 1(n= 24)			
	MD	BL	P†	MD	BL	P†	P*
Initial	75.40 (6.37)	72.71 (8.73)	<.05	76.67 (6.97)	76.23 (5.51)	NS	NS
3mo	84.78 (4.24)	84.88 (4.09)	<.05	82.45 (5.13)	82.53 (5.40)	NS	
P†	<.05	<.05		<.05	<.05		
*P**		<.05			<.05		

MD= mesiondistal; BL= buccolingual; NS= not significant. * Repeated-measures ANOVA; † Wlcoxon signed-rank test.

Table 4. Mean ISQs of Groups 1 and Groups 2 in the Mandible

	Group 1(n= 30)			Group 1(n= 30)			
	MD	BL	P†	MD	BL	P†	P*
Initial	78.41 (6.33)	77.89 (6.89)	NS	79.07 (6.46)	79.00 (5.63)	NS	NS
3mo	84.90 (4.32)	84.88 (4.32)	NS	82.92 (4.13)	82.76 (4.11)	NS	
P†	<.05	<.05		<.05	<.05		
*P**		<.05			<.05		

MD= mesiondistal; BL= buccolingual; NS= not significant. * Repeated-measures ANOVA; † Wlcoxon signed-rank test.

Conclusions

If high primary stability is acquired, tapered implants with hybrid textured surfaces are predictable for immediate loading in the posterior maxilla and mandible. In spite of the influence of implant design on marginal bone loss, all tapered implants showed successful clinical outcomes and stability in immediate loading.

Effect of loading time on marginal bone loss around hydroxyapatite-coated (TSIII HA) implants

Young-Kyun Kim, Kyo-Jin Ahn, Pil-Young Yun, Minkyoung Kim, Hong-So Yang, Yang-Jin Yi, Ji-Hyun Bae

J Korean Assoc Oral Maxillofac Surg 2013;39:161-167

Purpose

The objective of this study is to compare the rate of marginal bone resorption around hydroxyapatite-coated implants given different times in order to evaluate their stability.

Materials & Subjects

The study was conducted retrospectively for one year, targeting 41 patients whose treatment areas were the posterior maxilla and the mandible.

Table.1. Descriptive data for study groups.

	Number of patient	Number of implant
OSSTEM TSIII HA	17	33
Zimmer TSV-HA	24	41

Implant Placement & Loading

The study was conducted retrospectively for one year, targeting 41 patients whose treatment areas were the posterior maxilla and the mandible.

Table.2. Distribution of cases by loading period and implant system

Loading type	Implant system	Number of implant
Immediate loading	Osstem	18
	Zimmer	24
	Total	42
Delayed loading	Osstem	15
	Zimmer	17
	Total	32

Measurement of Implant Survival Rate & Bone Resorption

To measure and compare marginal bone resorption around the implant, digital periapical radiography was taken vertically from the longitudinal axis using the parallel cone technique.

Results

For all patients as a single group, the survival rate of the implants was 100%, and the mean marginal bone loss was 0.26 ±0.59mm. In comparision of the differences by loading, mean marginal bone loss of 0.32 ±0.69mm was recorded for the immediate loading group whereas the delayed loading group had mean marginal bone loss of 0.16 ±0.42mm. However, the difference was not statistically significant(P>0.05).

Table 3. Mean crestal bone resorption by loading type (at 12 months' loading)

Loading type	Number of implant	Bone loss (mm), mean ± stanadard deviation	P-value*
Immediate loading	42	0.32 ±0.69	0.260
Delayed loading	32	0.16 ±0.42	

* *P*-values were calculated with Mann-Whitnet (α=0.05)

Table 4. Mean crestal bone resorption by loading type in Osstem TSIII HA (at 12 months' loading)

Loading type	Number of implant	Bone loss (mm), mean ± stanadard deviation	P-value*
Immediate loading	18	0.52 ±1.00	0.556
Delayed loading	15	0.11 ±0.20	

* *P*-values were calculated with Mann-Whitnet (α=0.05)

Table 5. Mean crestal bone resorption by loading type in Zimmer TSV- HA (at 12 months' loading)

Loading type	Number of implant	Bone loss (mm), mean ± stanadard deviation	P-value*
Immediate loading	24	0.17 ±0.21	0.338
Delayed loading	17	0.21 ±0.56	

Table 6. Mean crestal bone resorption by loading type in the maxilla (at 12 months' loading)

Loading type	Number of implant	Bone loss (mm), mean ± stanadard deviation	P-value*
Immediate loading	16	0.41 ±0.82	0.526
Delayed loading	25	0.10 ±0.16	

Table 7. Mean crestal bone resorption by loading type in the mandible (at 12 months' loading)

Loading type	Number of implant	Bone loss (mm), mean ± stanadard deviation	P-value*
Immediate loading	26	0.27 ±0.61	0.620
Delayed loading	7	0.39 ±0.84	

* *P*-values were calculated with Mann-Whitnet (α=0.05)

Conclusions

Mean bone loss after 1year of loading was not significantly different between the immediate loading and delayed loading group. Neither was the difference in bone resorption rates statistically significant between the two groups by type of implant system and by dental location. Within the limited observation period of one year, predictable survival rates can be expected when using immediately loaded hydroxyapatite-coated implants.

Clinical Comparative Study of Immediate Loading Using Tapered Implant with Hydroxyapatite Coating (TSIII HA) 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 : Zimmer (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)

* An Independent T test was conducted to determine the statistical significance (SPSS program, P-value <0.05).

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 ($P < 0.05$).

Table1. Comparison of marginal bone loss

	Group I(n=54)	Group II(n=46)	Sig*
1 year	0.063(0.66)	0.44(0.65)	*

Independent T test, *: P-value<0.05

Table2. Comparison of marginal bone loss between groups according to site

	Group I	Group II	Sig*
Maxilla	0.32(0.67)(n=22)	0.66(0.74)(n=24)	-
Mandible	-0.12(0.60)(n=32)	0.19(0.42)(n=22)	*

Independent T test, *: P-value<0.05

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

Table3. Comparison of Peri-implant index between groups

	Group I(n=54)	Group II(n=46)	Sig*
PI	0.28(0.41)	0.50(0.54)	*
CI	0.02(0.13)	0.07(0.24)	-
SBI	0.24(0.44)	0.29(0.41)	-
PD(B)	3.13(1.03)	3.28(1.45)	-
PD(L)	3.13(1.05)	3.31(1.15)	-
PD(M)	3.54(1.27)	4.00(1.71)	-
PD(D)	3.56(1.20)	3.52(1.09)	-
Attached gingiva(B)	3.48(1.88)	3.39(1.34)	-
Attached gingiva(L)	1.12(1.39)	1.08(1.37)	-

Independent T test, *: P-value<0.05

Table4. Peri-implant index according to site <maxilla>

	Group I(n=22)	Group II(n=24)	Sig*
PI	0.23(0.38)	0.62(0.57)	*
CI	0.00(0.00)	0.14(0.33)	*
SBI	0.22(0.49)	0.34(0.40)	-
PD(B)	3.34(1.42)	3.42(1.50)	-
PD(L)	3.38(1.21)	3.43(1.10)	-
PD(M)	3.68(1.56)	4.33(2.03)	-
PD(D)	3.78(1.32)	3.84(1.04)	-
Attached gingiva(B)	4.04(2.63)	3.75(1.22)	-
Attached gingiva(L)	0.54(0.77)	0.54(0.55)	-

Independent T test, *: P-value<0.05

Table5. Peri-implant index according to site <mandible>

	Group I(n=32)	Group II(n=22)	Sig*
PI	0.312(0.44)	0.36(0.49)	-
CI	0.03(0.17)	0.25(0.42)	-
SBI	0.25(0.41)	0.23(0.43)	-
PD(B)	2.99(0.65)	3.13(1.42)	-
PD(L)	2.95(0.91)	3.18(1.22)	-
PD(M)	3.44(1.03)	3.63(1.21)	-
PD(D)	3.41(1.11)	3.18(1.05)	-
Attached gingiva(B)	3.10(1.01)	3.00(1.38)	-
Attached gingiva(L)	1.51(1.58)	1.68(1.73)	-

Independent T test, *: P-value<0.05

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).

Table6. Comparison of ISQ between Group I and Group II

	Group I(n=54)	Group II(n=46)	Sig*
1st(BL)	75.93(8.00)	77.43(5.72)	-
1st(MD)	77.40(6.50)	77.58(6.74)	-
2nd(BL)	83.32(4.74)	83.04(4.42)	-
2nd(MD)	84.42(4.70)	83.08(4.26)	-

Independent T test, *: P-value<0.05

Conclusions

The marginal bone loss of implant after immediate loading of two types of study implants with hydroxy apatite 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.

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 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 16days after placement.

Results

In tibiae of rabbit, group 1 had a mean removal torque of 50 Ncm versus 72 Ncm for group 2 after 16days 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 sufaces were more effective for bio mechanical properties of bone-implant contact from conventional SA surface in rabbits and miniature pigs.

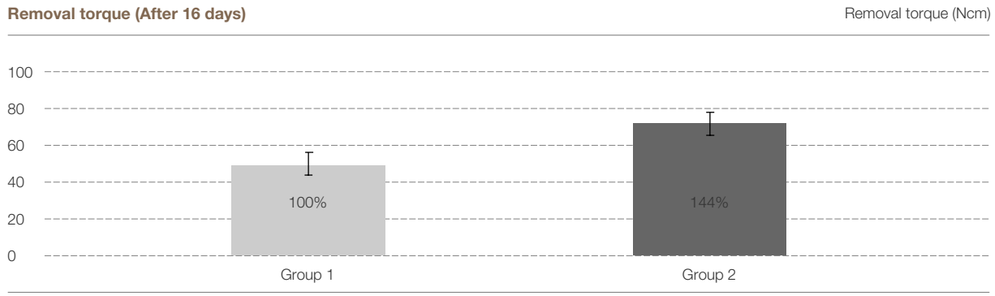


Fig. 1. The result of Removal torque in tibia of rabbits. Group 2 increased more than 40% of mean value compared with group. The sample size for group was 5.

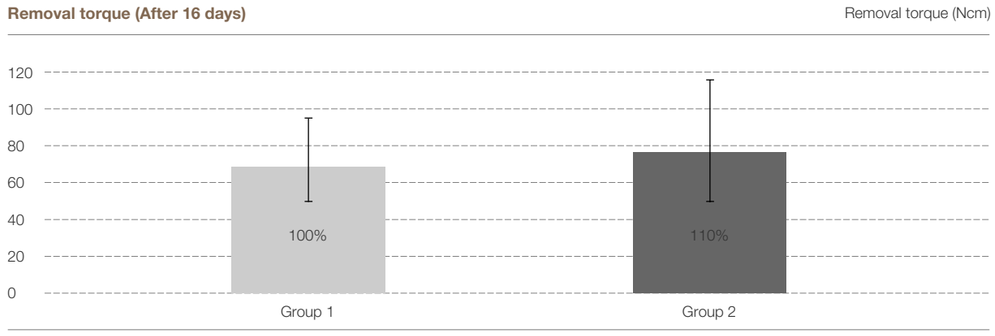


Fig. 2. The result of Removal torque in mandible of miniature pigs. Group 2 increased more than 10% of mean value compared with group. The sample size for group was 10.

Enhancement of in Vitro Osteogenesis to Chemically Activated CA Surface Compared with SA Surface

Hong-Young Choi, Jae-June Park, Su-Kyung Kim, Tae-Gwan Eom

Scientific Poster, Osstem Meeting, 2013

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 with12mm in diameter and 1mm in thickness were prepared.

1) SA surface : Hydrophobic surface by Sandblasting with Al_2O_3 and and acid etching with HCl/H_2SO_4

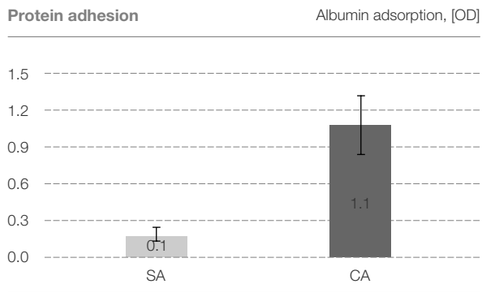
2) CA surface : Super-hydrophilic SA by reducing atmospheric carbon contamination and storing in a solution of calcium.

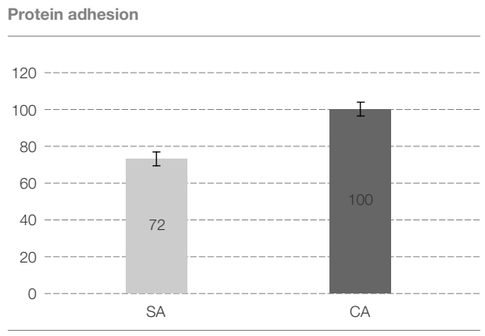
2. Surface characterization and in-vitro evaluation

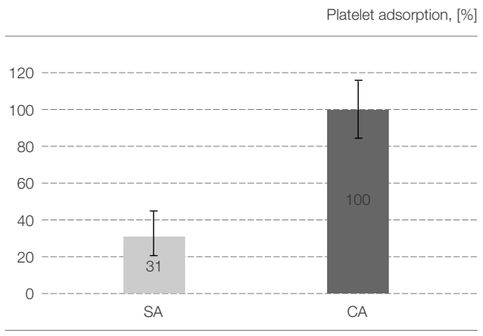
After surface treatment, we verified the surface topography, chemical composition and blood-wettability between two surfaces by SEM, EDS, contact angle measurement. The biological efficiency of chemically activated surface is evaluated by various in-vitro tests such as protein adsorption, platelet activity,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

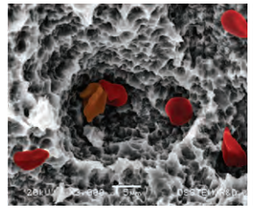
Results

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

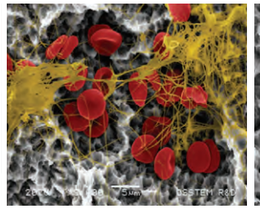




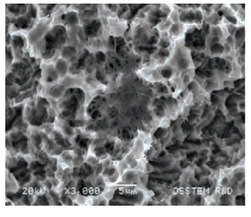




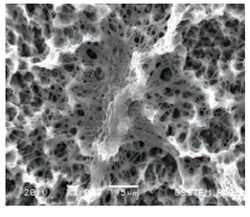
SA surface



CA surface

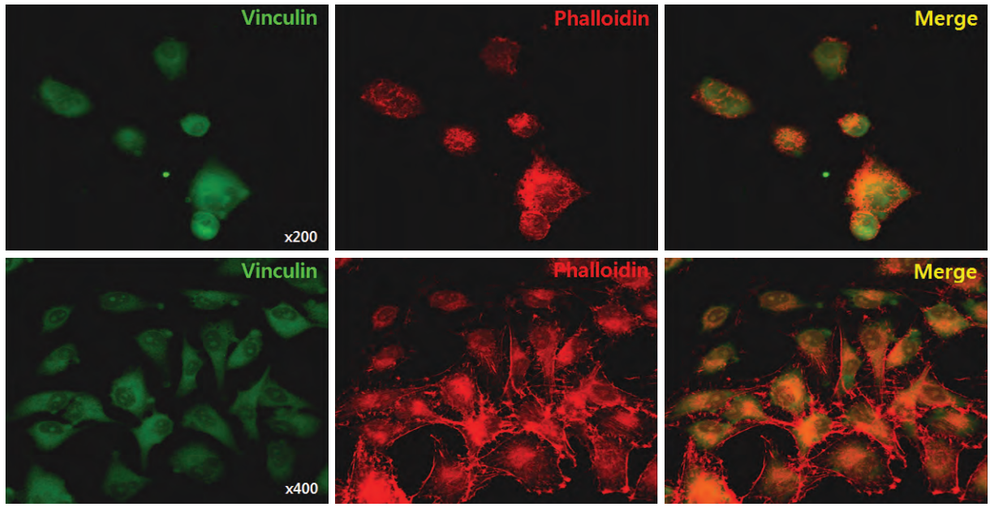


SA surface

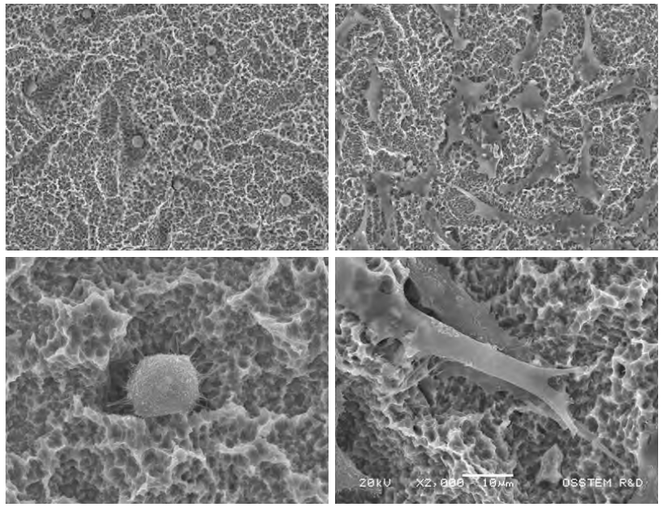


CA surface

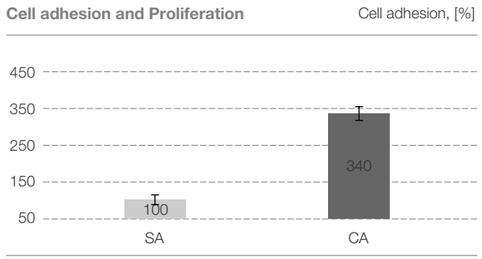
2. Hydrophilic CA surface enhances the cell spreading behavior.

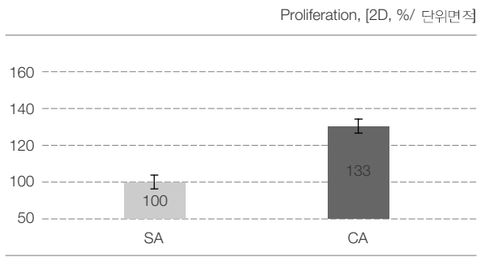


Morphology of MG63 osteoblast-like cell



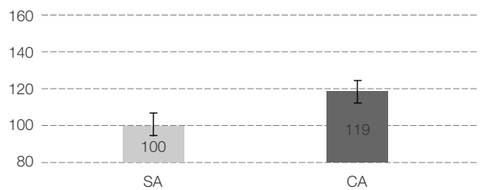
Cell adhesion and Proliferation



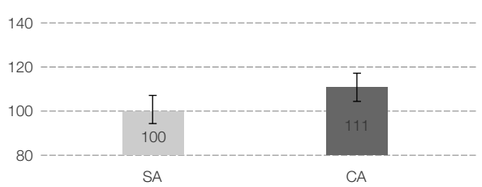


3. Hydrophilic CA surface accelerate ALP activity and Mineralization

ALP activity (7D)



Mineralization (14D)



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.

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

Yee-Seo Kwon, Hee Namgoong, 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-, or 8-week healing period. Each subgroup consisted of 4 animals. The mandibles were extracted, specimens were processed, and BIC was analyzed.

Fig. 1. Design of implants used in the experiment.

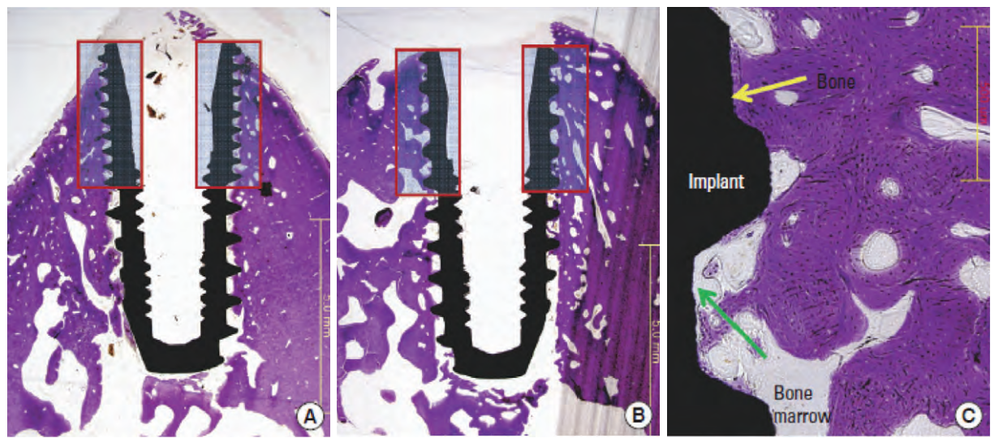


Fig. 2. Cross section of implant in mandible. A: Implant group A. B: Implant Group B. C: Larger magnification of the marginal portion where the BIC measurement was performed.

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 8 weeks.

Conclusions

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

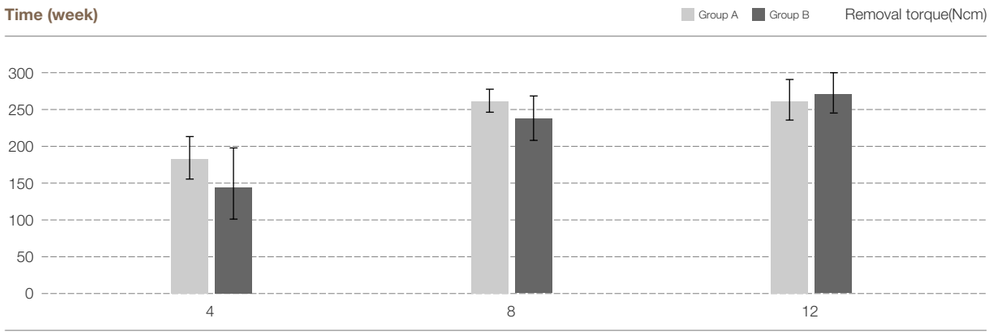


Fig. 3. Mean and standard deviation of removal torque(Ncm) at each healing period.

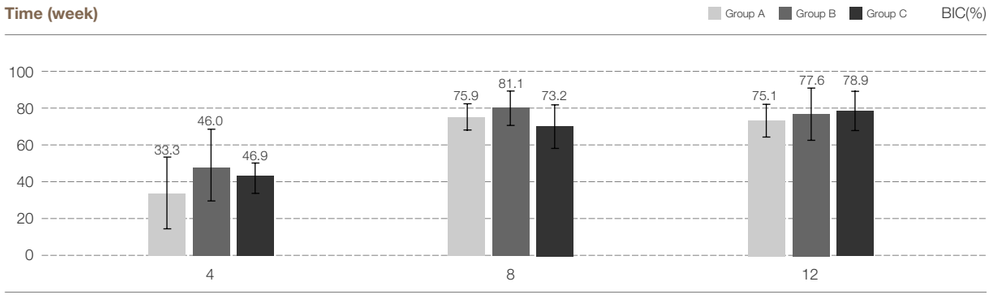


Fig. 4. Mean and standard deviation of BIC(%) at each healing period. BIC:bone-to-implant contact.

Experimental Study of Bone Response to Hydroxyapatite Coating Implants(TSIII HA) : BIC and Removal Torque Test

Tae-Gwan Eom, Gyeo-Rok Jeon, Chang-Mo Jeong, Young-Kyun Kim, Su-Gwan Kim, In-Hee Cho, Yong-Seok Cho, Ji-Su Oh

Oral Surg Oral Med Oral Pathol Oral Radiol 2012;114(4):411-8

Objective

The objective of this study was to evaluate the early osseointegration of hydroxyapatite (HA) coated implant versus resorbable blast media 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 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 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, SA were not significantly different ($p > .05$).
At 8 weeks, the BIC of HA was shown to be significantly higher than SA ($p < .05$). Nonetheless, 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.

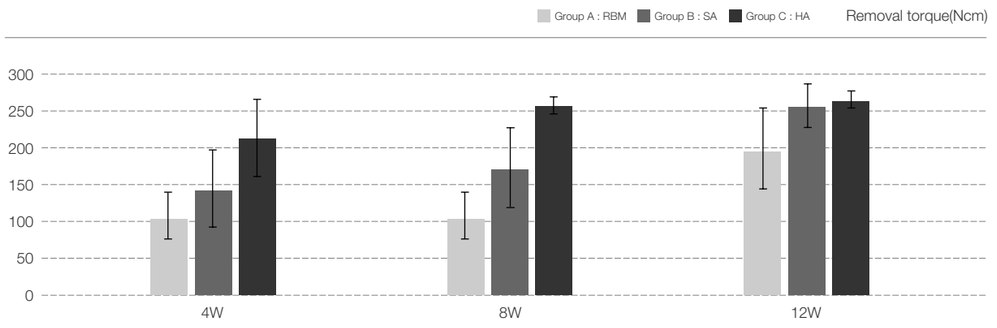


Fig. 3. Removal torque value graph.

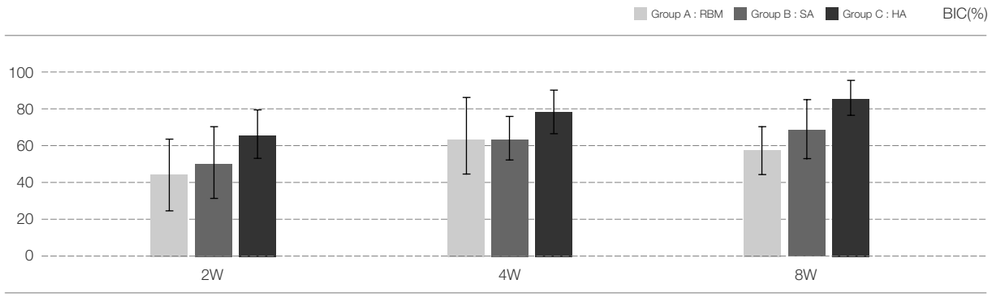


Fig. 4. BIC ratio.

Bone reconstruction after surgical treatment of experimental peri-implantitis defects at a sandblasted/acidetched hydroxyapatite-coated implant : an experimental study in the dog

Hee Namgoong, Myung duck Kim, Young Ku, In-Chul Rhyu, Yong Moo Lee, Yang Jo Seol, Hee jin Gu, Cristiano Susin, Ulf ME Wikesjo, Ki-Tae Koo

J Clin Periodontol 2015;42:960-966

Objective

The objective of this study was to evaluate bone formation/osseointegration following surgical treatment of experimental peri-implantitis at dental implants with different surface characteristics exposed to ligature-induced breakdown conditions.

Methods

Ten turned (control), 10 sandblasted/acid-etched (SA), and 10 SA/hydroxyapatite nanocoated (HA) implants were installed into the edentulated posterior mandible in five Beagle dogs and allowed to osseointegrate for 12 weeks. Ligature-induced breakdown defects were then induced over 23 weeks using stainless steel wire ligatures. The ligatures were removed and soft tissues were allowed to heal for 3 weeks.

Next, exposed implant surfaces were decontaminated followed by guided bone regeneration using a collagen membrane and submerged wound healing. The animals were euthanized for histometric analysis at 12 weeks post-surgery.

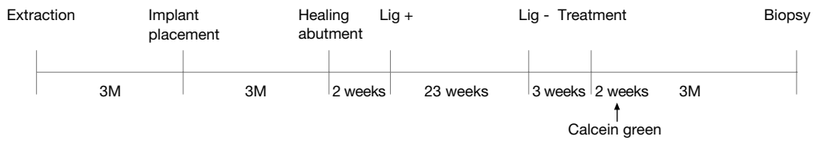


Fig. 1. Study ouline: Placement (Lig+) and removal (Lig-) of ligatures 23 weeks later. Administration of calcein 2 weeks following guided bone regeneration surgery. Animals were sacrificed and biopsies collected at 12 weeks following surgery.

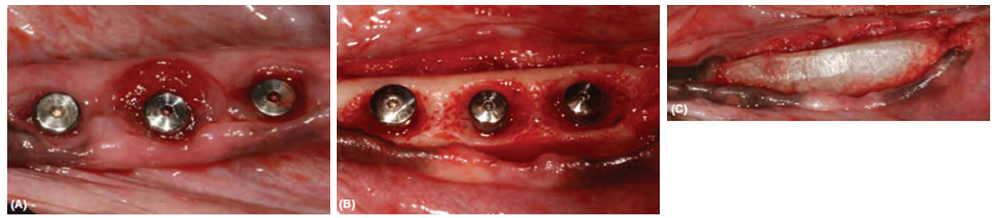


Fig. 2. Ligature-induced peri-implantitis (A), peri-implantitis defects following flap surgery and debridement (B), and following application of a collagen membrane for guided bone regeneration (C).

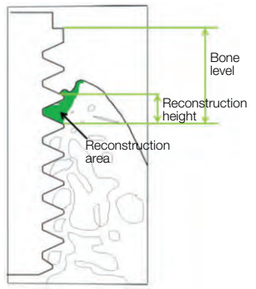


Fig. 3. Schematic representation of the histometric analysis.

Results

The radiographic analysis showed vertical bone loss following ligatureinduced breakdown without statistically significant differences among implant technologies. The histometric analysis showed significantly enhanced bone formation(height) at SA and SA/HA compared with turned implants (p = 0.028) following reconstructive surgery. Bone formation area was greater at SA/HA compared with turned implants, however the difference did not reach statistical significance.

Table 1. Radiographic analysis (means ± SD in mm; 95% CI, n=5)

	Week 5	Week 8	Week 12	Week 18	Week 23	Treatment(Week 26)	Week 4	Week 8	3Week 12
Turned	0.7 ±0.5	1.6 ±0.8	1.9 ±0.9	2.5 ±0.9	2.4 ±0.9	2.4 ±1.0	2.2 ±0.8	2.1 ±0.8	2.2 ±0.8
SA/HA	0.8 ±0.5	1.8 ±0.4	2.1 ±0.5	2.5 ±0.5	2.6 ±0.5	2.7 ±0.6	2.4 ±0.6	2.3 ±0.6	2.3 ±0.7
SA	0.7 ±0.5	1.6 ±0.7	1.8 ±0.7	2.4 ±0.7	2.3 ±0.9	2.3 ±1.0	2.2 ±0.8	2.0 ±0.8	2.0 ±0.8
P-value	0.956	0.796	0.772	0.939	0.773	0.746	0.812	0.697	0.700

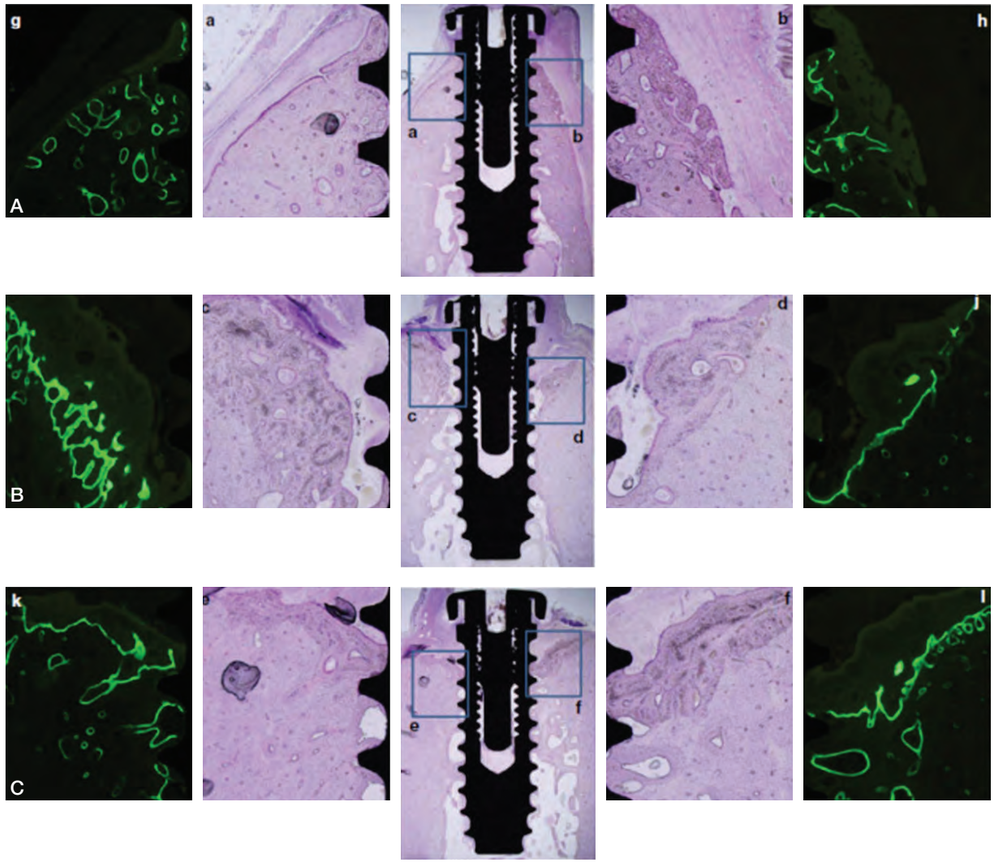


Fig. 4. Representative photomicrographs showing overviews (912.5) of turned (A), SA/HA (B), and SA (C) surface implants and magnification (inserts; 940) of crestal bone levels (haematoxylin & eosin and calcein fluorescent marker).

Table 2. Histometric analysis (means ± SD in mm; 95% CI, n=5)

	Peri-implantitis defect depth	Bone reconstruction height(mm)	Bone reconstruction area(mm^2)	Bone-implant contact(%)
Turned	2.7 ±1.2	0.1 ±0.2 * †	0.2 ±0.2	40.3 ±44
SA/HA	3.5 ±1.2	0.5 ±0.6*	0.5 ±0.6	60.9 ±39
SA	3.2 ±1.4	0.5 ±0.7 * †	0.3 ±0.4	49.8 ±39
p-value	0.823	0.025	0.420	0.284

Resorption of BA crystals

Kyung-won HA, Woo-jung Kim, Hyun-man Kim

Scientific Poster, Osstem Meeting 2015

Introduction

The BA is sporadically coated with a single layer of bone-like low crystallline apatite crystals to enhance biocompatibility. The BA apatite coating is unique in being designed to be removed during the bone remodelling to expose its full titanium surface where the load-bearing lamellar bone is deposited.

Purpose

The purpose of this study was to examine the removing process of apatite crystals coated on the BA.

Materials & Methods

The removing process of apatite crystals coated on the BA surface was examined in vivo. The BA fixtures were inserted into the tibia of rabbits. Then, the animals were sacrificed at 1, 3 and 7 days respectively. The BA surface was examined using FE-SEM after removing the soft tissue by treating fixtures with NaOCl.

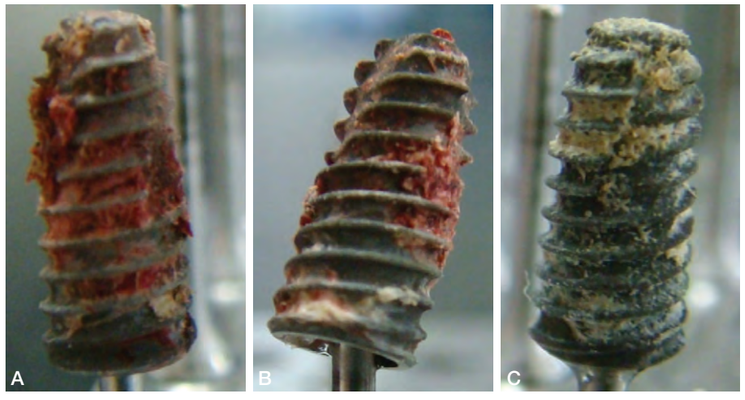


Fig. 1. Surface view of titanium fixture implanted in the bone.
A: 1 day after implantation: blood clots cover the fixture surface.
B: 3 days after implantation: blood clots covering the fixture decrease,
C: 7 days after implantation: woven bone covers the fixture.

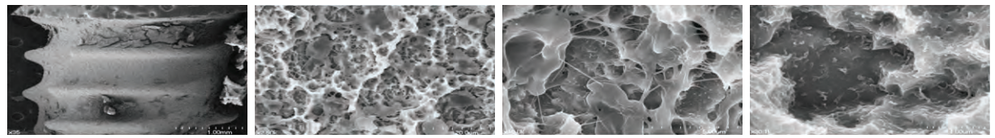


Fig. 2. Surface view of BA on 1 day after implantation. Apatite crystals are clearly seen on the surface.
A: ×35. B: ×10k. C and D: ×30k.

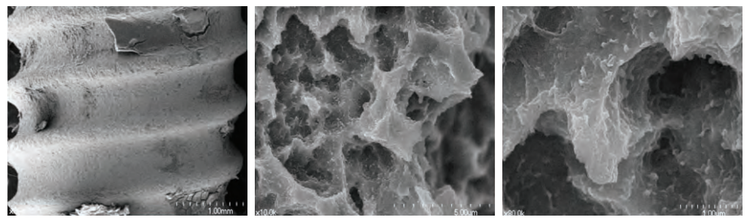
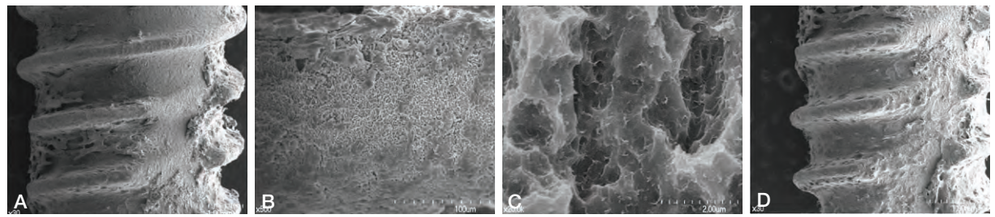


Fig. 3. Surface view of BA on 3 days after implantation. Apatite crystals are clearly seen on the surface.
A: ×35. B: ×10k. C: ×30k

BA crystals were found intact without any alteration on the titanium surface upto 3 days after implantation when new bone was not deposited yet. New bone was found deposited over both the apatite crystals on 7 days afer implantation. It was interesting that new bone was rapidly remodeled after deposition, which was evident on 7 days after implantation.

During this remodelling process, apatite crystals were also removed from the titanium surface when new bone deposited over the apatite crystals was resorbed. Then, load-bearing lamellar bone is suggested to be deposited over the titanium surface devoid of apatite crystals.



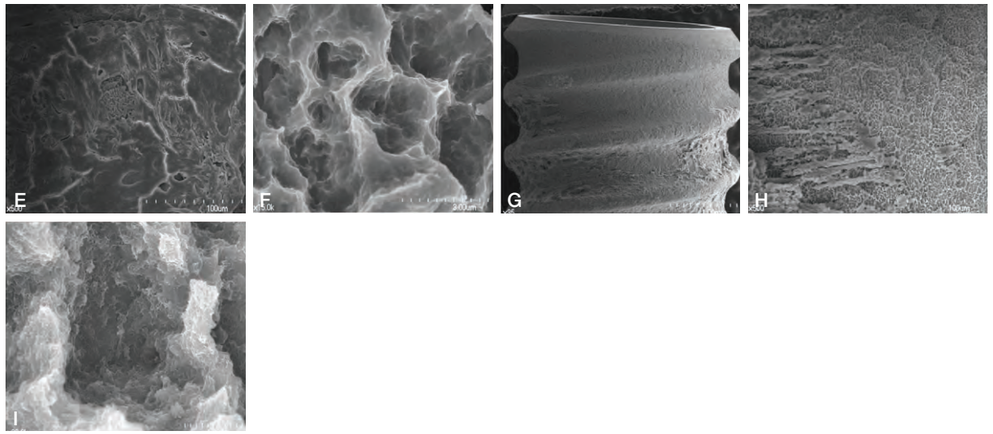


Fig. 4. Surface view of BA on 7 days after implantation. a-c) Fixture surface free of new bone is covered with the intact apatite crystals. d-f) Bone remodelling surface exhibits the titanium surface devoid of apatite crystals which is suggested to be resorbed by osteoclasts. g-i) Woven bone forming surface is coverd with new bone which is deposited over the apatite crystals. a, d, g: x30; b, e, h: x500; c, f, i: x 30k.

Conclusions

These results indicate that the BA crystals are quickly removed during the bone remodelling process which immediately follows the new bone formation. A nano-thick single layer of low crystalline bone-like apatite crystals is entirely resorbed by osteoclasts during bone remodelling, which exposes the titanium surface devoid of crystals.
Then, load-bearing lamellar bone is deposited on the titanium surface which is, now, exposed, free of crystals, to the osteogenic cells. This Osstem's new surface technology will provide the BA with the excellent osteoconductivity by apatite crystals free of the interfacial failure between fixture and crystals.

Effects of SOI, dental implants with hydro-, blood-philicity surface on early osseointegration

Su-Kyoung Kim, Il-Seok Jang, Ju-Dong Song, Tae Gwan Eom

Scientific Poster, Osstem Meeting 2015

Introduction

The topography of titanium implants has been identified as an important factor affecting the osseointegration of surgically placed dental implants. Further modification to produce a hydrophilic micro-rough titanium implant surface has been shown to increase osseointegration compared with micro-rough topology alone.

Purpose

The objective of this study was to determine whether SOI implants could significantly enhanced early osseointegration compare with SA implants.

Materials & Methods

For this study, sand-blasted and acid-etched titanium implants with lengths of 8.5mm and diameters of 3.5mm were prepared. Some of these implants were treated with alpha and humectants coating prior to surgery.
The strength of osseointegration generated by these implants was evaluated using a biomedical implant removal torque test in micropig tibia model. A micro-CT scanner was used to monitor peri-implant osteogenesis at 16 days post-operatively.

Results

The aged SA surfaces shown hydrophobicity, were activated into hydrophilic surface and these activated surfaces were maintained by humectants coating. The adsorption of protein and osteoblasts during an initial culture period were higher in humectants-coated surfaces than in aged SA surfaces. Removal torque values for the SOI implants were 30~50% greater than those of the aged SA implants at 16 days of healing.

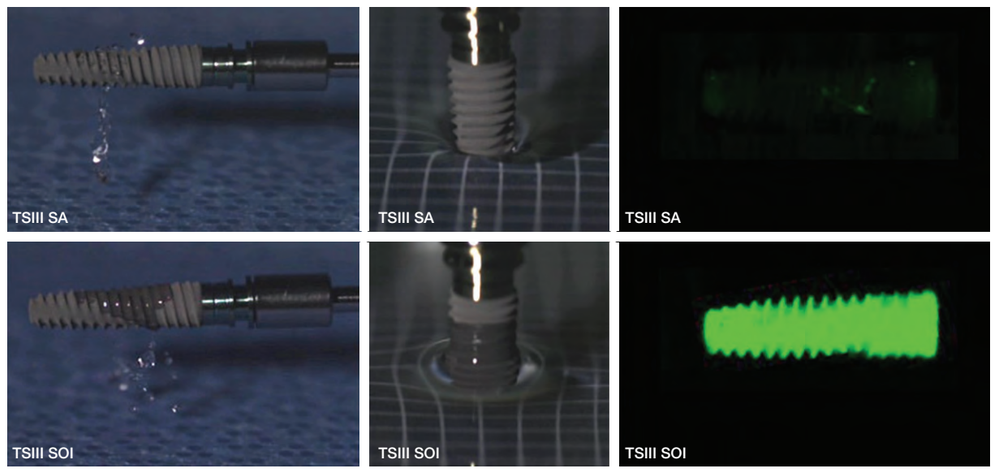


Fig. 1. Initial hydrophilicity and blood protein adsorption in humectant-applicated titanium surfaces.

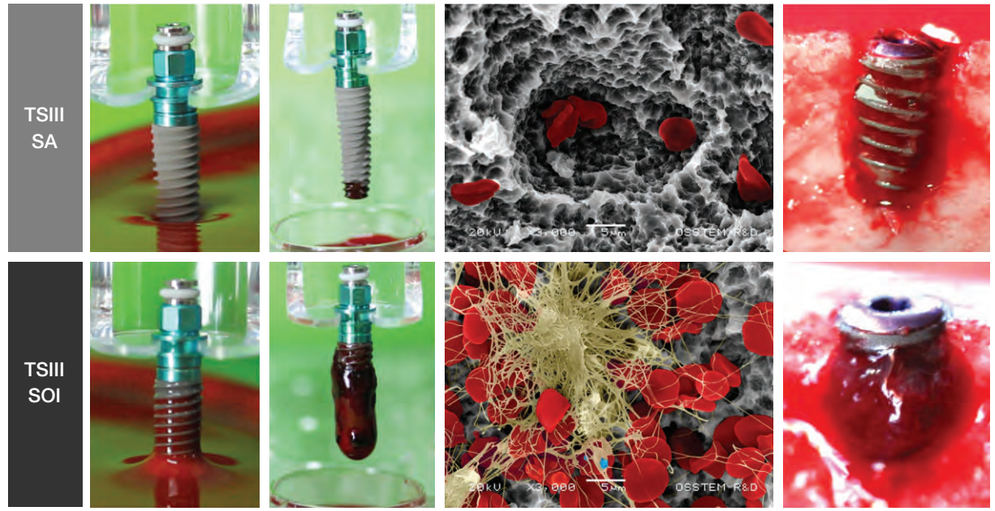
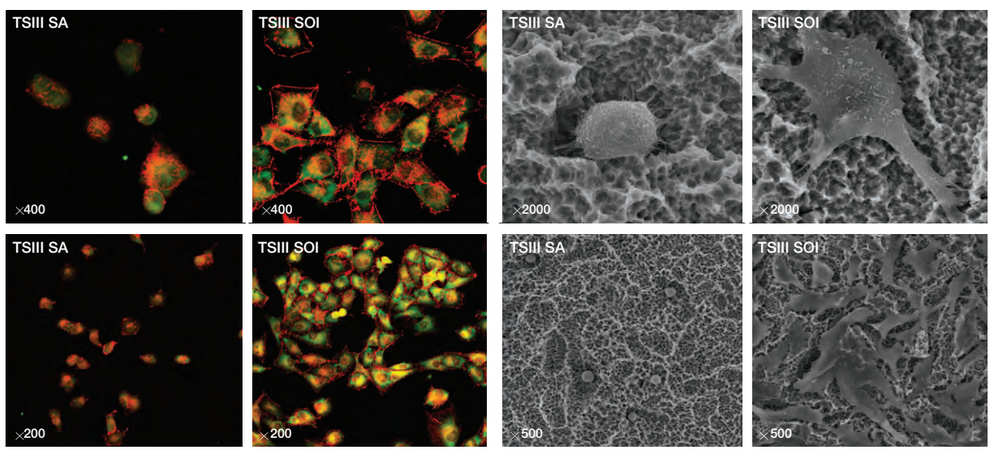


Fig. 2. Blood-philicity and blood clot formation in humectant-applicated titanium surfaces.



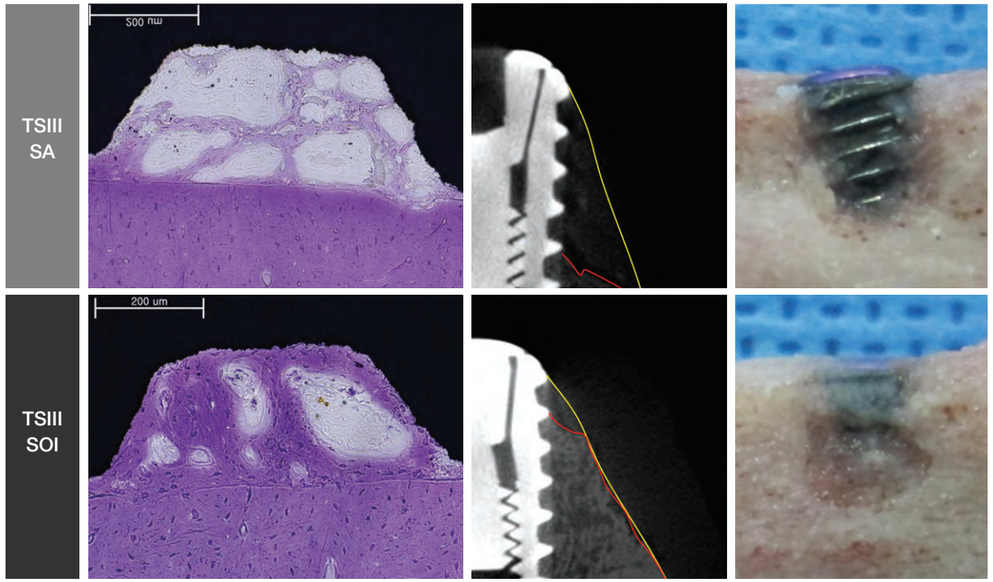
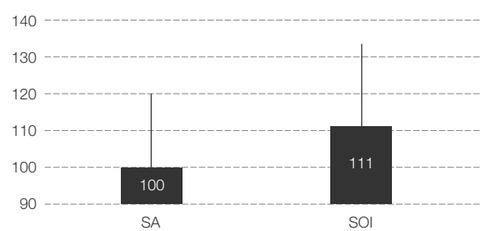
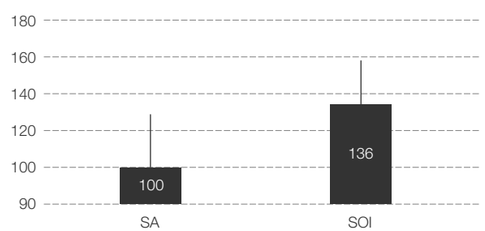


Fig. 3. Osteoblast adhesion and spreading in humectant-applicated titanium surfaces.

New Bone Formation_Micro-pig_4weeks (Micropig, TSIII 3508, n=8)



New Bone Formation_Micro-pig_4weeks (Micropig, TSIII 3508, n=8)



Bone-Implant Integration Strength (Micropig, TSIII 3508, n=8)

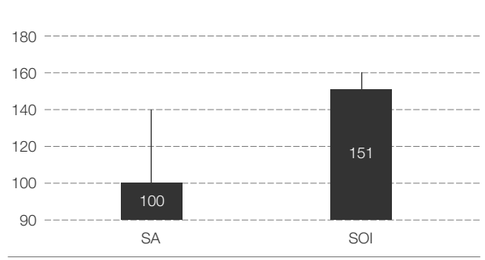


Fig. 4. The effects of humectants application on the strength of bone-implant integration and new bone formation in micro-pig.

Conclusions

In this investigation, SOI implant substantially enhanced the early osseointegration capacity of titanium implant created by combination of sandblasting and acid-etching. These results suggest that SOI surfaces maintained their hydrophilicity and resulted in a continuous retention of bioactivity and osteoconductivity.

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10 Hong-Young Choi, Jae-June Park, Su-Kyung Kim, Tae-Gwan Eom. The Effects of Surface Roughness on the Sandblasted with Large Grit Alumina and Acid Etched Surface Treatment: In Vitro Evaluation. Scientific Poster, Osstem World Meeting 2011

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12 Tae-Gwan Eom, Gyeo-Rok Jeon, Chang-Mo Jeong, Young-Kyun Kim, Su-Gwan Kim, In-Hee Cho, Yong-Seok Cho, Ji-Su Oh. Experimental Study of Bone Response to Hydroxyapatite Coating Implants: BIC and Removal Torque Test. Oral Surg Oral Med Oral Pathol Oral Radiol 2012;114(4):411-8

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14 Min-Woo Kim, Tae-Gwan Eom. Surface Property Evaluation According to the High Crystallinity of the TSIII HA Implant. Scientific Poster, Osstem World Meeting 2011

15 June-Cheol Hwang, Hong-Young Choi, Tae-Gwan Eom. Architectural Feature of TSIII HA Implant. Scientific Poster, Osstem World Meeting 2011.

02

SS System

Selected literature of published Journals

The seven-year cumulative survival rate of Osstem implants

Young-Kyun Kim, Bum-Su Kim, Pil-Young Yun, Sang-Un Mun,
Yang-Jin Yi, Su-Gwan Kim, Kyung-In Jeong

J Korean Assoc Oral Maxillofac Surg 2014;40:68-75

Introduction

This study was performed to analyze the cumulative survival rate of Osstem implants (Osstem Implant Co., Ltd.) over a seven-year period.

Materials & Methods

A total of 105 patients who had 467 Osstem implants that were placed at the Section of dentistry, Seoul National University Bundang Hospital(Seongnam, Korea) from June 2003 through December 2005 were analyzed.

Table 1. implant diameters

Diameter of fixture (mm)	Number	Diameter of fixture (mm)	Number
SS II		**US III**	
4.1	122	4.0	14
4.8	106	5.0	13
Total	228	Total	27
US II		**GS II**	
3.3	37	3.5	3
3.75	20	4.0	5
4.0	115	4.5	3
5.0	27	5.0	2
Total	199	Total	13

SS II, US II, US III, and GS II: Osstem implants (Osstem Implant Co., Ltd.).
Young-Kyun Kim et al: The seven-year cumulative survival rate of Osstem implants. J Korean Assoc Oral Maxillofac Surg 2014

Table 2. Implant length

Length of fixture (mm)	Number	Length of fixture (mm)	Number
SS II		**US III**	
8.5	10	10.0	2
10.0	27	11.5	17
11.5	119	13.0	8
13.0	61	Total	27
15.0	11	**GS II**	
Total	228	10.0	2
US II		11.5	8
8.5	15	13.0	1
10.0	25	15.0	2
11.5	72	Total	13
13.0	64		
15.0	23		
Total	199		

SS II, US II, US III, and GS II: Osstem implants (Osstem Implant Co., Ltd.).
Young-Kyun Kim et al: The seven-year cumulative survival rate of Osstem implants. J Korean Assoc Oral Maxillofac Surg 2014

Table 3. Distribution of implant position

Position	Number
Maxilla	
Anterior	54
Posterior	149
Total	203
Mandible	
Anterior	65
Posterior	199
Total	264

Young-Kyun Kim et al: The seven-year cumulative survival rate of Osstem implants. J Korean Assoc Oral Maxillofac Surg 2014

Results

The seven-year cumulative survival rate of Osstem implants was 95.37%. The Cox proportional hazard model revealed that the following factors had a significant influence on survival rate; increased diameter, reduced prosthetic loading period and performance of bone grafting.

Table 4. Seven-year cumulative survival analysis (total: 467, cen- sored: 447, event: 20)

Interval time(yr)	Proportional surviving	Cumulative Survival rate[1] (%)	Hazard rate
1	0.9734	97.34	0.0022
2	0.9852	95.90	0.0012
3	0.9945	95.37	0.0005
4	1.0000	95.37	0.0000
5	1.0000	95.37	0.0000
6	1.0000	95.37	0.0000
7	1.0000	95.37	0.0000

[1] Life table method.

Table 5. Evaluation of other prognostic factors

Factor	Significance level[1]	Exp (B)	95% CI	
			Lower	Upper
Age	0.721	0.995	0.956	1.034
Sex	0.105	0.450	0.168	1.208
Diameter	0.021*	1.516	0.907	2.533
Length	0.963	1.134	0.797	1.613
Bone graft	0.046	0.494	0.195	1.247
1-Stage/2-Stage	0.547	1.466	0.524	4.103
Loading	0.000*	0.682	0.559	0.832

(CI: confidence interval)
[1] Cox proportional hazard model.
* P<0.05.
Young-Kyun Kim et al: The seven-year cumulative survival rate of Osstem implants. J Korean Assoc Oral Maxillofac Surg 2014

Conclusions

The osstem implants showed satisfactory results over the seven-year study period.

Multi-center prospective clinical study of 7-mm short implants

Young-Kyun Kim, Su-Gwan Kim, Pil-Young Yun, Yong-Seok Cho, Choon-Mo Yang

J Int Congr Oral Implantol Korea Vol.6, No.1, April 2014

Purpose

The objective of this study was to verify the stability of 7-mm short implants.

Methods

A multi-center prospective clinical study on 7-mm short implants was conducted at 4 Korean medical centers. In 53 patients, 92 implants of 2 types were placed. Through clinical and radiological evaluation, the survival and success rate of the implants, peri-implant tissue condition, and complications were examined. The subjective functional evaluation of patients was performed by the distribution of a questionnaire at the final follow-up observation appointment.

Results

Among 92 implants, 5 implants failed and were thus removed. The failed implants were all from the GSII system. The implant survival rate of the GSII system was 92.7% and the SSII system was 100%; nonetheless, it was not statistically significantly different(P>0.05). The success rate of GSII was 83.9% and SSII was 97.2%, and a statistically significant difference was shown(P<0.05).

In the evaluation of the peri-implant tissue condition, crestal bone loss was significantly smaller in the SSII system. In the short-term observation, 7-mm short implants showned good clinical outcomes.

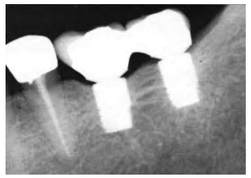

Fig. 1. Periapical radiograph 25 months after prosthetic loading.
The crestal bone level has been maintained.

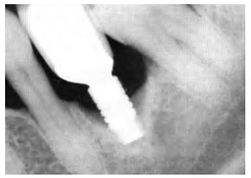

Fig. 2. Periapical radiograph 23 months after prosthetic loading.
Progressive crestal bone loss is observed.

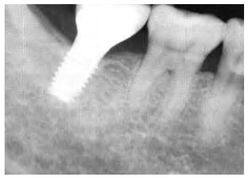

Fig. 3. Periapical radiograph 17 months after prosthetic loading.
The stable level of the crestal bone is maintained.

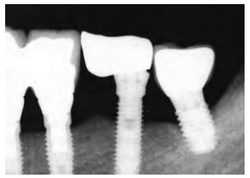

Fig. 4. Periapical radiograph 1 year after prosthetic loading.
Approximately 2.4 mm of crestal bone loss is shown.

Table 1. Survival rate between GSII and SSII group

	GSII	SSII
Survival	51	36
Fail	5	0
Survival rate(%)	91.1	100

Chi-square test was performed; no significant differences were seen between GSII and SSII group(P>.05).

Table 2. Success rate between GSII and SSII group

	GSII	SSII
Success	47	35
Fail	9	1
Success rate(%)	83.9	97.2

Chi-square test was performed; no significant differences were seen between GSII and SSII group(P>.05).

Table 3. Periodontal index comparison between GSII and SSII group

	GSII (n=48)		GSII (n=48)		P
	Mean	SD	Mean	SD	
Crestal bone loss(mm)	0.44	0.60	0.11	0.46	.000*
Plaque index	1.09	0.82	1.24	0.90	.489
Pocket depth(mm)	3.03	0.75	3.10	0.70	.778
Gingiva index	0.70	0.58	1.00	0.91	.166
Attached gingiva width(mm)	1.75	0.98	1.89	1.08	.274

P-values calculated withMann-Whitney Test.
*Indicates statistically significant difference (P<.05).

Table 4. Types of complications

Types	Number
Implant mobility	3
Neurologic complication	2
Peri-implantitis	6
Screw loosening and fracture	1
Upper prosthesis dislodgement	1
Neuropathic pain	1

Conclusions

According to this analysis, if surgery that causes minimal trauma on the crestal bone is performed and implants with appropriate designs are selected, better clinical outcomes can be obtained.

A Randomized Clinical 1-year Trial Comparing Two Types of Non-Submerged Dental Implant

Jong-Chul Park, Seung-Ryong Ha, Soung-Min Kim, Myung-Jin Kim, Jai-Bong Lee, Jong-Ho Lee

Clin Oral Implants Res 2010 Feb;21(2):228-36

Objective

This study compared the implant stability and clinical outcomes obtained with two types of non-submerged dental implant that have different thread designs and surface treatments.

Materials & Methods

A randomized clinical trial with one year of follow-up was performed on 56 participants with 75 implants (control group, 36 implants in 28 subjects; experimental group, 39 implants in 28 subjects). The experimental group received the Osstem SSII Implant system; the control group received the Standard Straumann Dental Implant System. The diameter and length of the fixture were uniform at 4.1 mm and 10 mm and all the implants restored the unilateral loss of one or two molars from the mandible.

To compare implant stability, the peak insertion torque, implant stability quotient (ISQ), and periotest value (PTV) were evaluated during surgery, and at 4 and 10 weeks after surgery. To compare marginal bone loss, standard periapical radiographs were obtained during surgery, and at 10 weeks and one year after surgery.

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

Duration	Area †	Type of Implant: Standard Straumann® Dental Implant system N	Standard Straumann® Dental Implant system Mean ± SD (mm)	Osstem SSII Implant system N	Osstem SSII Implant system Mean ± SD (mm)	p value*
During the 10 weeks after surgery	Proximal	25	0.96 ± 0.64	28	0.75 ± 0.49	.273
	Distal	25	0.62 ± 0.44	28	0.60 ± 0.51	.722
	Avg ‡	25	0.79 ± 0.51	28	0.67 ± 0.43	.624
One year follow-up	Proximal	24	1.21 ± 0.57	26	0.92 ± 0.68	.066
	Distal	24	0.93 ± 0.39	26	0.65 ± 0.37	.013
	Avg	24	1.07 ± 0.46	26	0.79 ± 0.42	.048

* The p values were calculated using Mann - Whitney test.
† Area means the radiographic measurement area for calculation of marginal bone loss.
‡ Avg means the average value of proximal and distal bone loss.

Results

This study showed statistically significant differences between the two groups in peak insertion torque (p= .009) and ISQ (p= .003) but not in PTV (p= .097) at surgery. In contrast, there was no statistically significant difference in the pattern of change of ISQ during the 10 weeks after surgery (p= .339).

For marginal bone loss, no significant difference was observed between the control and experimental groups before functional loading (p= .624), but after one year of follow-up, a borderline difference was noted (p= .048).

Conclusions

The success rate after one year of follow-up was 100% for both systems of implant, despite there being significant difference in implant stability during surgery.

There was a borderline difference in marginal bone loss after one year of follow-up.

A Comparison of Implant Stability Quotients Measured Using Magnetic Resonance Frequency Analysis from Two Directions : Prospective Clinical Study During the Initial Healing Period

Jong-Chul Park, Hyun-Duck Kim, Soung-Min Kim, Myung-Jin Kim, Jong-Ho Lee

Clin Oral Impl Res 2010;21(6):591-7

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.

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

Diameter	ISQ discrepancy* (mean SD)	P-value**
Straumann (N=25) During surgery At post-operative week 10	 1.1 ± 2.72 0.42 ± 1.48	 0.16
Osstem SSII (N=28) During surgery At post-operative week 10	 0.36 ± 3.6 -0.14 ± 1.54	 0.317

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

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 were made.

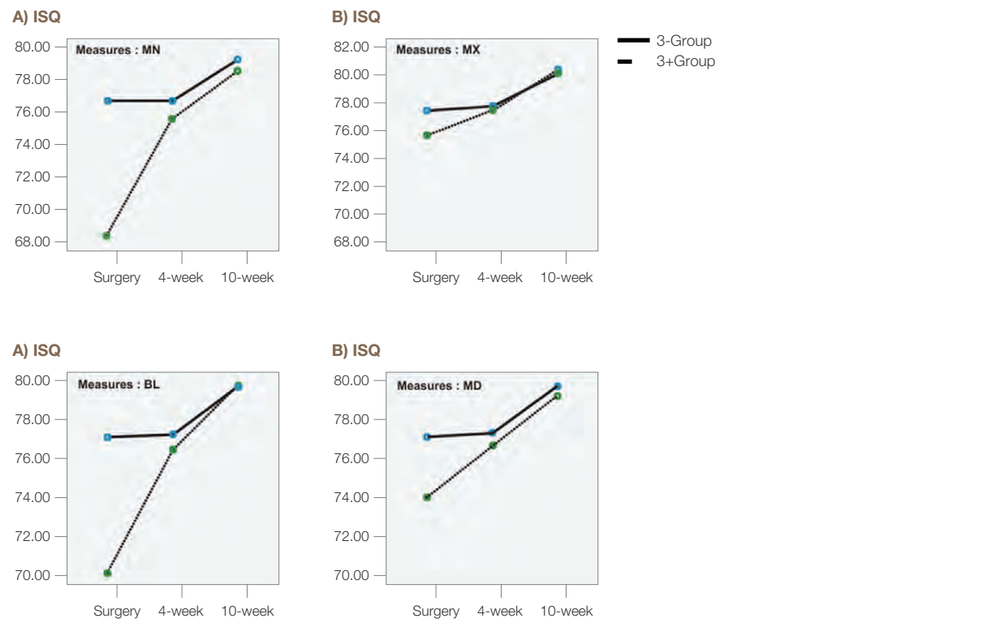

Fig. 1. The comparison of the pattern of change in the implant stability quotient (ISQs) obtained from the four measures from surgery to 10 weeks after surgery. 3+Group=the group with ISQ variation of 3 or more. 3-Group, the group with ISQ variation of <3.
A: Pattern of change of MN. B: Pattern of change of MX. C: Pattern of change of BL. D: Pattern of change of MD.

Non-Submerged Type Implant Stability Analysis During Initial Healing Period by Resonance Frequency Analysis

Deug-Han Kim, Eun-Kyoung Pang, Chang-Sung Kim, Seong-Ho Choi, Kyoo-Sung Cho

J Korean Acad Periodontol 2009;39(3):339-48

Objective

The purpose of the present study was to analyze the implant stability quotient (ISQ) values for Korean non-submerged type implant and determine the factors that affect implant stabilty.

Materials & Methods

A total of 49 Korean non-submerged type implants were installed in 24 patients, and their stability was measured by resonance frequency analysis (RFA) at the time of surgery, and 1, 2, 3, 4, 8, 12 weeks postoperatively. The data for implant site, age, sex, implant length and diameter, graft performing, bone type, and insertion torque were analyzed.

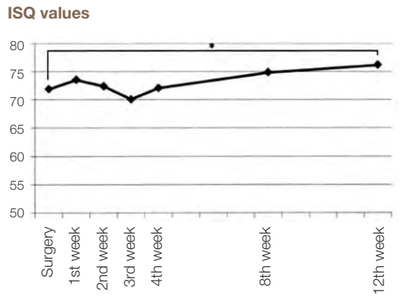

Fig. 1. Change in the mean ISQ values during healing up to 12 weeks.
* : Statistically significant change compared to surgery (P < 0.05)

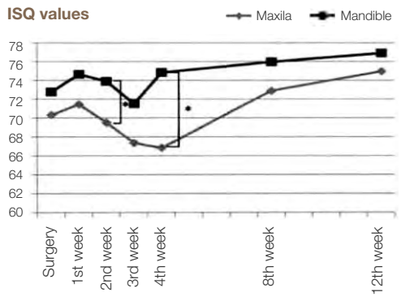

Fig. 2. Evaluation of implant stability between implant placement and 12 weeks for implant placed in the maxilla and in the mandible.
* : Statistically significant difference between maxilla and mandible(P < 0.05)

Results

The lowest mean stability measurement was at 3 weeks. There was significant difference between implant placement and 12 weeks. There was significant difference between implant placement and 12 weeks in diameters of 4.1 mm and 4.8 mm. Also, there were significant differences between diameters of 4.1 mm and 4.8 mm at implant placement and 12 weeks after surgery. This result suggests that the factor related to implant diameter may affect the level of implant stability.
No statistically significant relationship was found between the resonance frequency analysis and the variables of maxilla/mandible, sex, anterior/posterior, implant length, age of patient, graft performing, bone type, insertion torque during initial healing period.

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.

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

Diameter	P value	
Maxilla/Mandible	0.6141	> 0.05
Sex	0.9918	> 0.05
Anterior/Posterior	0.8408	> 0.05
Length	0.6317	> 0.05
Diameter	0.0092	< 0.05
Age	0.3836	> 0.05
Graft	0.9635	> 0.05
Bone type	0.8354	> 0.05
Insertion torque	0.0675	> 0.05

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

Four-Year Survival Rate of Internal Connection Non-Submerged Implants and the Change of the Peri-Implant Crestal Bone

Hye-Ran Jeon, Myung-Rae Kim, Dong-Hyun Lee, Jung-Sub Shin, Na-ra Kang

J Korean Assoc Maxillofac Plast Reconstr Surg 2009;31(3):237-42

Materials & Methods

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 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).

Fig. 1. A computer-assisted calibration was carried out for each single site by evaluating the given distance between several threads (pitch: 0.8 mm).

Results

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 1mrn in 89.0%. to 1-2 mm loss of the marginal bone in 8.3%. And the bone loss over 2 mm was occured 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.

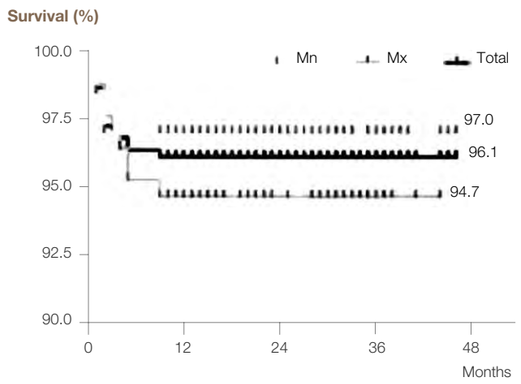

Fig. 2. The 4-year cumulative survival rate: (p > .05).

Evaluation of Peri-Implant Tissue in Nonsubmerged Dental Implants : A Multicenter Retrospective Study

Young-Kyun Kim, Su-Gwan Kim, Hee-Kyun Oh, Yong-Geun Choi, Yong-Seok Cho, Young-Hak Oh, Jun-Sik Son

Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2009;108(2):189-95

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 non-submerged implants placed in 108 patients at 5 clinical centers between January 2003 and December 2007.

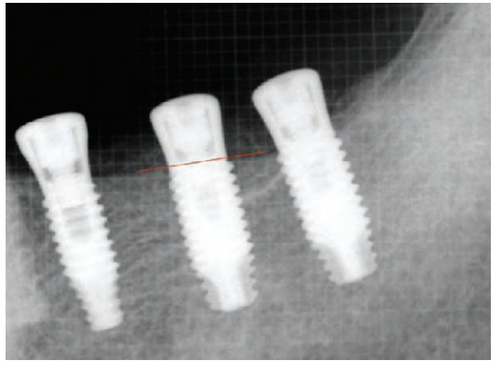

Fig. 1. Periapical radiograph taken immediately after implant placement. In the #36 area, an implant, 4.8 mm in diameter and 10 mm in length, was placed. The crestal bone level in the vicinity of implant was considered as the baseline.

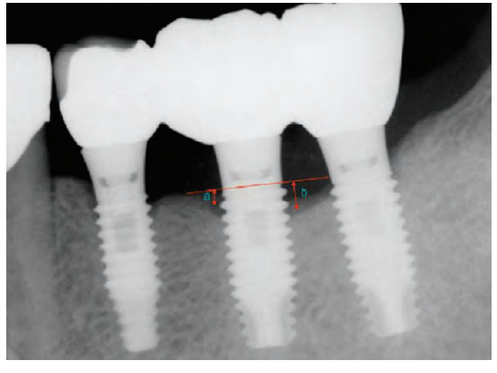

Fig. 2. Periapical radiograph taken 1 year after implant placement. Based on the baseline, the crestal bone level on the radiograph taken immediately after surgery, from mesial side (a) and distal side (b), the vertical length to the first implant-bone contact area was measured and added by referring to the magnification rate and 0.8 mm pitch, and the average was obtained. In this case, a=0.8 mm and b=1.2 mm, and after 1 year; the mean amount of crestal bone resorption was 1.2 mm.

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. Crestal bone resorption

Bone resorption	No. of implants
None	198
0.1~0.5 mm	10
0.6~1.0 mm	81
1.1~2.0 mm	7
~2.0 mm	8
Total	304*

*Not specified for 35 implants.

Table 2. Implant failure and survival by year

Year	No. implants at start of year	No. implants survival at follow-up	Failures	Survival,%
1	339	336	3	99.1
2	336	336	0	100
3	336	336	0	100

Influence of Abutment Connections and Plaque Control on the Initial Healing of Prematurely Exposed Implants : An Experimental Study in Dogs

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

J Periodontol 2008;79:1070-4

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.

Materials & 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 postimplantation, microcomputed tomography was performed at the implantation site to measure bone height in the periimplant 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 (8.2± 0.6 mm) than with the abutment-connected implant (6.5±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.

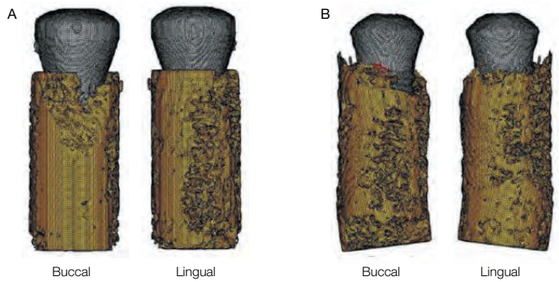

Fig. 1. A: Three-dimensional micro-CT of an abutment-connected implant from the plaque control group demonstrating bone (yellow) around the implants (gray). B: Three-dimensional micro-CT of a partially exposed implant from the plaque control group demonstrating bone (yellow) around the implants (gray).

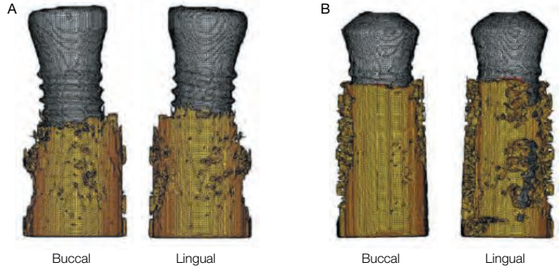

Fig. 2. A: Three-dimensional micro-CT of an abutment-connected implant from the group without plaque control demonstrating bone (yellow) around the implants (gray). B: Three-dimensional micro-CT of a partially exposed implant from the group without plaque control demonstrating bone (yellow) around the implants (gray).

Table 1. Parameters (mm; mean±SD) of bone height during the healing period in abutment-connected and partially exposed dental implant groups

	Abutment-connected sites	Partially exposed sites	P values
Plaque control	10.1 ± 0.5	9.3 ± 0.5	< .05
No plaque control	6.5 ± 0.7	8.2 ± 0.6	< .05

Evaluation of the correlation between insertion torque and primary stability of dental implants using a block bone test

Dorjpalam Bayarchimeg, Hee Namgoong, Byung Kook Kim, Myung Duk Kim, Sungtae Kim, Tae-Il Kim, Yang Jo

Seol, Yong Moo Lee, Young Ku, In-Chul Rhyu, Eun Hee Lee, Ki-Tae Koo

J Periodontal Implant Sci 2013;43:30-36

Purpose

Implant stability at the time of surgery is crucial for the long-term success of dental implants. Primary stability is considered of paramount importance to achieve osseointegration. The purpose of the present study was to investigate the correlation between the insertion torque and primary stability of dental implants using artificial bone blocks with different bone densities and compositions to mimic different circumstances that are encountered in routine daily clinical settings.

Methods

In order to validate the objectives, various sized holes were made in bone blocks with different bone densities (#10, #20, #30, #40, and #50) using a surgical drill and insertion torque together with implant stability quotient (ISQ) values that were measured using the Osstell Mentor. The experimental groups under evaluation were subdivided into 5 subgroups according to the circumstances.

Results

In group 1, the mean insertion torque and ISQ values increased as the density of the bone blocks increased. For group 2, the mean insertion torque values decreased as the final drill size expanded, but this was not the case for the ISQ values.

The mean insertion torque values in group 3 increased with the thickness of the cortical bone, and the same was true for the ISQ values. For group 4, the mean insertion torque values increased as the cancellous bone density increased, but the correlation with the ISQ values was weak.

Finally, in group 5, the mean insertion torque decreased as the final drill size increased, but the correlation with the ISQ value was weak.

Table 1. Correlation between the insertion torque and implant stability according to the bone density.

	No.	Insertion torque(Ncm)			ISQ value			Correlation
		Average	SD	*P*-value[a]	Average	SD	*P*-value[a]	
Bone density				0.00			0.00	CQ=0.82, P=0.00
#10	5	3.9	0.36		32.4	2.93		
#20	5	16.2	2.59		52.5	0.74		
#30	5	41.0	3.94		60.0	0.70		
#40	5	90.8	7.15		65.6	0.56		

SD: standard deviation, ISQ: implant stability quotient, ANOVA: analysis of variance. [a] ANOVA

Table 2. Correlation between the insertion torque and implant stability according to the final drill diameter.

	No.	Insertion torque(Ncm)			ISQ value			Correlation
		Average	SD	*P*-value[a]	Average	SD	*P*-value[a]	
Final drill diameter				0.00			0.00	CQ=-0.07, P=0.77
Ø2.7 mm	5	39.2	2.77		52.1	0.85		
Ø3.0 mm	5	35.4	1.95		53.9	0.64		
Ø3.3 mm	5	26.0	2.00		54.4	1.64		
Ø3.6 mm	5	16.2	2.65		52.5	0.74		

SD: standard deviation, ISQ: implant stability quotient, ANOVA: analysis of variance. [a] ANOVA

Table 3. Correlation between the insertion torque and implant stability according to the thickness of the cortical bone.

	No.	Insertion torque(Ncm)			Insertion torque(Ncm)			Correlation
		Average	SD	*P*-value[a]	Average	SD	*P*-value[a]	
Cortical bone thickness				0.00			0.00	CQ=0.84, P=0.00
0.5 mm	5	9.20	1.63		54.4	1.34		
1.0 mm	5	12.0	1.58		55.7	1.68		
1.5 mm	5	24.8	2.86		57.9	0.51		
2.0 mm	5	25.4	3.97		57.9	0.45		

SD: standard deviation, ISQ: implant stability quotient, ANOVA: analysis of variance. [a] ANOVA

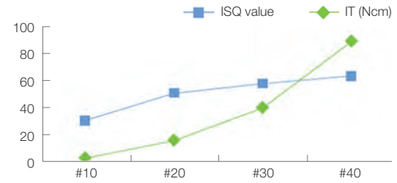

Fig. 1.

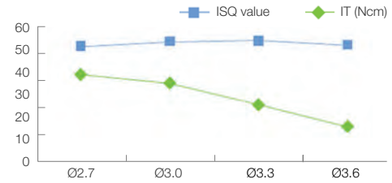

Fig. 2.

Table 4. Correlation between the insertion torque and implant stability according to the cancellous bone density with cortical bone.

	No.	Insertion torque(Ncm)			ISQ value			Correlation
		Average	SD	*P*-value[a]	Average	SD	*P*-value[a]	
Cancellous bone density				0.00			0.15	CQ=0.45, P=0.09
#10	5	19.6	1.14		59.8	1.59		
#20	5	24.8	2.86		57.9	0.51		
#30	5	51.0	5.34		60.8	1.56		

SD: standard deviation, ISQ: implant stability quotient, ANOVA: analysis of variance. [a] ANOVA

Table 5. Correlation between the insertion torque and implant stability according to the final drill diameter with cortical bone.

	No.	Insertion torque(Ncm)			ISQ value			Correlation
		Average	SD	*P*-value[a]	Average	SD	*P*-value[a]	
Final drill diameter				0.00			0.02	CQ=0.57, P=0.01
Ø3.0 mm	5	36.4	4.04		58.9	1.33		
Ø3.3 mm	5	32.8	5.97		58.7	0.58		
Ø3.6 mm	5	24.8	2.86		58.0	1.48		
Ø3.8 mm	5	16.2	2.17		56.8	1.33		

SD: standard deviation, ISQ: implant stability quotient, ANOVA: analysis of variance. [a] ANOVA

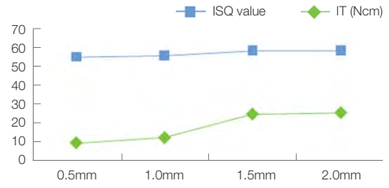

Fig. 3.

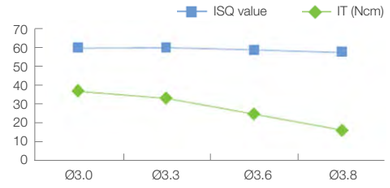

Fig. 4.

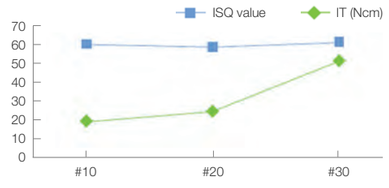

Fig. 5.

Conclusions

Within the limitations of the study, it was concluded that primary stability does not simply depend on the insertion torque, but also on the bone quality.

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

Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008;105:144-8

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, microscopic computerized 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.

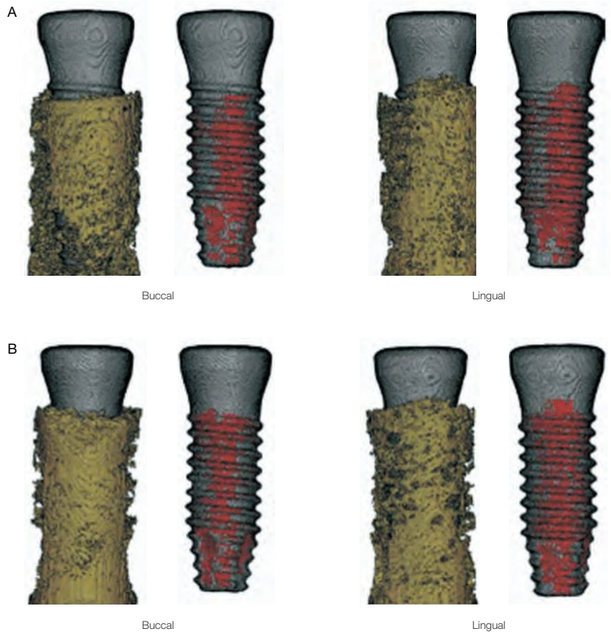

Fig. 1. Three-dimensional micro-CT showing the bone (yellow) and the bone-to-implant contact area (red) around the implants (gray): A, immediately loaded implant; B, delayed loading implant. Buccal, buccal side of the alveolus; lingual, lingual side of the alveolus.

Table 1. Parameters (mean values and standard deviations) of bone-to-implant contact and bone height around dental implants with either immediate or delayed loading

	Immediately	Delayed	P values
Bone-implant contact (%)	60.9 ± 8.2	65.5 ± 8.8	< .05
Bone height (mm)	9.6 ± 0.5	10.6 ± 0.4	< .05

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

Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2007;104:24-8

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 at flapless sites (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.

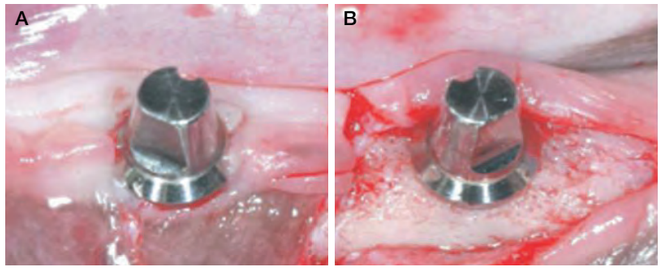

Fig. 1. Clinical feature after implant placement. A: Flapless surgery B: Flap surgery

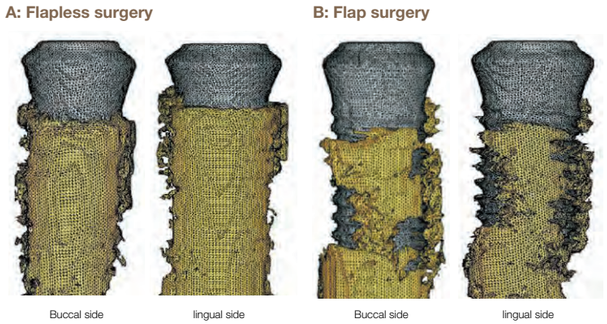

Fig. 2. Three-dimensional micro-CT showing the bone (yellow) around the implants (gray).

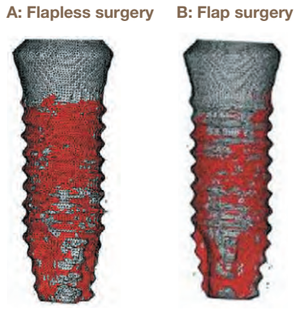

Fig. 3. Three-dimensional micro-CT overview of the bone-to implant contact area (red) around the implant surface (gray).

Table 1. Parameters of bone-to-implant contact and bone height around dental implants when placed either without or with a flap

	Flapless group	Flap group
Bone-implant contact (%)	70.4 ± 6.3	59.5 ± 6.3
Bone height (mm)	10.1 ± 0.5	9.0 ± 0.7

The Effect of Internal Implant-Abutment Connection and Diameter on Screw Loosening

Chun-Yeo Ha, Chang-Whe Kim,Young-Jun Lim, Kyung-Soo Jang

J Kor Acad Prosthodont 2005;43(3):379-92

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 Molars.

The purposes of this study were: (1) to compare the initial abutment screw de torque values of the six different implant-abutment 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-abutment 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 (20 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.

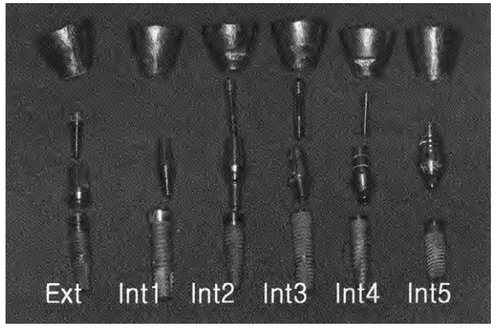

Fig. 1. Regular diameter implants, abutments, abutment screws and titanium crowns.

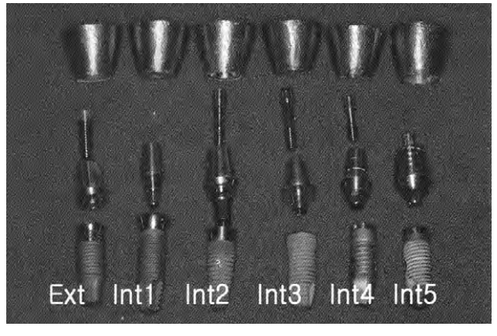

Fig. 2. Wide diameter implants, abutments, abutment screws and titanium crowns.

Results & Conclusion

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 ($p < .05$).

Table 1. List of Components

Group	Brand name	Types of cemented abutments
Ext(R)	Osstem USII Implant	Hexed, collar 1mm, height 5.5mm
Ext(W)		Hexed, collar 1mm, height 5.5mm
Int1(R)	Osstem SSII Implant	non-octa, height 5.5mm
Int1(W)		non-octa, height 5.5mm
Int2(R)	Camlog☆	trivam, gingival collar 1.5mm
Int2(W)		trivam, gingival collar 1.5mm
Int3(R)	Implantium☆	non-hex, gingival collar 1.0mm
Int3(W)		non-hex, gingival collar 1.0mm
Int4(R)	MIS☆	hexed, gingival collar 2.0mm
Int4(W)		hexed, gingival collar 2.0mm
Int5(R)	Tapered Screw Vent☆	hexed, 5.5mm wide profile
Int5(W)		hexed, 5.5mm wide profile

Ext : extenal, Int : intenal

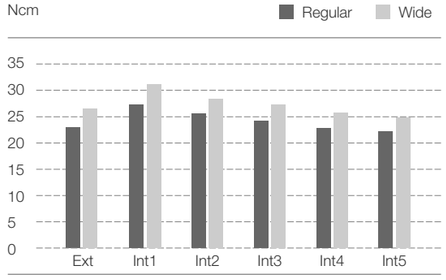

Fig. 3. Mean initial detorque value.

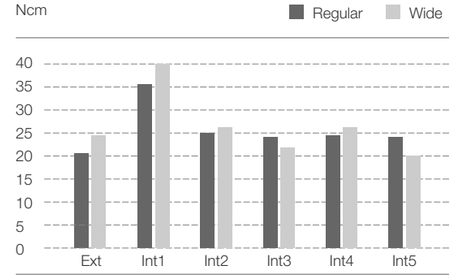

Fig. 4. Mean detorque values after cyclic loading.

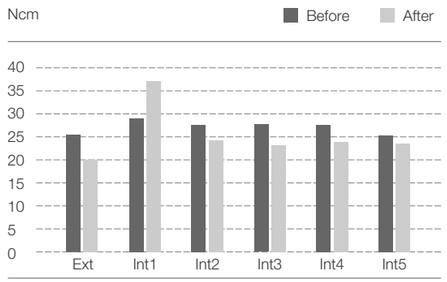

Fig. 5. Mean detorque values of regular diameter implants.

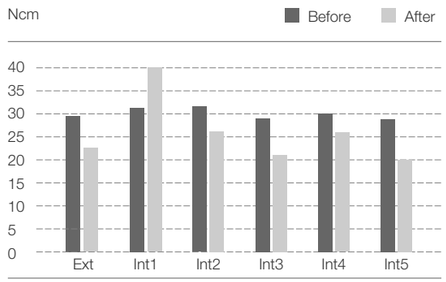

Fig. 6. Mean detorque values of wide diameter implants.

Influence of different impression coping connection methods on rotational error of implant fixture and analog

Hyeonjong Lee, Yi-Hyung Woo, Hyeong-Seob Kim, Ahran Pae, Kwante Noh, Janghyun Paek, Kung-Rock Kwon.

Scientific Poster, Osstem Meeting 2015

Introduction

Many clinician use fingers or a tool such as crown gripper to place impression coping (IC) on fixture. IC is placed on the fixture with clockwise(CW) state or counter clockwise(CCW) state unconsciously then screw is tightened. All of these situation cause the difference of rotational error.

Purpose

The purpose of this study was to measure the rotational error from fixture to analog among four different method and find out the method how the rotational error could be minimized.

Materials & Methods

Four tightening methods were used to obtain rotational error using one type of eight internal tissue level implants(SSIII, Diameter : 4.0mm, Length : 10mm Osstem, Busan), IC and analogs. IC was placed on fixture with pre-CW or CCW state, tightened 10Ncm using torque controller.

Transpositional zig was used to transfer precise rotational position of IC from baseplate 1 to 2. Analog was connected and fastened 10Ncm with different methods. Holding analog by crown gripper(G) or holding tray and analog by hand(H). Analog was set on base plate2. Group 1 was CWG, Group 2 was CWH, group3 was CCWG and group 4 was CCWH. Five repeated measurement were performed.
All transfered analog were taken image by optical device, compared to original model and measured the difference of internal hex position using image program.

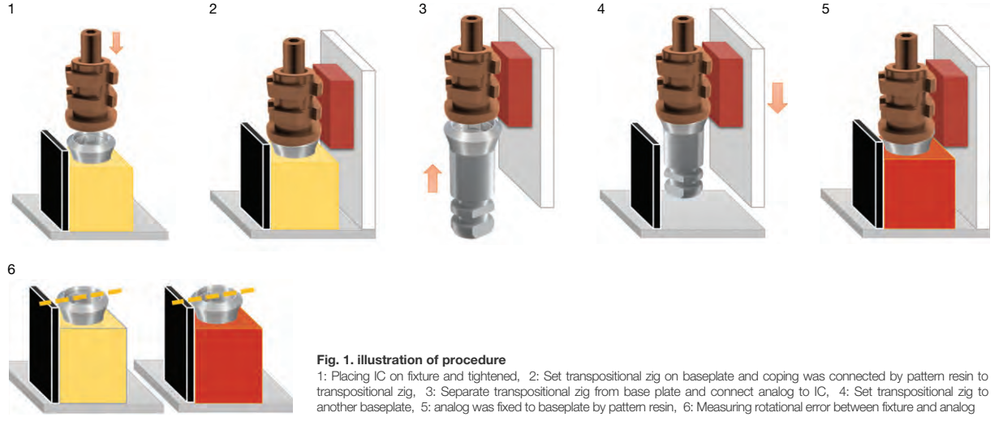

Fig. 1. illustration of procedure
1: Placing IC on fixture and tightened, 2: Set transpositional zig on baseplate and coping was connected by pattern resin to transpositional zig, 3: Separate transpositional zig from base plate and connect analog to IC, 4: Set transpositional zig to another baseplate, 5: analog was fixed to baseplate by pattern resin, 6: Measuring rotational error between fixture and analog

Guide structure for measuring rotational error

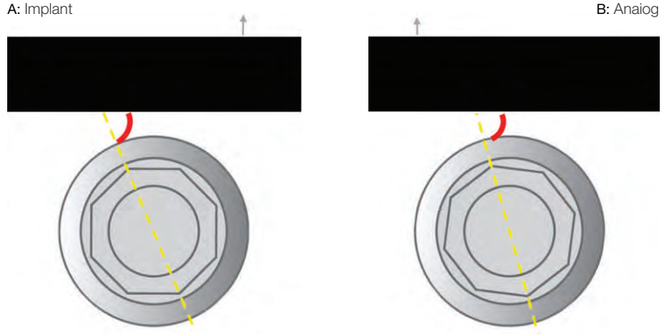

Fig. 2. Measuring method of rotational error

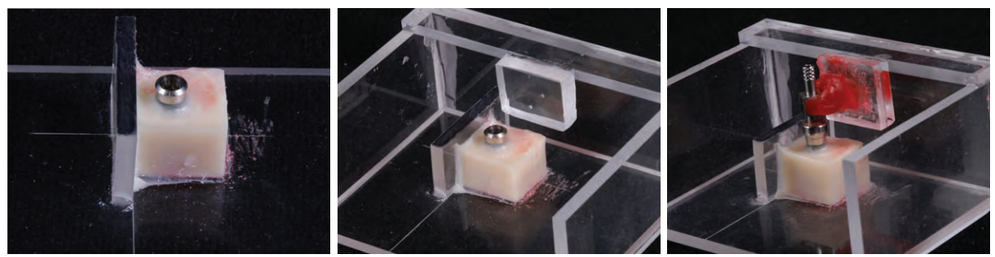

Fig. 3. A) Embedded fixture by resin, B) Set transpositional zig to base plate 1, C) Tightening IC and connecting IC to transpositional zig, D) Seperating transpositional zig from base plate 1, connecting analog to IC and set to base plate 2, E) Image of analog, F) Measuring rotational error.

Results

CWG exhibits 0.01 ±0.24 degree of rotational error, CWH was -1.83 ±0.25, CCWG was 2.36 ±0.26 and CCWH shows -0.27 ±0.23. Plus degree means that analog was rotated CCW compared to fixture, minus means CW. Analogs were held by crown gripper in CWG and CCWG which is known as right method to decrease deformation of impression body. However, rotational error was high in CCWG.

Conclusions

Analog should be tightened by using crown gripper in order to prevent deformation of impression body which could be occurred by using just hand holding. It reveals that when using crown gripper to fasten analog to IC, analog turns CCW direction. Thus, to offset rotational error between fixture and analog, IC should be placed CW state on fixture before screw tightening, and analog should be tightened with crown gripper

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03

US System

Selected literature of published Journals

A Multicenter Clinical Study on the Survival and Success Rates of Two Commercial Implants of Korea according to Loading Period

Sung-Hwan Yoon, Myung-In Kim, Kwang Chung, Seunggon Jung, Min-Suk Kook, Hong-Ju Park, Hee-Kyun Oh, Su-Gwan Kim, Young-Kyun Kim, Yong-Seok Cho, Woo-Cheoul Kim, Choon-Mo Yang.

J Korean Dent Sci 2013 Vol.6, No.2 67-77

Purpose

The purpose of this study was to evaluate the survival and success rates of Korean Osstem implants US II Plus, GS II following loading period.

Materials & Methods

Dental records were obtained in total 201 patients who were treated with Korean Osstem implants US II Plus, GS II on both maxillary and mandibular interior and posterior areas in six different clinics for 2years from January 2007 to December 2008. Total 430 implants were evaluated clinically and radiographically using predefined success criteria prospectively and following results were obtained.

Results

US II Plus, GS II implants showed high survival rates of more than 99% and high success rates more than 90% independent of loading period. As a result of cross analysis to evaluate clinical significance between implant loading period and success rate, the P-value of US II Plus was 0.10 (P>0.05), and the P-value of GS II was 0.17 (P>0.05), which showed no statistical significance.

Bone quality, smoking, and edentulous state are factors that can affect the survival and success rates following differently loaded implants, but did not significantly affect in this study.

Table 1. Influence of locations on US II plus implant survival and success rate

Location	Number of implant			Survival rate, n (%)			Survival rate, n (%)		
	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
Maxilla									
Anterior	8	10	1	8/8 (100)	10/10 (100)	1/1 (100)	8/8 (100)	10/10 (100)	1/1 (100)
Posterior	7	44	20	7/7 (100)	44/44 (100)	20/20 (100)	5/7 (71.4)	44/44 (100)	19/20 (95.0)
Mandible									
Anterior	4	1	7	4/4 (100)	1/1 (100)	7/7 (100)	4/4 (100)	1/1 (100)	7/7 (100)
Posterior	4	12	49	4/4 (100)	12/12 (100)	49/49 (100)	4/4 (100)	11/12 (91.7)	49/49 (100)
Total	23	67	77	23/23 (100)	67/67 (100)	77/77 (100)	21/23 (91.3)	66/67 (98.5)	76/77 (98.7)

Table 2. Influence of locations on GS II implant survival and success rate

Location	Number of implant			Survival rate, n (%)			Survival rate, n (%)		
	Group 4	Group 5	Group 6	Group 4	Group 5	Group 5	Group 4	Group 5	Group 6
Maxilla									
Anterior	3	8	28	3/3 (100)	8/8 (100)	28/28 (100)	3/3 (100)	8/8 (100)	28/28 (100)
Posterior	6	59	83	6/6 (100)	59/59 (100)	82/83 (98.8)	5/6 (83.3)	57/59 (96.6)	82/83 (98.8)
Mandible									
Anterior	1	4	5	1/1 (100)	4/4 (100)	5/5 (100)	1/1 (100)	4/4 (100)	5/5 (100)
Posterior	5	29	32	5/5 (100)	28/29 (96.6)	32/32 (100)	5/5 (100)	28/29 (96.6)	32/32 (100)
Total	15	100	148	15/15 (100)	99/100 (100)	147/148 (99.3)	14/15 (93.3)	98/100 (98.0)	147/148 (99.3)

Table 3. Influence of bone quality on implant

Bone quality	US II plus			GS II		
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Survival rate, n (%)						
Type 1	0	0	0	0	2/3 (66.7)	7/7 (100)
Type 2	13/13 (100)	30/30 (100)	39/39 (100)	7/7 (100)	30/30 (100)	47/47 (100)
Type 3	10/10 (100)	37/37 (100)	38/38 (100)	4/4 (100)	25/25 (100)	45/45 (100)
Type 4	0	0	0	4/4 (100)	42/42 (100)	48/49 (98.0)
Total	23/23 (100)	67/67 (100)	77/77 (100)	15/15 (100)	99/100 (99.0)	147/148 (99.3)
Success rate, n (%)						
Type 1	0	0	0	0	2/3 (66.7)	7/7 (100)
Type 2	12/13 (92.3)	30/30 (100)	38/39 (97.4)	6/7 (85.7)	30/30 (100)	47/47 (100)
Type 3	10/10 (100)	36/37 (97.3)	38/38 (100)	4/4 (100)	25/25 (100)	45/45 (100)
Type 4	0	0	0	4/4 (100)	40/42 (95.2)	48/49 (98.0)
Total	22/23 (95.7)	66/67 (98.5)	76/77 (98.7)	14/15 (93.3)	97/100 (97.0)	147/148 (99.3)

Table 4. Influence of smoking on implant success rate

Smoking	US II plus			GS II		
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Survival rate, n (%)						
Smoking	5/5 (100)	6/6 (100)	7/7 (100)	3/3 (100)	18/18 (100)	19/19 (100)
Non-smoking	18/18 (100)	61/61 (100)	70/70 (100)	12/12 (100)	81/82 (98.8)	128/129 (99.2)
Total	23/23 (100)	67/67 (100)	77/77 (100)	15/15 (100)	99/100 (99.0)	147/148 (99.3)
Success rate, n (%)						
Smoking	5/5 (100)	6/6 (100)	7/7 (100)	2/3 (66.7)	18/18 (100)	19/19 (100)
Non-smoking	17/18 (94.4)	60/61 (98.4)	69/70 (98.6)	12/12 (100)	80/82 (97.6)	128/129 (99.2)
Total	22/23 (95.7)	66/67 (98.5)	76/77 (98.7)	14/15 (93.3)	98/100 (98.0)	147/148 (99.3)

Table 5. Influence of edentulous type on implant success rate

Type	US II plus			GS II		
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Survival rate, n (%)						
Full	6/6 (100)	11/11 (100)	12/12 (100)	3/3 (100)	5/5 (100)	26/26 (100)
Partial	11/11 (100)	29/29 (100)	38/38 (100)	8/8 (100)	78/79 (98.7)	98/99 (99.0)
Single	6/6 (100)	27/27 (100)	27/27 (100)	4/4 (100)	16/16 (100)	22/22 (100)
Total	23/23 (100)	67/67 (100)	77/77 (100)	15/15 (100)	99/100 (99.0)	147/148 (99.3)
Success rate, n (%)						
Full	6/6 (100)	11/11 (100)	12/12 (100)	3/3 (100)	5/5 (100)	26/26 (100)
Partial	11/11 (100)	28/29 (96.6)	38/38 (100)	7/8 (87.5)	77/79 (97.5)	98/99 (99.0)
Single	5/6 (83.3)	27/27 (100)	26/27 (96.3)	4/4 (100)	16/16 (100)	22/22 (100)
Total	22/23 (95.7)	66/67 (98.5)	76/77 (98.7)	14/15 (93.3)	98/100 (98.0)	147/148 (99.3)

Table 6. Clinical significance between implant loading time & success rate

Statistical list	Value	df	Asymptotic Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
US II plus					
Pearson chi-square	4.54	2	0.10	0.16	
Likelihood ratio	3.10	2	0.21	0.25	
Fisher's exact test	3.62				
Linear-by-linear association	2.71	1	0.10	0.15	0.10
Number of valid cases	167				
GS II					
Pearson chi-square	3.51	2	0.17	0.15	
Likelihood ratio	2.48	2	0.29	0.37	
Fisher's exact test	3.74			0.15	0.11
Linear-by-linear association	2.84	1	0.09	0.11	
Number of valid cases	263				

df: degrees of freedom, Sig: significance.

Conclusions

These results suggest that selection of loading period of Korean Osstem implants US II Plus, GS II would be done carefully considering implant install area, the quality alveolar bone, the state of edentulous ridge and experience of operator, though they showed clinically good results on both maxillary and mandibular anterior and posterior areas.

Success Rate and Marginal Bone Loss of Osstem USII Plus Implants : Short Term Clinical Study

Sun-Keun Kim, Jee-Hwan Kim, Keun-Woo Lee, Kyoo-Sung Cho, Dong-Hoo Han

J Korean Acad Prosthodont 2011;49(3):206-13

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 (α=0.05), and one way repeated measures ANOVA was used to compare the amount of marginal bone resorption.

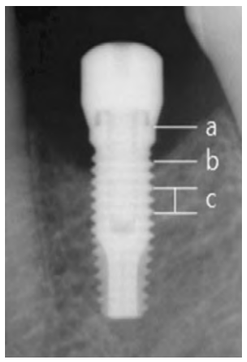


Fig. 1. References used to measure actual marginal bone loss.
a: top level of implant platform
b: implant to marginal bone contact level
c: interthread distance of three threads

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

	Marginal bone resorption (mm) (Mean ± SD)			
	Mesial	Distal	Total	t-test P value
Sur-B	0.25±0.48	0.24±0.41	0.24±0.40	.697
B-12 month	0.20±0.50	0.18±0.38	0.19±0.43	.756
Sur-12 month	0.44±0.67	0.42±0.53	0.43±0.56	.439

Sur-B: period from surgery to baseline (functional loading)
B-12 month: period from baseline to 12 month
Sur-12 month: period from surgery to 12 month post baseline, SD: standard deviation

Results

The cumulative survival rate for 88 implants was 100%. The marginal bone resorption from implant placement to prosthetic delivery 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>.05), however, implants placed in the posterior areas showed significantly more marginal bone loss than those placed in the anteriorareas (p<.05).

Conclusions

Based on these results, the short term clinical success rate of 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 2. Distribution of implants by bone resorption

Amount of bone resorption (mm)	Number of implants	Amount of bone resorption (mm)	Number of implants
<0.2	40	0.9	1
0.3	10	1	2
0.4	3	1.2	7
0.5	9	1.5	4
0.6	5	2	1
0.7	3	3	1
0.8	2		

The Study of Bone Density Assessment on Dental Implant Sites

Su-Won Park, Soo-Mi Jang, Byoung-Hwan Choi, Han-Na Son, Bong-chan Park, Chang-Hwan Kim, Jang-Ho Son, Lel-Yong Sung, Ji-Ho Lee, Yeong-Cheol Cho

J Korean Assoc Oral Maxillofac Surg 2010;36(5):417-22

Objective

Bone density is one of the important factors for the long term success of endosseous implants. The bone density varies from site to site and from patient to patient. A preoperative evaluation of the bone density is quite useful to oral surgeons for planning dental implantation. More accurate information on the bone density will help surgeons identify suitable implant sites, thereby increase the success rate of dental implantation.

This study examined the correlation between the bone density measured preoperatively by computed tomography (CT) and the implant primary stability measured by resonance frequency analysis. Furthermore, the effects of the implant sites, gender, age and generalized systemic disorder patients on the bone density and primary implant stability were examined.

Materials & Methods

One hundred and fourteen patients were selected. None of the patients had undergone a tooth extraction or bone graft history in the previous year. Preoperatively, the patients underwent CT scanning to evaluate the Hounsfield unit (HU), and resonance frequency analysis (RFA) was used to evaluate the implant primary stability at the time of implant installation.

All implants were 4.0 mm diameter and 11.5 mm length USII. All patients were recorded and the HU and implant stability quotient (ISQ) value were evaluated according to the sites, gender and age.

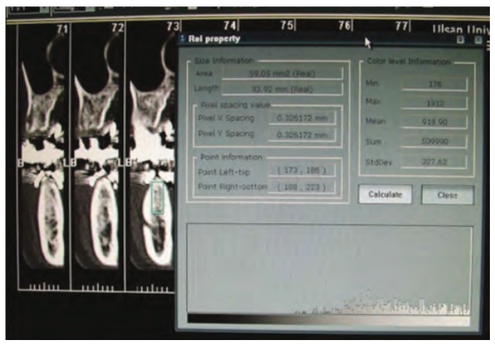


Fig. 1. Image of transaxial cut of Somatom computed tomography (CT). The hounsfield unit (HU) measurement feature of CT was utilized to evaluate the bone density.

Results

The highest HU values were found in the mandibular anterior site (827.6±151.4), followed by the mandibular molar site (797±135.1), 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 (76.4±11.9), maxillary premolar site (74.2±14.3) and maxillary molar site (73.7±7.4). The mean HU and ISQ value were similar in females and males. (HU: p=0.331, ISQ: p=0.595) No significant difference was also found in the age group respectively. However, the correlation coefficients between the variables showed a closed correlation between the HU and ISQ value.

Conclusions

Based on these results, the short term clinical These results showed close correlation between the bone density (HU) and primary stability value (ISQ) at the time of implant installation (Correlation coefficients=0.497, p<0.01). These results strengthen the hypothesis that it might be possible to predict and quantify the initial implant stability and bone density from a presurgical CT diagnosis.

Table 1. Results of ANOVA for Hounsfield unit (HU) and implant

	No	HU	ISQ
Zone 1	14	723.6±154.4	74.4±4.1
Zone 2	14	656.7±173.8	74.2±14.3
Zone 3	23	621.5±164.9	73.7±7.4
Zone 4	8	827.6±151.4	76.4±11.9
Zone 5	12	753.8±171.2	81.5±2.4
Zone 6	43	797.7±135.1	80.0±5.7
p value*		0	0.011

(No: number of patients, Zone 1: maxillary anterior, Zone 2: maxillary premolar, Zone 3: maxillary molar, Zone 4: mandibular anterior, Zone 5: mandibular premolar, Zone 6: mandibular molar, *: p value was taken by ANOVA)

Table 2. Partial correlation coefficients between the variables

	No	HU
ISQ	(-)	0.497*
HU	0.497*	(-)
Age	-0.104	-0.125

(HU: Hounsfield unit, ISQ: implant stability quotient,
*: p<0.01, adjusted by sex and systemic diseases)

Re-implantation to surgically treated bisphosphonate-related osteonecrosis of the jaw(BRONJ) : Case report

Ji-Wan Kim, Ju-Hong Jeon
Scientific Poster, Osstem Meeting 2015

Introduction

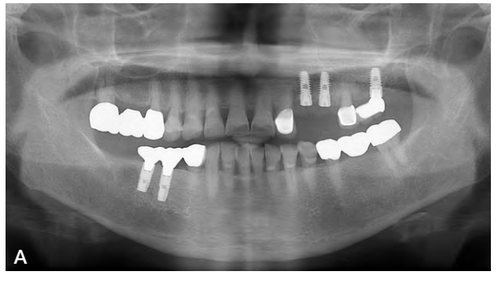
Many surgeons don't recommend to place implant at the site of healed bisphosphonate-related osteonecrosis of the jaw(BRONJ). But this trends rely on empirical data, scientific evidence is lacking now. We placed implants at the region of surgically well treated BRONJ and it shows favorable result so far.

Purpose

The object of this case report is to present a rare case of re-implantation at the region of surgically well treated BRONJ.

Case Presentation

In March 2013, a 73-year-old female was referred to the Department of Oral and Maxillofacial Surgery with pain and facial swelling at the upper left canine implant and the first premolar implant area beginning about 6 months previously. Two dental implants had been placed at the private clinic 3 year earlier. She had been diagnosed with osteoporosis, taken oral BPs(bisphosphonate), 70 mg alendronate (Fosamax, Merck, Whitehouse Station, USA) during 4-year once per week.



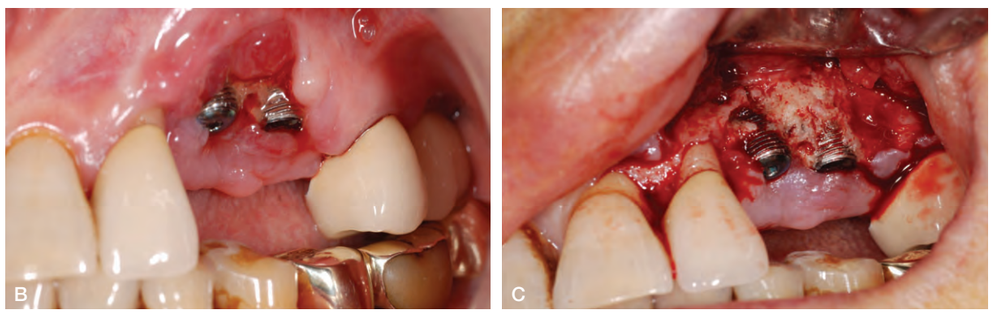


Fig 1. A: Panoramic radiograph at first visit(2013/03). B: Intraoral photograph at first visit(2013/03) C: Intraoral photograph during surgery(2013/05)

On dental examination, she complained of pain on palpation, and gingival swelling and redness on the buccal side of the two implants. Exposure of the necrotic bone and alveolar bone resorption was observed(Fig1B). She was treated with conventional antibiotic therapy during 2 month, but symptom still remained. So in May 2013, we diagnosed her as BRONJ finally, sequestrectomy was performed and the two implants were removed. (Fig1C)

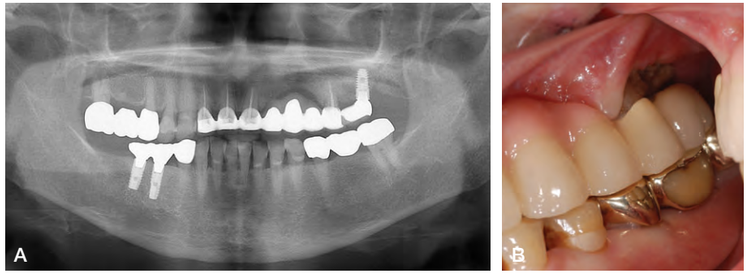


Fig 2. A: Implant removal and conventional bridge prosthesis was rehabilitated. (2013/12). B: Intraoral photograph of necrotic bone exposure at the upper left molar area(2014/04)

After surgery, soft tissue coverage without any necrotic bone could be achieved. In August 2013, she complained of pain and gingival swelling on the upper left first molar implant again. Same as earlier, we performed conservative therapy, but necrotic bone was exposed (Fig2B).

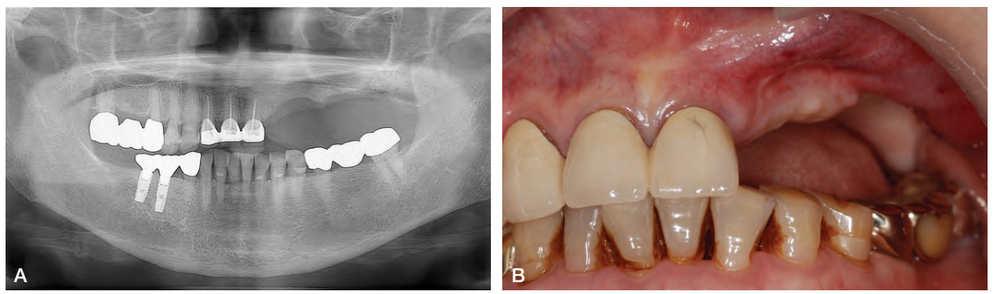


Fig 3. A: Panoramic radiograph before re-implantation(2014/09) B: Intraoral photograph(2014/10)

In Aplil 2014, sequestrectomy was performed. The upper left first molar implant and the upper left second premolar were removed.(Fig 3A, 3B) The patient wore a removable partial denture(RPD). But patient couldn't' adapt to RPD, she wanted to restore her edentulous area using implant again.

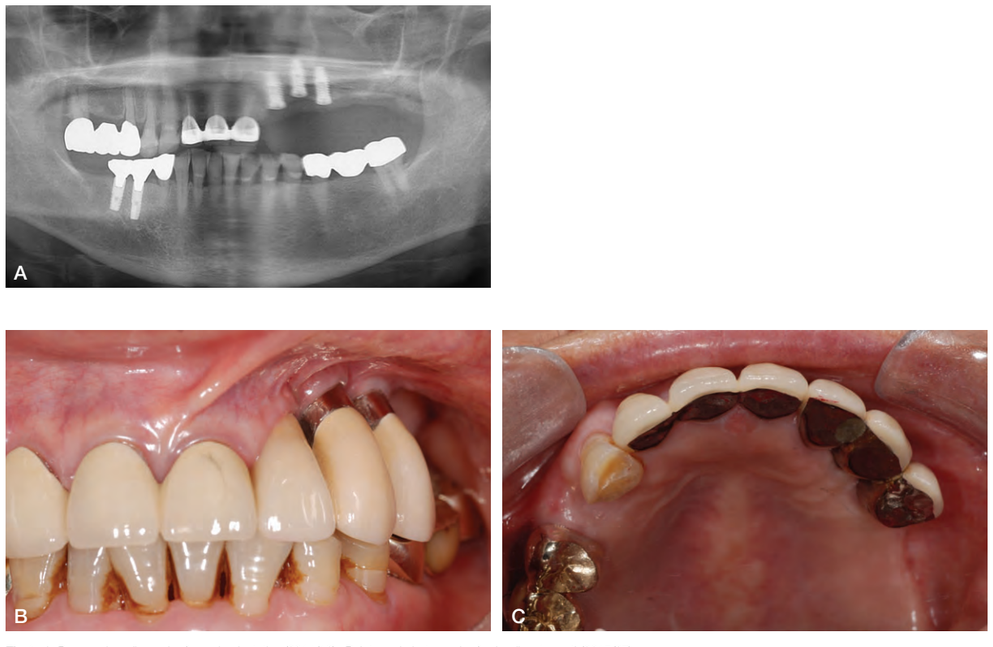


Fig 4. A: Panoramic radiograph after re-implantation (2014/10) B: Intraoral photograph after loading 4 month(2015/07)
C: Intraoral photograph after loading 4 month(2015/07)

Patients who have already experienced BRONJ are estimated to be high-risk cases. Therefore, implant therapy is not recommended to date. But in this case, we decided on implant therapy because healing after BRONJ surgery was uneventful. Alveolar bone which have more fast bone turnover rate was removed on maxilla, because basal bone which have slower bone turnover rate may be lower risky than alveolar bone, implant therapy was choosen. BRONJ usually appears at the alveolar bone.

The patient was specifically informed about BRONJ risk and had to sign a written informed consent. In October 2014, three implants were placed to replace the lateral incisor(#22), canine(#23), first premolar(#24). (Osstem US II SA 4x10mm) (Fig4A) Implant site was prepared with the standard protocol for submerged implants.
In March 2015, after an osseointegration phase of 5 months, implants were exposed and healing abutments were inserted. Implants showed good stability, then crowns were supplied. 12 months after implant surgery and 9 months after restoration, the peri-implant region remained fine until now.(Fig 4B, 4C)

Conclusions

The results of this case suggest that a patient taking BPs orally should be treated cautiously. But re-implantation to the patient who have a healed history of BRONJ is not absolute contraindication in carefully selected cases, considering individual factors. Further studies are needed to confirm this conclusion.

Prosthetic rehabilitation for a patient with CO-MI discrepancy

Seung-Sik Choo, Lee-Ra Cho, Chan-Jin Park, Yoon-Hyuk Huh

Scientific Poster, Osstem Meeting 2015

Introduction

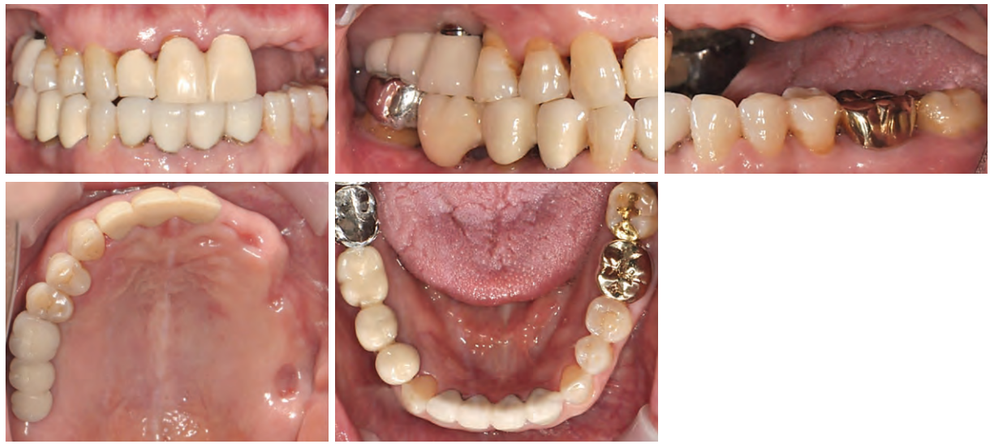
Centric occlusion-maximum intercuspation (CO-MI) discrepancy is one of main causes of evoking premature contact and resultant mandibular shift. In patients with CO-MI discrepancy, extensive prosthetic rehabilitation may be needed to correct these non-physiological condition. Implant and tooth supported fixed partial denture through proper prosthodontic stage is a suitable method to restore physiological occlusion.

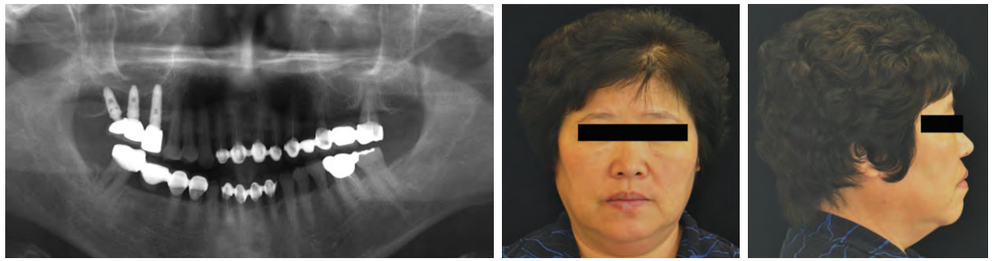
Case Report

Patient information

- Chief complaint : inefficiency on chewing food
- PMH : nothing special, PDH : discomfort after restoration

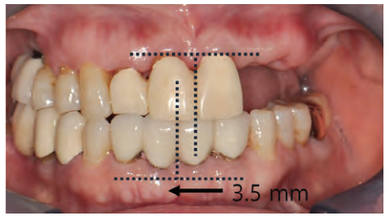
Initial examination



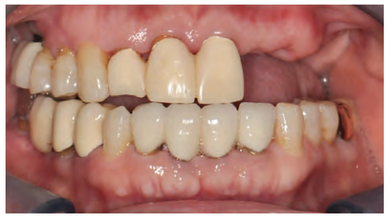


Diagnosis

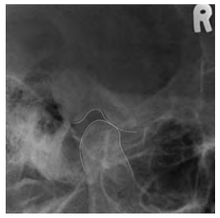
- Periodontitis and multiple caries
- CO-MI discrepancy : 3.5 mm shift to right-side



Maximum intercuspal position



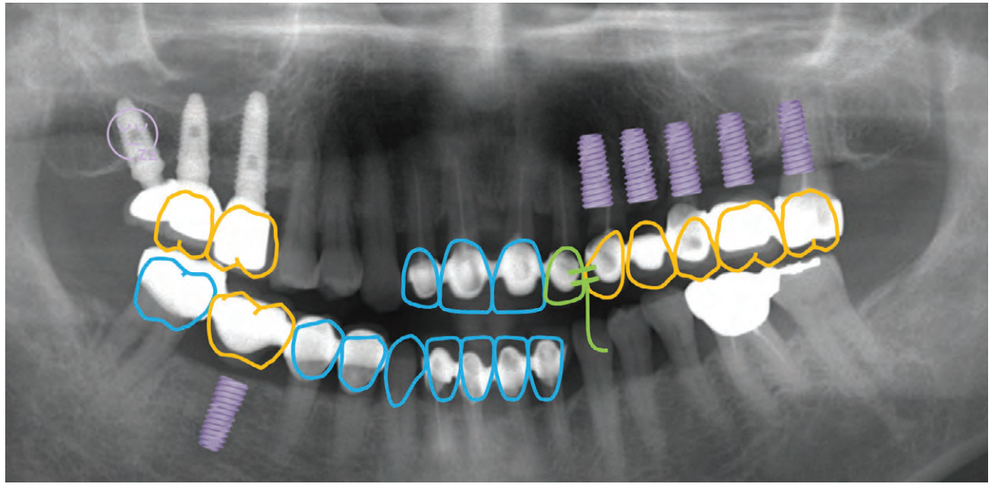
Centric occlusion



Anterior displacement of right mandibular condyle

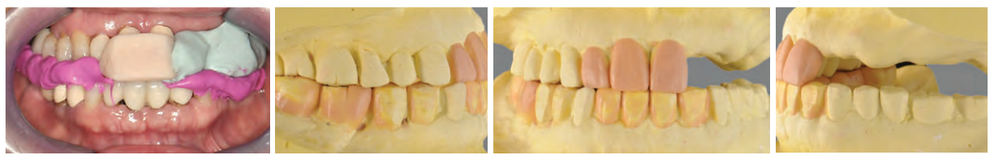
Treatment plan

- Seven implants, 10-unit fixed dental prosthesis were designed

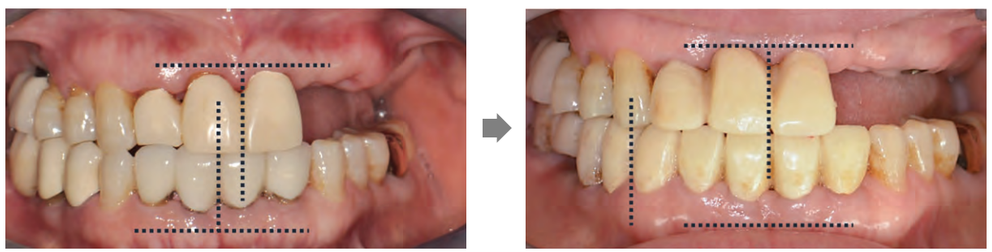


1st provisional prosthesis

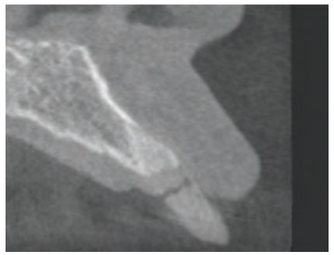
Centric relation record + diagnostic wax pattern



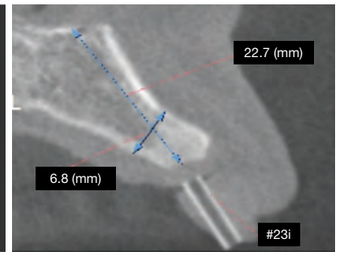
Elimination of deflective occlusal contact



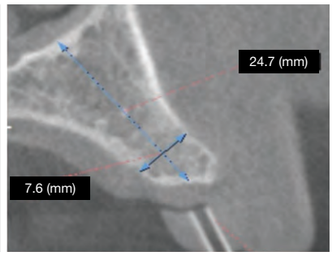
CBCT taking, lack of available bone on #22 area



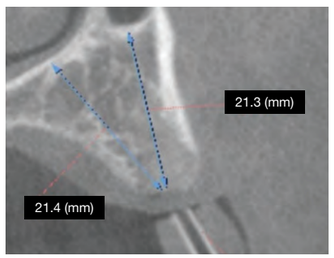
#22i : 2.1 / 23.3 mm



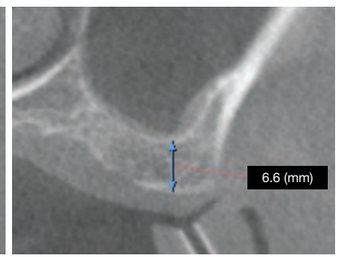
#23i : 6.8 / 22.7 mm



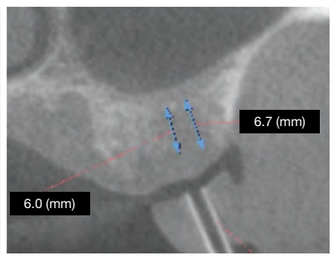
#24i : 7.6 / 24.7 mm



#25i : 8.9 / 21.4 mm

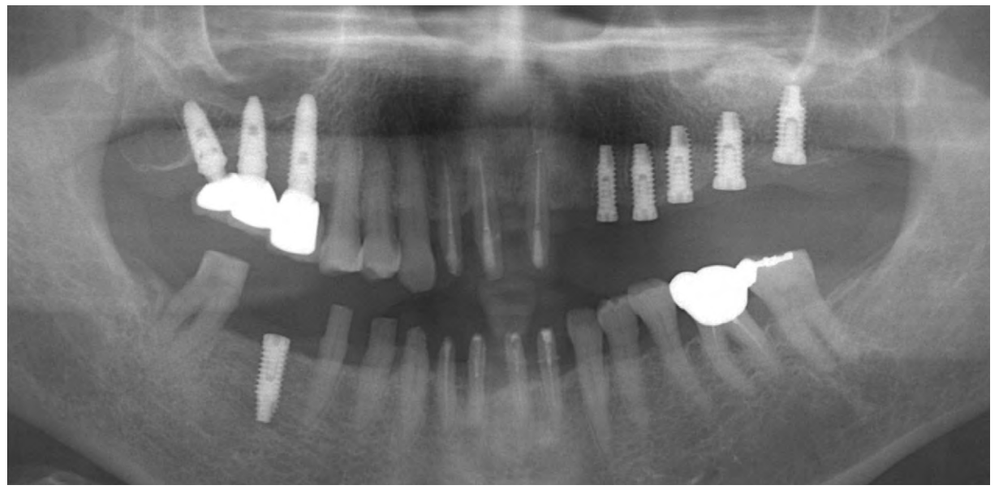


#26i : 4.5 / 6.6 mm



#27i : 5.6 / 6.7 mm

Seven implants (USII) placement

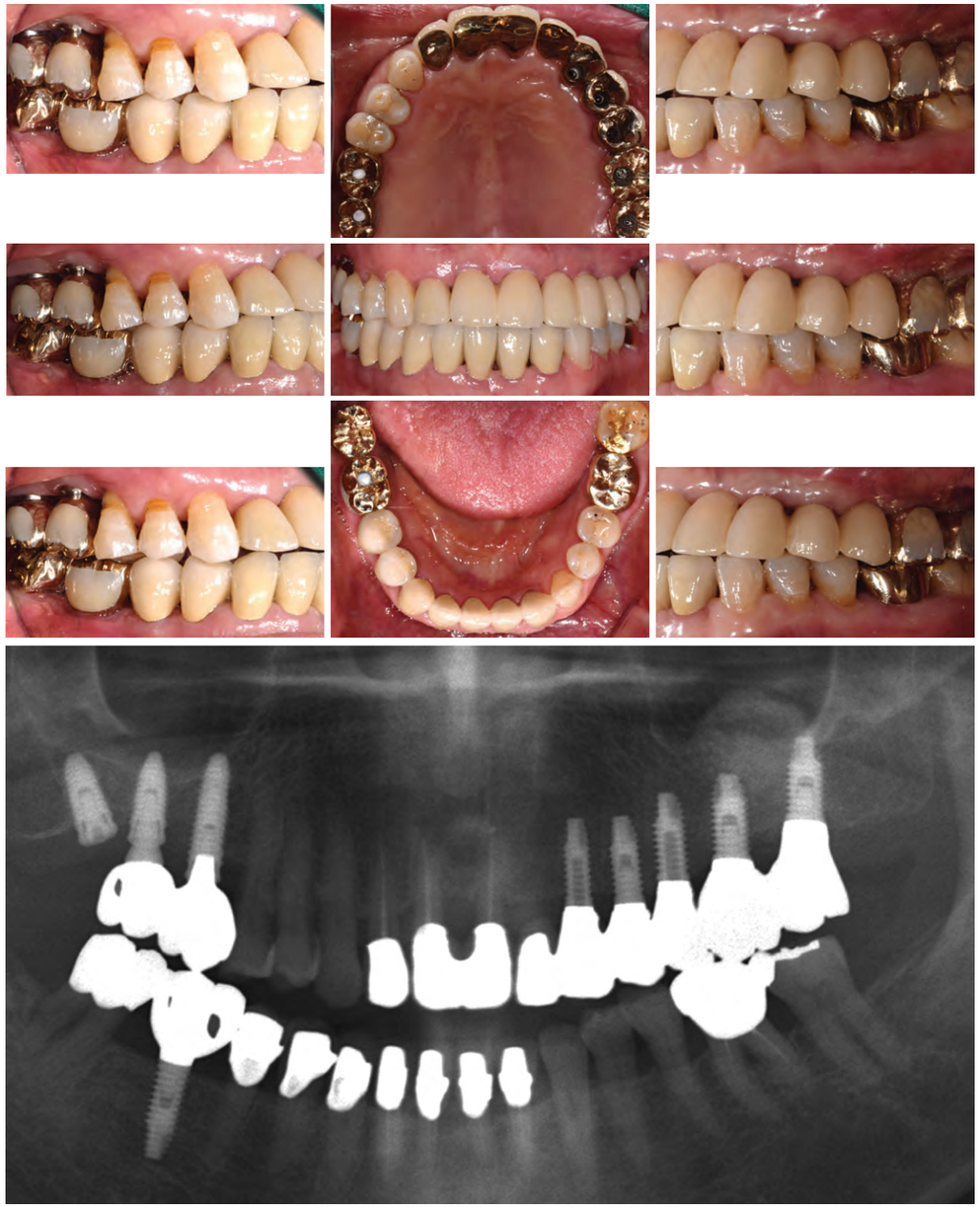


2nd provisional prosthesis

- #22 cantilevered pontic
- Right side : healthy canine and good interarch relationship
  : mutually protected occlusion is suitable
- Left side : multiple implants, cantilevered pontic
  : group function occlusion is suitable

Definitive prosthesis

- Anatomical wax pattern, cut back, metal coping
- Clinical remounting using anterior programming device
- PFG, and gold crown fabrication and panoramic view



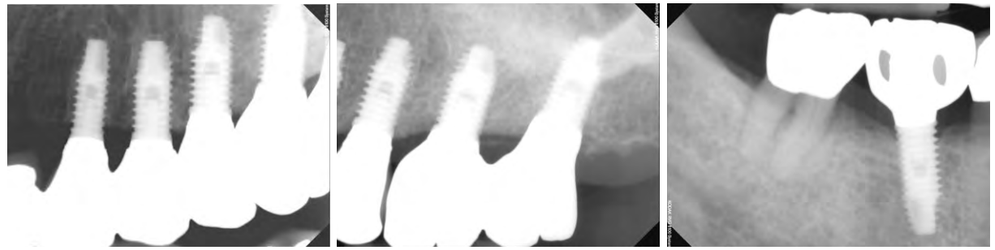
US System Clinical Study

Arcusdigmall- proper mandibular position and modified opening & closing movement were confirmed

Protrusion pattern(C) has a risk of incisal attrition or various degrees of flaring. Retrusive mandibular position during closing is more physiological.

Three months follow up

Stable occlusion, slight marginal bone loss were observed



Result & Discussion

Implants and tooth supported fixed partial denture through proper prosthodontic stage is a suitable method to restore physiological occlusion.

Patient obtained physiologic occlusion state and be satisfied with her restored function and esthetics. Her proper mandibular position and modified opening & closing movement were confirmed by Arcusdigmall and transcranial view. Deflective occlusal contact has a tendency to recur slightly after occlusal adjustment. Therefore, periodic follow up is needed for occlusal adjustment.

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 processes. 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㎛), Small SA (Ra 1.5㎛) and SA (Ra 2.8㎛).
The micro-pigs were sacrificed following a2 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.

Fig. 1. The ground sections illustrate the result of healing (original magnification, x 100).

Results

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

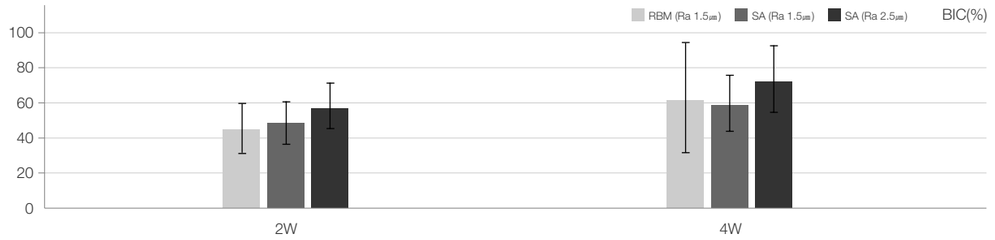


Fig. 2. BIC analysis.

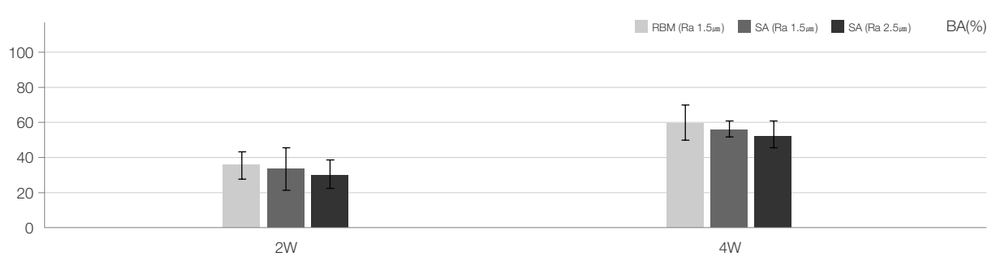


Fig. 3. BA analysis.

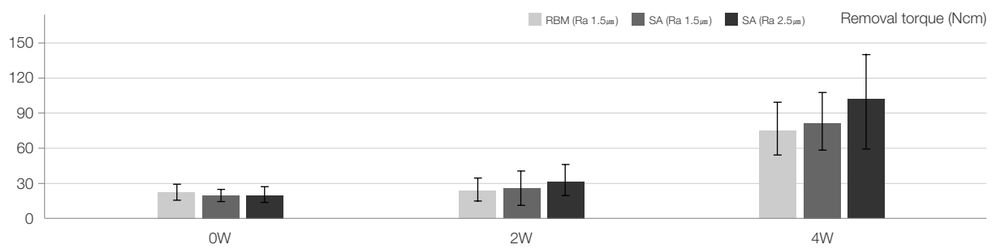


Fig. 4. Removal torque measurements.

Conclusion

The contribution of macro and micro topography to the anchorage of SA implants was determined. For the SA surface treatment, 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.

Quantatitive Biomechanical Analysis of the Influence of the Cortical Bone and Implant Length on Primary Stability

Jongrak Hong, Young-Jun Lim, Sang-Oh Park

Clin Oral Impl Res 2013; 23(10):1193-7

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. (Group1: with cortical and cancellous bone; Group 2: with cancellous bone only). A total of 60 external type implants (Ø4.1, 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.

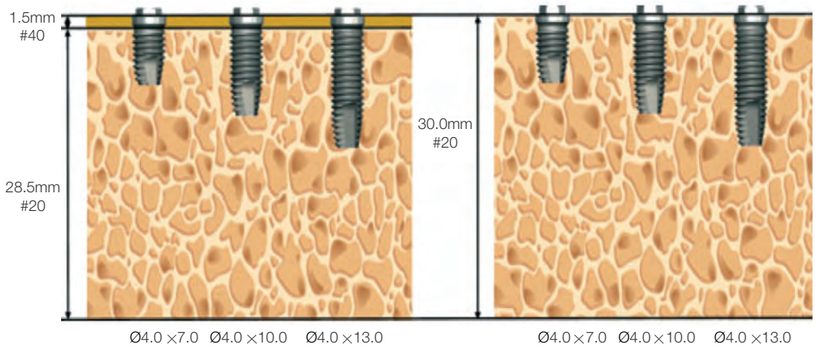


Fig. 1. Schematic drawing of this experiment.

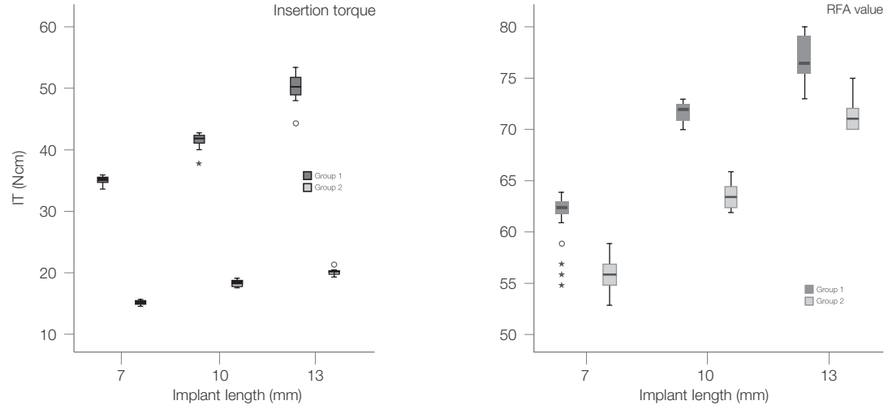


Fig. 2. Boxplots of maximum insertion torque(left) and ISQ values(right).

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 crestal 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.

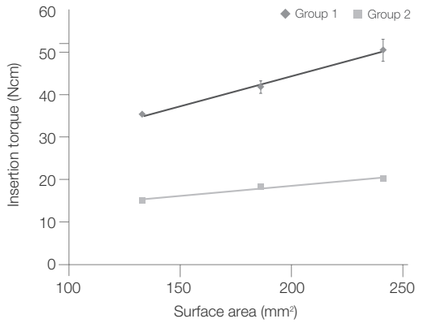


Fig. 3. Relationship between implant fixture surface area and insertion torque.

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

Wook-Jin Seong, Shahrzad Grami, Soo-Cheol Jeong,
Heather J. Conrad, James S. Hodges

Clin Implant Dent Res 2013;15(3):460-9

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 (Ø3.3 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.

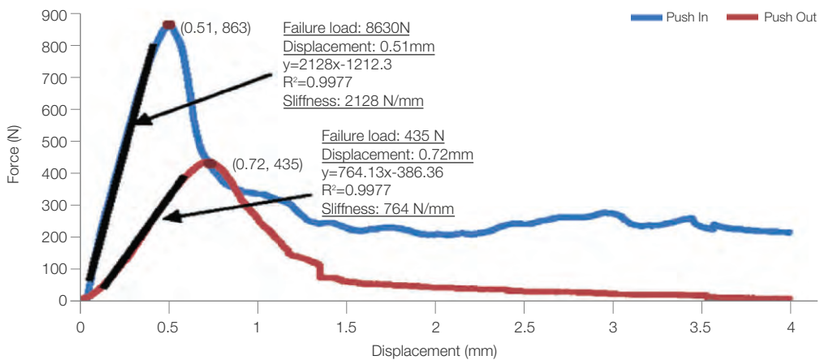


Fig. 1. Force-displacement graphs for both pull-out(red: left tibia) and push-in (blue: right tibia) tests for rabbit number 12 from the 12-week healing group.

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 ($r = 0.66$) 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 $r = 0.40$).

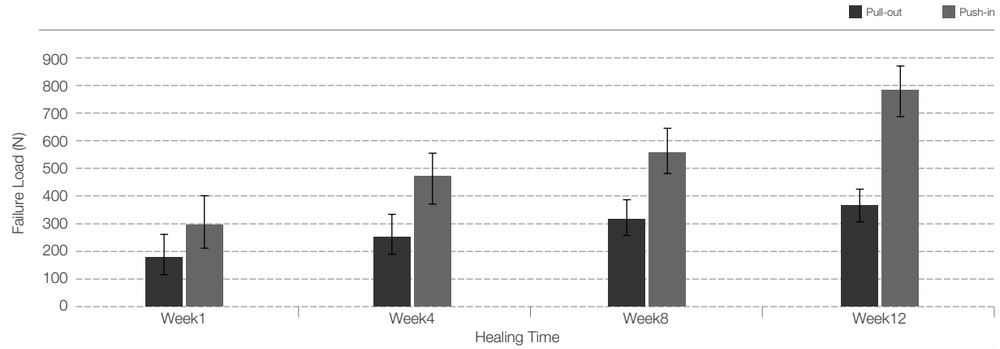


Fig. 2. Failure load measured by pull-out(black) and push-in(grey) tests, with the different healing periods (1- to 12- week).

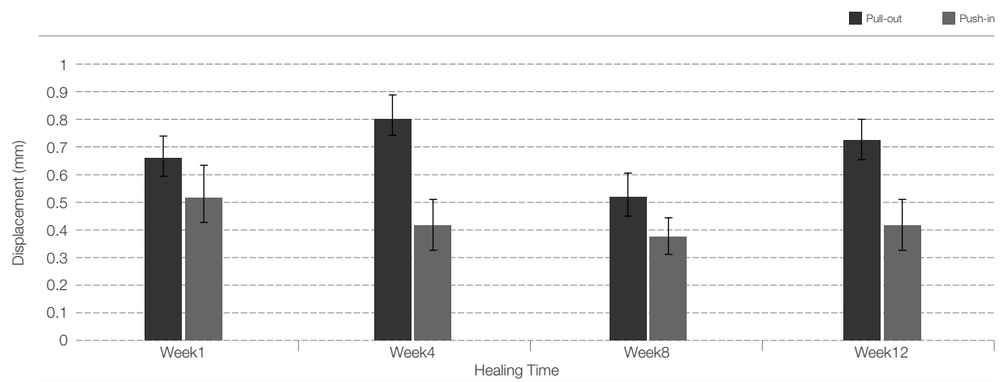


Fig. 3. Displacement measured at the failure of the bone-implant interface under pull-out(black) and push-in(grey) tests, with the different healing periods (1- to 12- week).

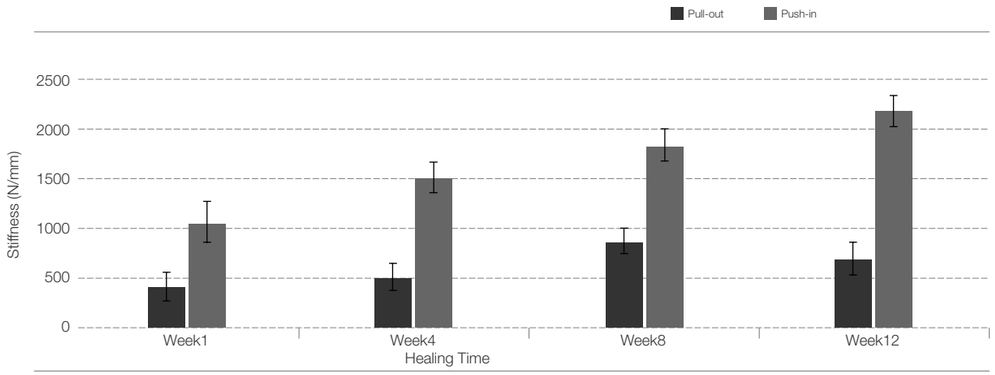


Fig. 4. Stiffness of the bone-implant interface measured by pull-out(black) and push-in(grey) tests, with the different healing periods (1- to 12-week).

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.

Heat Transfer to the Implant-Bone Interface During Preparation of Zirconia/Alumina Abutment

Jung-Bo Huh, Steven E. Eckert, Seok-Min Ko, Yong-Geun Choi

Int J Oral Maxillofac Implants 2009;24:679-83

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.

Materials & 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℃ water bath. Abutments were reduced horizontally 1mm height over a period of 1 minute with highspeed handipiece 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.

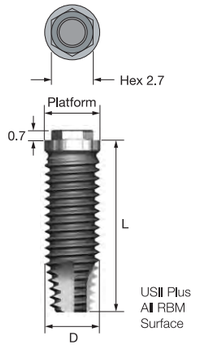


Fig. 1. USII Plus implant (Diameter:4.0mm, Length:13mm).

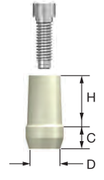


Fig. 2. ZioCera Abutment (Platform: regular, Height: 5.5mm, collar:5.0mm).

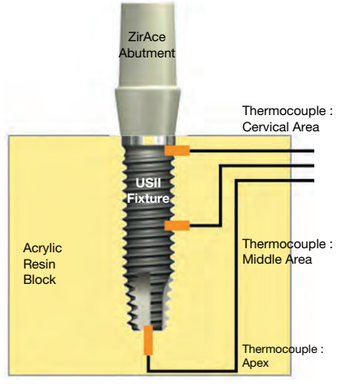


Fig. 3. Schematic of locations of three temperature sensors.

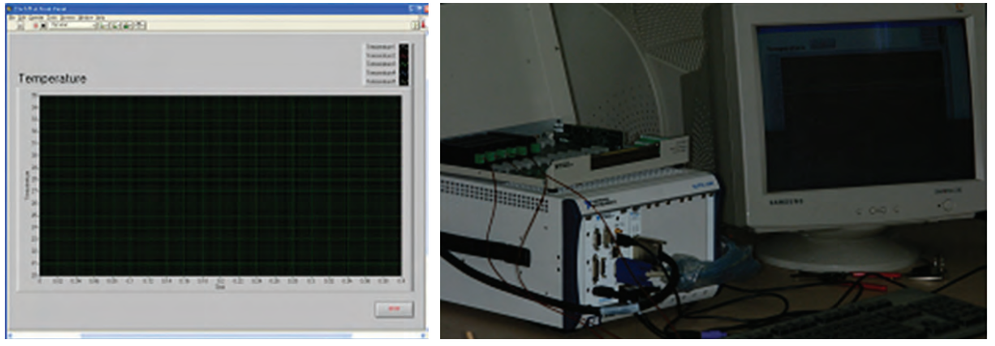


Fig. 4. Temperature monitoring system: LabView (National Instrument, Texas, US), PXI6259 (National Instrument, Texas, US).

Results

1mm reduction with highspeed handpiece without coolant resulted in maximum temperature of 41.22℃ at the cervical of implant. 3 of 4 temperatures more than 40℃ were observed at the cervical part of implant with highspeed handpiece without coolant. Temperature difference between “with coolant” and “without coolant” during both lowspeed polishing and highspeed reduction was statistically significant at the cervix of implant ($p = 0.009$). In contrast, temperature difference between “with coolant” and “without coolant” during both lowspeed polishing and highspeed reduction was not statistically significant at the middle and apical part of implant ($p > .05$).

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

Experiment Group	Handpiece type	Coolant	Location	Abutment 1 (℃)	Abutment 2 (℃)	Abutment 3 (℃)	Abutment 4 (℃)	Abutment 5 (℃)
1	High	Yes	Cervical	38.58	37.50	38.90	37.80	38.58
2	High	Yes	Middle	37.80	37.50	37.02	36.69	37.21
3	High	Yes	Apical	37.50	37.39	37.02	36.33	37.21
4	High	No	Cervical	41.22	40.22	38.99	40.10	39.58
5	High	No	Middle	37.15	38.00	36.98	37.55	37.12
6	High	No	Apical	37.15	37.69	36.98	37.50	37.01
7	Low	Yes	Cervical	37.55	37.56	37.89	37.11	37.00
8	Low	Yes	Middle	37.01	37.00	36.98	37.45	37.69
9	Low	Yes	Apical	37.01	36.99	36.98	37.45	37.69
10	Low	No	Cervical	39.33	38.52	39.12	38.20	40.01
11	Low	No	Middle	37.08	37.96	37.45	37.45	37.23
12	Low	No	Apical	37.08	37.93	37.40	37.10	37.00

Table 2. Mean temperature and statistical significance of temperature difference for Zirconia/Alumina Complex abutment with highspeed contouring

Location	Coolant	Mean temperature ±SD	Statistical significance (p-value)
Cervical	Yes	38.27±0.59	0.009
	No	40.02±0.83	
Middle	Yes	37.24±0.43	0.754
	No	37.36±0.42	
Apical	Yes	37.09±0.46	0.834
	No	37.27±0.31	

Table 3. Mean temperature and statistical significance of temperature difference for Zirconia/Alumina Complex abutment with lowspeed polishing

Location	Coolant	Mean temperature ±SD	Statistical significance (p-value)
Cervical	Yes	37.42±0.36	0.009
	No	39.04±0.71	
Middle	Yes	37.23±0.33	0.245
	No	37.43±0.33	
Apical	Yes	37.22±0.33	0.465
	No	37.30±0.38	

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 external hexed implants were divided into 7 of 4 groups; Group A (3i, FULL OSSEOTITE Implant), Group B (Nobelbiocare, Bra nemark System Mk III Groovy RP), Group C (Neobiotec, SinusQuickTM EB), Group D (Osstem, USII). The type III gold alloy prostheses were fabricated using adequate UCLA gold abutments. Fixture, abutment screw, and abutment were connected and cross-sectioned vertically. Hardness test was conducted using MXT-α. 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 finite element analysis.

Group	Manufacturer	Implant	Type	Abutment	Abut. screw
A	3i Implant Innovations Inc., FL, USA	FULL OSSEOTITE	External	UCLA Gold Standard ZRTM	Gold tite™
B	Novel biocare AB, Goteburg, Sweden	Mk III Groovy RP	External	Gold Adapt Engaging Branemark System RP	Torqtite™
C	Neobiotec Co., Ltd., Seoul, Korea	SinusQuick™ EB	External	Gold UCLA Gold Abutment regular/single	Titanium
D	Osstem, Seoul, Korea	USII	External	US UCLA Gold Abutment	Ebony Gold

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 B 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.

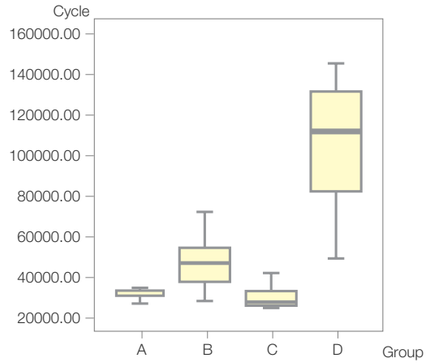
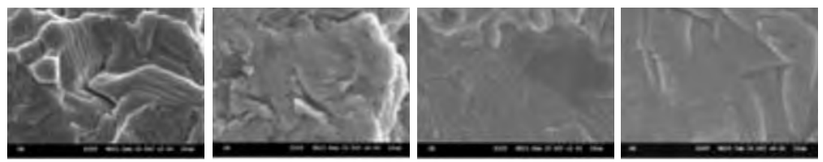
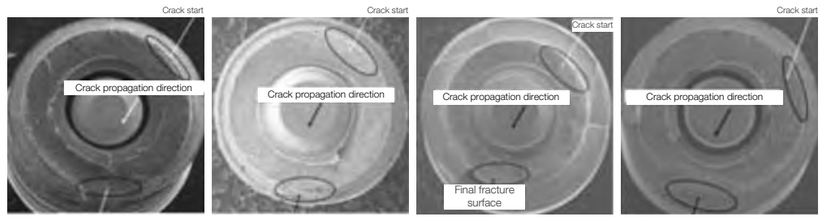


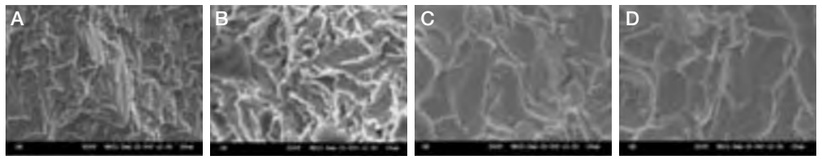
Fig. 1. Mean fatigue life of each implant.



Crack start (×3000) Crack start (×4000) Crack start (×2000) Crack start (×4000)

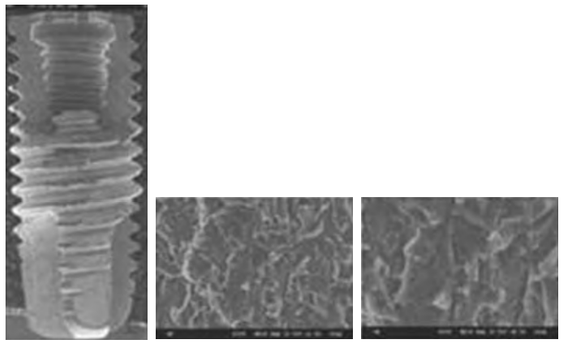


Final fracture surface Final fracture surface Final fracture surface



Final fracture surface (×1000) Final fracture surface (×2000) Final fracture surface (×2000) Final fracture surface (×2000)

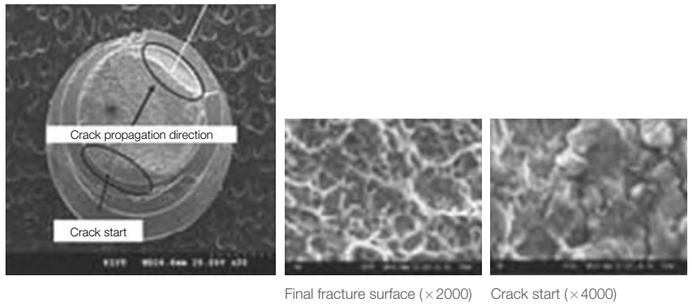
Fig. 2. SEM picture of fractured surface of A, B, C and D implant.



Final fracture surface (×2000) Crack start (×4000)

Fig. 3. SEM picture of fractured surface of B implant.

Final fracture surface



Final fracture surface (×2000) Crack start (×4000)

Fig. 4. SEM picture of fracture surface of B abutment screw.

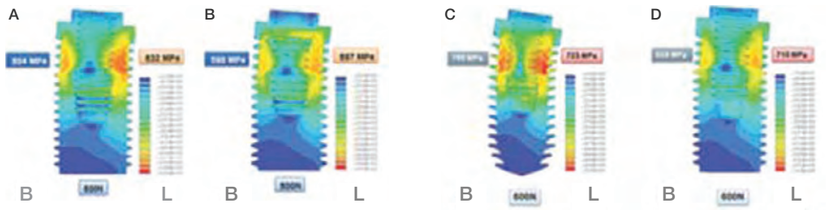


Fig. 5. Stress distribution of implant under 600 N loading in 30 angle.

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 jig surface 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.

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04

MS System

Selected literature of published Journals

Clinical and radiographic evaluation of MS implant placed in mandibular incisor area with immediate loading : A retrospective study

Kwantae Noh, Jina Oh, Yong-Jin Kim

Scientific Poster, Osstem Meeting 2015

Introduction

In the past, the outcome of restorative treatment with implants in mandibular anterior region was dubious and poor in appearance. The mesiodistal crown diameter is as little as 5~5.5 mm and the cervical crown diameter is as little as 3.5~4 mm in the mandibular anterior region.
In addition, the space is often crowded and narrow by the continuously mesial moving due to its nature. Therefore, the two stage implant with 3.5 mm diameter, also called a mini-implant, which was formerly on the market, was not easy to stably install due to the shortage of bone mass and limitations in physical properties.

In addition, the esthetic outcome was poor.
However, the mandibular anterior region has some benefits including an arch shape allowing relatively stable occlusion and hard bone quality allowing immediate loading. Therefore, a more proper implant for this region is urgently needed based on these considerations.

Anatomical condition of mandibular anterior region

An implant with a diameter of 3 mm or less is required for installation in a mandibular anterior region with a missing tooth, and mechanical intensity should be properly maintained at the same time Since immediate loading or provisionalization may be needed in many cases for esthetic reasons, one body implant could be prefered in mandibular anterior region.

This one body narrow diameter makes it easy to conduct flapless surgery and requires bone grafting with relatively less frequency. In particular, hard bone quality is greatly beneficial for the initial implant stability and allows immediate loading in the mandibular anterior region.

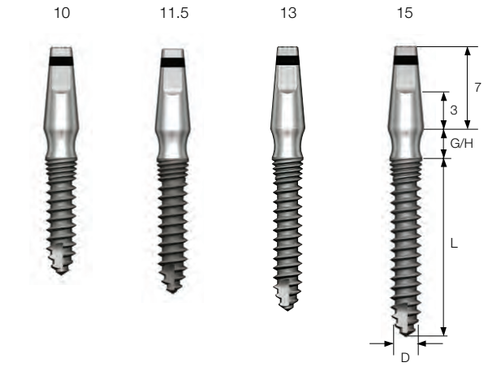
In addition, implant installation equipment should be small enough not to bother the neighboring tooth because the mandibular anterior space is often crowded and narrow.
The purpose of this retrospective study was to evaluate clinical and radiographic outcome of mini-onebody implant placed in mandibular incisor site with immediate provisionalization.

Materials & Methods

Study participants

Thirty-four patients(20 men, 14 women; mean age 60.6) were selected from a group of patients treated with implant-supported prosthesis at one clinic. Informed written consent, approved by the Ethics Committee of the University of KyungHee, was obtained from patients to use their data for research purposes. The patients were followed for a median of 22months (range, 10 to 50months) after loading.

Implant



MS implant produced by Osstem(Korea) is suitable for areas affected by buccolingual width and mesiodistal width such as in the mandibular anterior region. Since the fixture and abutment is contained in one body, low cost is an additional benefit. Fixtures with diameters of 2.5 mm and 3 mm are available, and recommended installation torque is approximately 30Ncm.

Surgical and prosthetic procedure

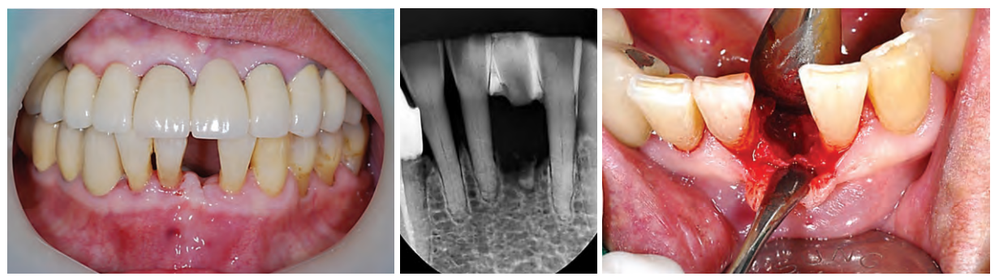


Fig. 1~3. Mucoperiosteal flap was elevated through a crevicular incision and root rest was extracted.

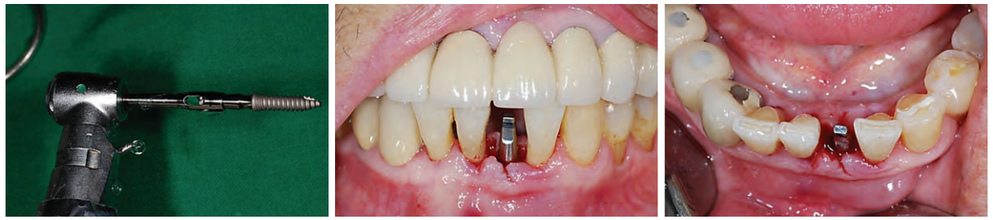


Fig. 4~6. Initial drilling was started with a sidecut drill. MS implant 3.0x11.5mm was placed and insertion torque was 25Ncm.

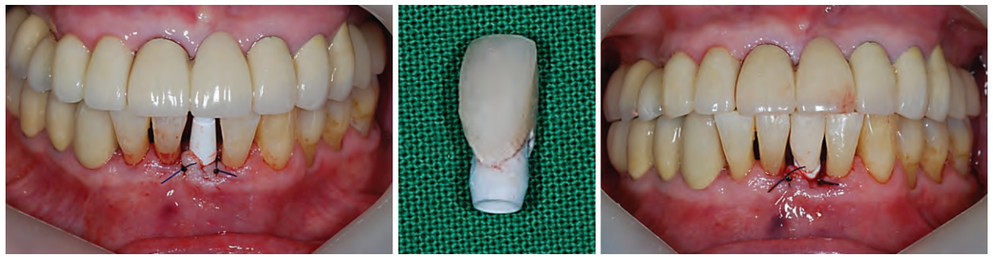


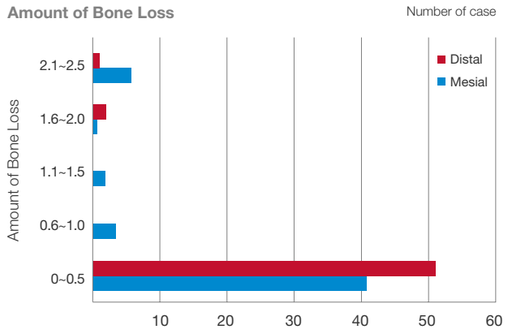
Fig. 7~9. Provisionalization was done immediate post-operatively with MS temporary cap.

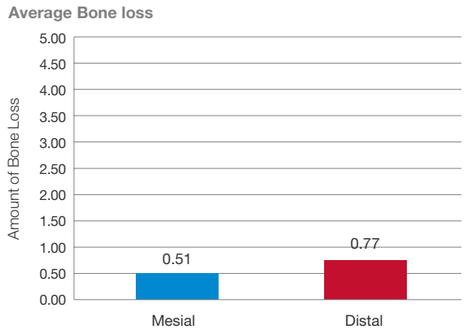
Fig. 10~12. Final prosthetic treatment was finished at POD 6 weeks. Soft tissue around the MS implant looks so healthy and harmonious with adjacent teeth.

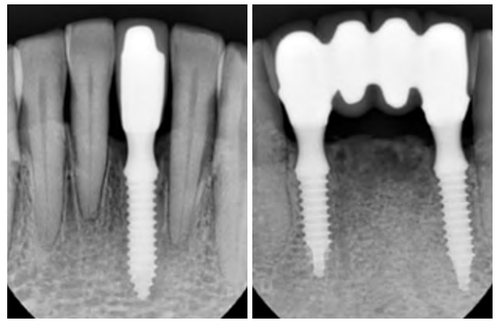
Results

Implant survival

Two of the 54 MS implants were lost in 2 patients, giving a cumulative survival rate of 96.2%.







Periapical radiograph 2years following insertion of definitive prosthesis

Conclusion

As reviewed above, since MS implant, a one-body implant system, is designed based on the considerations of physical properties needed for occlusion suitable for regions where buccolingual width and mesiodistal width is narrow, it is beneficial for the implant repair of single missing teeth in the mandibular anterior region in terms of both esthetic aspects and cost-effectiveness.

So, one body & narrow diameter implant, such as MS implant can be valid alternative in many clinical situations in which space problems do not permit the use of standard-diameter implants.

Multicentric Retrospective Clinical Study on the Clinical Application of Mini Implant System

Young-Kyun Kim, In-Sung Yeo, Yang-Jin Yi, Un-Kyu Kim, Kyung-Nam Moon, Seung-Joon Jeon, Yong-Seok Cho, Pil-Young Yun

J Korean Assoc Oral Maxillofac Surg 2010;36(4):325-30

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)

	Variables	The number of cases (Implants)
Age (years)	0-19	1 (4)
	20-29	4 (4)
	30-39	7 (11)
	40-49	9 (25)
	50-59	23 (36)
	60-69	18 (51)
	70-79	7 (19)
Gender	Male	39 (73)
	Female	30(74)
Medical history	Healthy	48(98)
	Hypertension	10 (19)
	Diabetes mellitus	8 (15)
	Cerebrovascular attack history	2 (9)
	Asthma 2 (6)	2 (6)
	Alcoholism 2 (3)	2 (3)
	Thyroid disease	1(5)
Smoking	No	56 (123)
	Yes	13 (24)

	Variables	The number of cases (Implants)
Results	Success	66 (146)
	Failure	3 (3)
Complications	No	61 (141)
	Osseointegration failure	3 (3)
	Infection	3 (3)

Results

From 147 implants, only three implants failed, one of them was for temporary loading. There were no serious surgical or prosthetic complications in this study.

Conclusions

An analysis of the preliminary data revealed a satisfactory clinical outcome. However, more long-term evaluation of narrow ridge type as well as the patient's satisfaction on the use of a provisional type mini-implant system is needed.

Clinical Research of Immediate Restoration Implant with Mini-Implants in Edentulous Space

Huang JS, Zhao JJ, Liu Q, Liu TT

Hua Xi Kou Qiang Yi Xue Za Zhi. 2010 Aug;28(4):412-6

Objective

The purpose of this study was to investigate the clinical effective of immediate restoration with Osstem MS mini implant in the edentulous space of 5-6 mm.

Materials & Methods

The sample consisted of 36 consecutively treated partially edentulous patients who had a total of 36 Osstem MS mini implants, which were 2.5 mm or 3.0 mm in diameter and placed in 5-6 mm gap. The chair-side-made or laboratorymade provisional crowns for implants were fabricated at the time of fixtures placed.
The final restorations were fabricated with gold alloy-fused-porcelain crown 3 to 5 months later. During the mean 21.3 months (12-37 months) follow-up time since fixtures placement, all implants were examined clinically and radiologically.

Results

No implant failed before restoration. One implant led an adjacent tooth pulp necrosis after the implantation, but the natural tooth and implant were successfully retained by root canal therapy. 36 implants in 36 patients who were followed up were successful and their aesthetic results were satisfactory.

Conclusions

Immediate loaded implant with Osstem MS mini-implant has good clinical prosthetic effects in the edentulous space of 5-6mm.

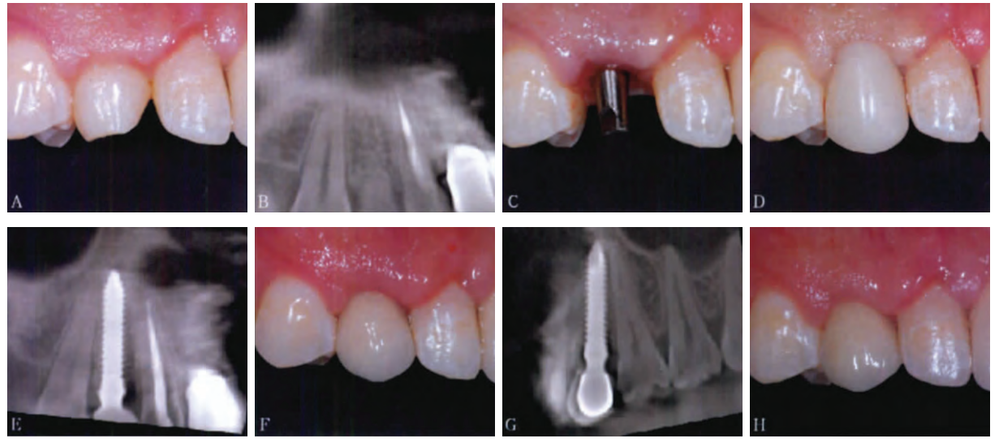


Fig. 1. Immediate restoration implant with mini-implant of case 1.

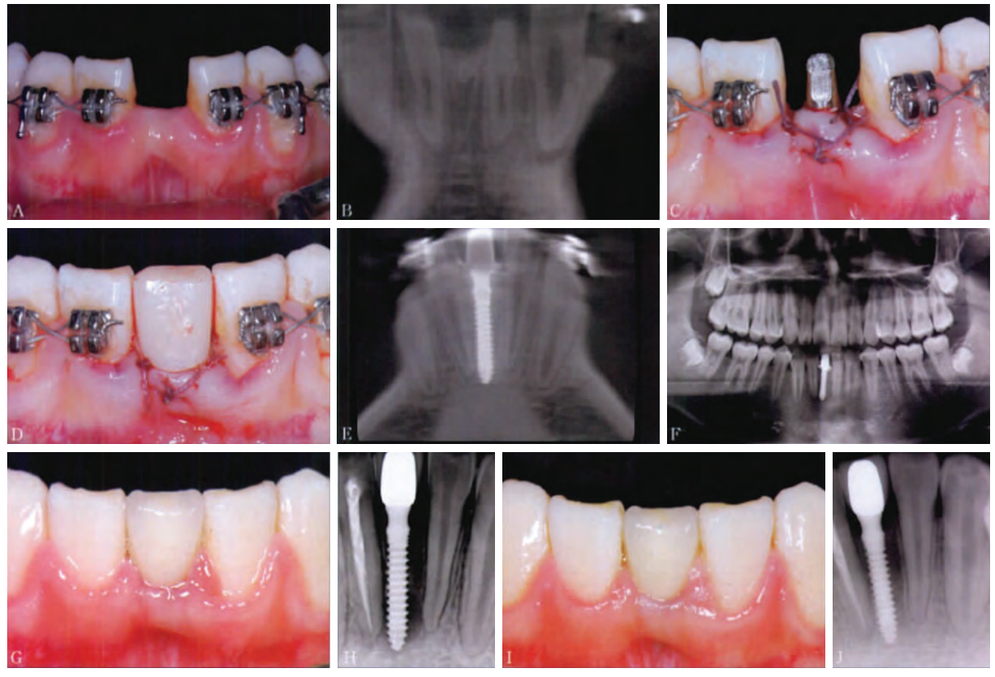


Fig. 2. Immediate restoration implant with mini-implant of case 2.

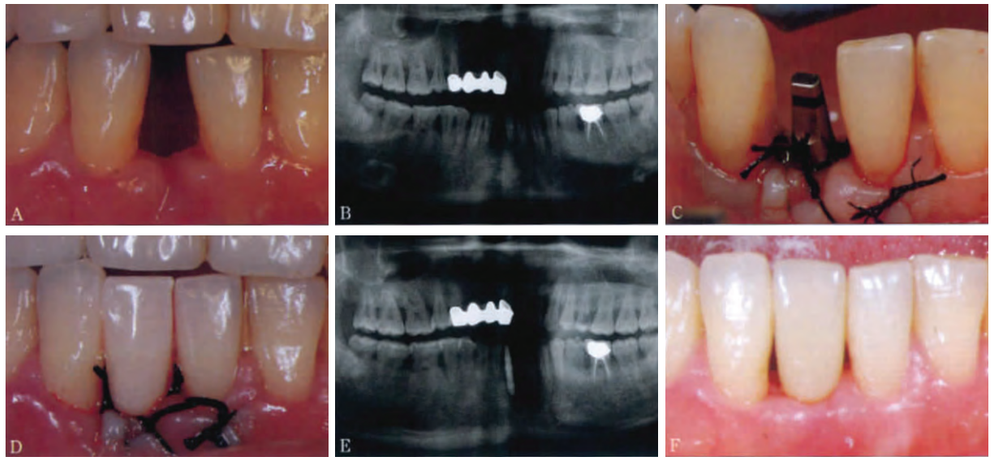


Fig. 3. Immediate restoration implant with mini-implant of case 3.

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05

GBR

Selected literature of published Journals

Clinical prognosis of xenograft material (A-oss) used in complicated bone grafting patients - 2 Case reports

Sang - Yong Yoon

Scientific Poster, Osstem Meeting 2015

Introduction

Severe vertical and horizontal bone loss encountered during implantation surgery is one of the main causes that make the treatments difficult. In these bone defects, alveolar bone augmentation and maxillary sinus lifting are essential to get the bone width and height suitable for placement of implants and are generalized as the reliable surgical techniques based on the many studies and clinical experiences.

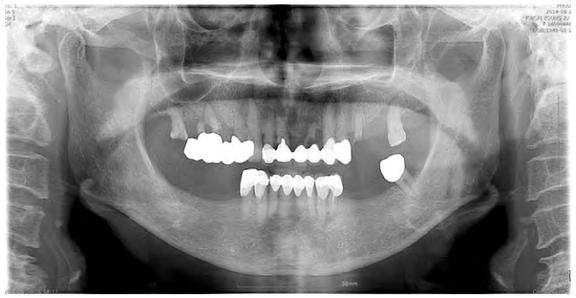
Xenograft is the most commonly used bone materials in the dental clinic. Xenograft is primarily harvested from bovine and porcine animals and the collected bones go through multi-step process such as defatting, deproteinization, and thermal processing. End-product xenograft materials have low inflammatory reaction and immune rejection, and maintains the structures similar to human bone. When xenograft materials are grafted in alveolar bone defects, they usually play osteoconductive effect as scafford and have long term stability based on the structural stability of the inorganic materials.
In this study, I will consider the healing condition and prognosis of xenograft materials through two bone graft cases using xenograft materials(A-oss) in complicated patients with severe alveolar bone resorption.

Case Presentation

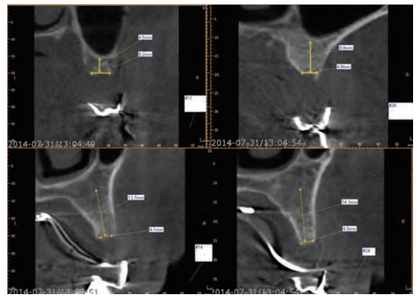
Case 1

Age : 65 / **Sex :** F / **PMH :** N/S
Ext. of #14,16,17,24,25,27,37
Simultaneous implantation on #14,17,24,27 ext. site (submerged, US III SA)
SFE /c CAS kit on #17 ext. site (/c A-oss 0.5cc), #27 ext. site (/c PRF)
Ridge split & GBR on #14,24 ext. site (/c A-oss 0.5cc, tisseel, oss-guide)
Implantation on #36,46 ext. site (Non-submerged, US III SA)

First visit

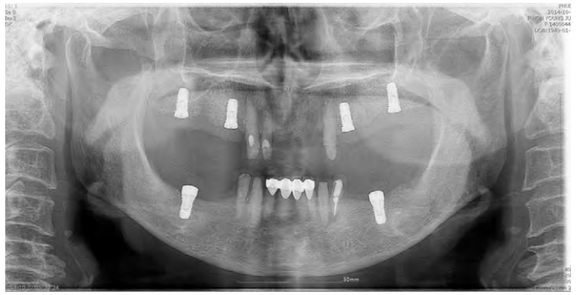


2m check after Ext.

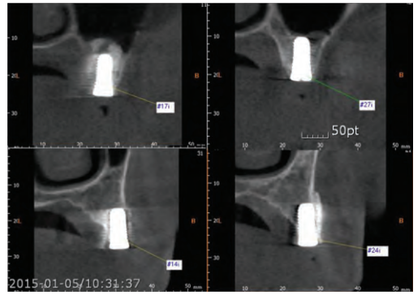


generalized alveolar bone resorption & sinus pneumatization

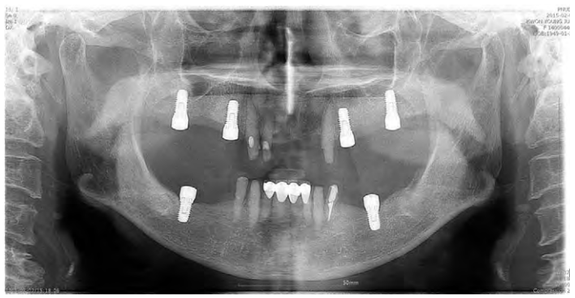
Implantation /c SFE & Ridge split (post-op.)



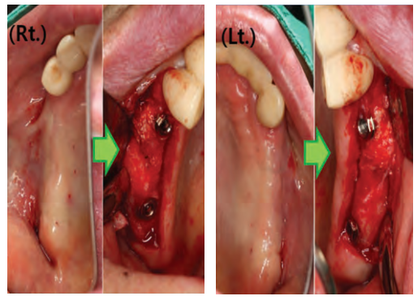
POD 5M CBCT



2nd op. on both Mx. (post-op.)



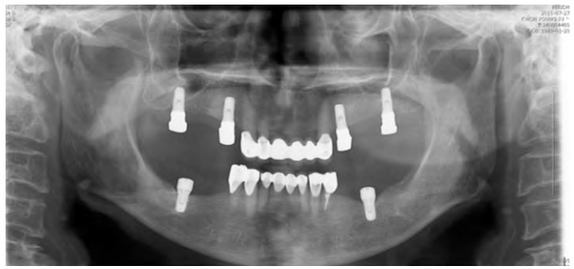
POD 5M Intraoral photo



Reliable volume maintenance & well-healed bone in clinical & radiologic findings
→ ISQ (/c osstell) : #17 - 72 / #14 - 78 / #24 - 71 / #27 - 76

GBR Clinical Study

POD 11m

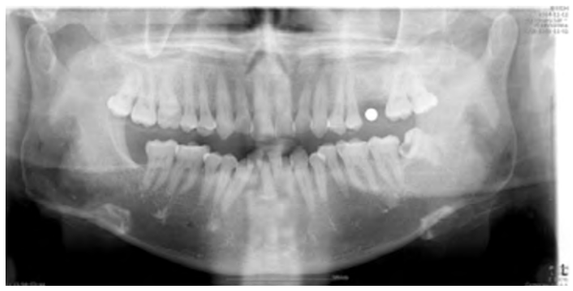


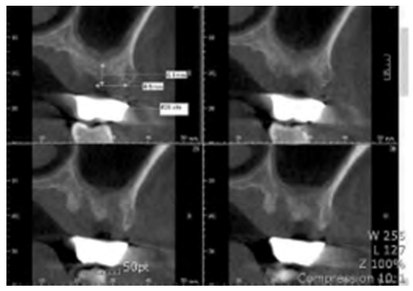
a. 5 months after loading by implant supported overdenture /c Magnetic attachment
b. 11 months after bone graft using xenograft materials(A-oss)
c. Crestal bone recession and changes of alveolar bone height & width were hardly observed in clinical and radiologic findings.

Case 2

Age : 56 / **Sex :** M / **PMH :** HT, Arthritis
Simultaneous implantation on #26 ext. site (Non-submerged, TS III CA)
OSFE on #26 ext. site → fail d/t sinus membrane tearing
Sinus membrane repair via lat. Approach(cola-tape, PRF)
Sinus lift(Lt.) (/c A-oss 0.5cc, particulated autogenous bone, tisseel)
GBR on #26i (/c A-oss 0.25cc, particulated autogenous bone, oss-guide)
Surgical ext. of impacted #38 d/t severe dental caries
Autogenous bone harvesting from Mn. Lt. Ramus body bone

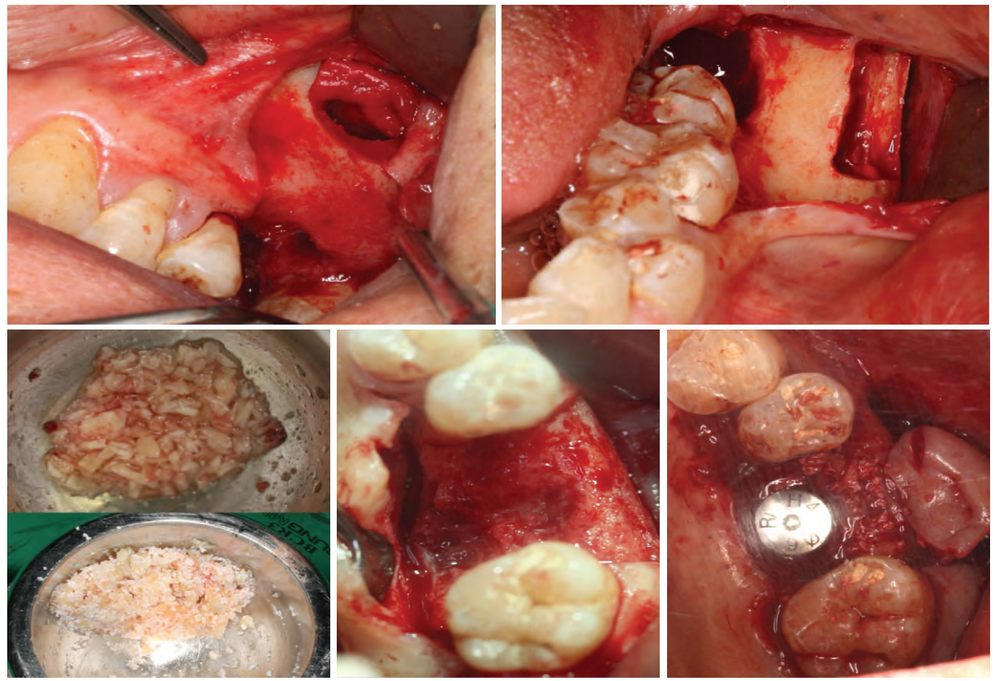
Pre-op. Panorama & CBCT on 1m check after ext. of #26





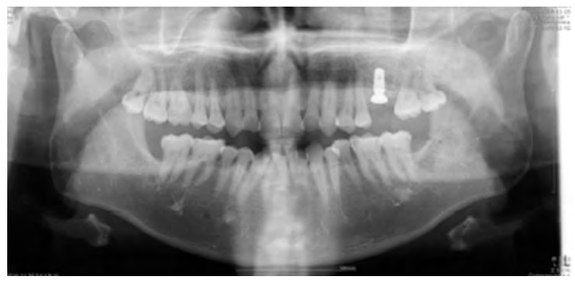
Good soft tissue healing state, but little changes of ext. socket & palatal bone loss.

Intra-op. clinical photo



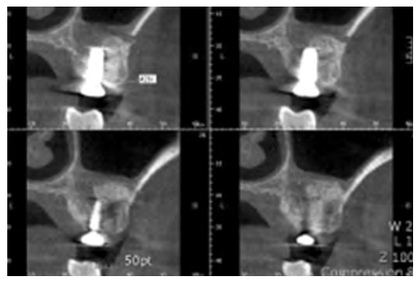
a: Sinus membrane tearing during OSFE
b: Damaged membrane exposure & elevation via lateral window approachc
c: Membrane repair with Cola-tape and PRF(double covering technique)
d: Surgical ext. of #38 + ramal bone harvesting(particulation /c bone crusher)
e: Non-submerged GBR (Intrasocket & Extrasocket graft)

Implantation /c Sinus lift & GBR (post-op.)



Healing abutment installation

POD 6m - before prosthesis



Excellent healing of sinus mucosa Good stability of grafted b. material

Result & Conclusion

Xenograft materials are originated animal bone(bovine, porcine, etc) and made by purification of bone mineral(hydroxiapatite components). Xenograft materials can play the role of 'scaffold' that maintain long-term volume stability without resorption and regenerate the recipient sites through bone conduction effect because they have similar porosity and macro- & micro-scopic structure like human bone.
Autogenous bones were traditionally selected for alveolar reconstructions in complicated patients with severe alveolar bone resorption up to this time. However selections of xenograft materials are increasing lately in complicated cases due to many advantages of the xenograft(long-term volume stability, economics, no donor site, etc.) Two above cases also show advantages of xenografts very well.

In first case, changes in the height and volume of recipient alveolar bone was hardly observed and the recession of crestal bone did not show. In second case, we found good healing state of sinus mucosa & stably healed grafted bone. I conclude that we can get successful and predictable results with alveolar bone augmentation using xeno-grafting materials in complicated patients with severe alveolar bone resorption if we select the case carefully.

Preliminary Evaluation of a Three-dimensional, Customized, and Preformed Titanium Mesh in Peri-implant Alveolar Bone Regeneration

Gyu-Un Jung, Jae-Yun Jeon, Kyung-Gyun Hwang, Chang-Joo Park

J Korean Assoc Oral Maxillofac Surg 2014;40:181-187

Introduction

Guided bone regeneration (GBR) is the essential technique for the successful implant treatment in vertically or horizontally deficient alveolar ridge. Particularly, a variety of barrier membranes have been introduced to prevent the invasion of epithelial or gingival connective tissue in bone regeneration.

Among these barrier membranes, titanium mesh membrane is getting the limelight due to its innate space maintaining ability as well as excellent blood supply for bone regeneration. Moreover, titanium mesh has the non-negligible merit in terms of costs compared to other membranes.

Purpose

The purpose of this preliminary study is to evaluate the effectiveness of a customized, three-dimensional, and preformed titanium mesh as a barrier membrane for peri-implant alveolar bone regeneration.

Materials & Methods

Ten patients were recruited for this study. At the time of implant placement (TS III CA, Osstem, Korea), all patients had fenestration or a dehiscence defect around the implant fixture. A mixture of particulate intraoral autologous bone and freeze-dried bone allograft (SureOss, Hans Biomed, Korea) was applied to the defect in a 1 : 1 volume ratio and covered by the preformed titanium mesh (SmartBuilder, Osstem).

A core biopsy specimen was taken from the regenerated bone four months postoperatively. Patients were followed for 12 months after the definitive prosthesis was placed.

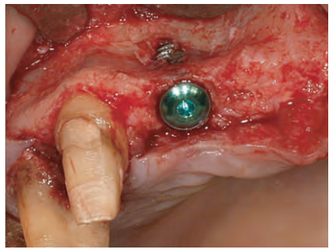


Fig. 1. After implant placement on #12 missing area, labial fenestration defect was found.

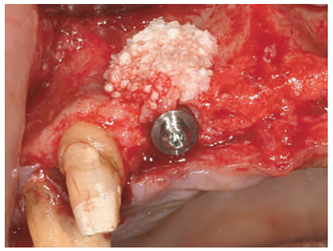


Fig. 2. After connecting the height on the implant fixture, the defect was covered with a mixture of particulated autologous bone harvested from the mandibular ramus and freeze-dried bone allograft.

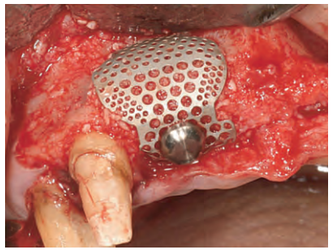


Fig. 3. A preformed titanium mesh (SmartBuilder type II) was connected to the anchor.

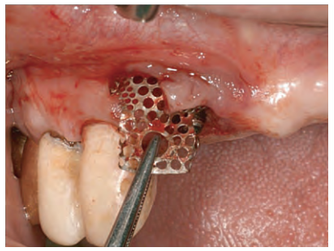


Fig. 4. The preformed titanium mesh was easily removed under the minimum flap elevation at postoperatively 4-month re-entry.

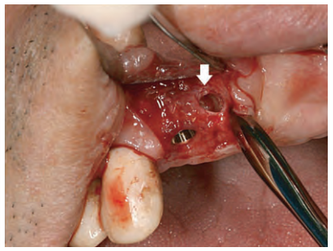


Fig. 5. Bone core biopsy was carried out on the labial regenerated bone by a trephine drill (arrow)

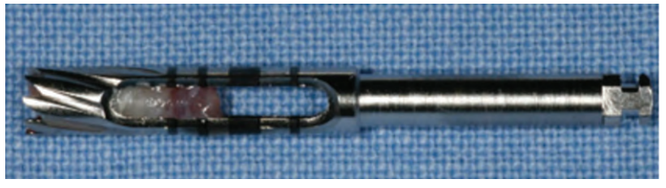


Fig. 6. A biopsy specimen was collected by a trephine bur with 2.2 mm diameter

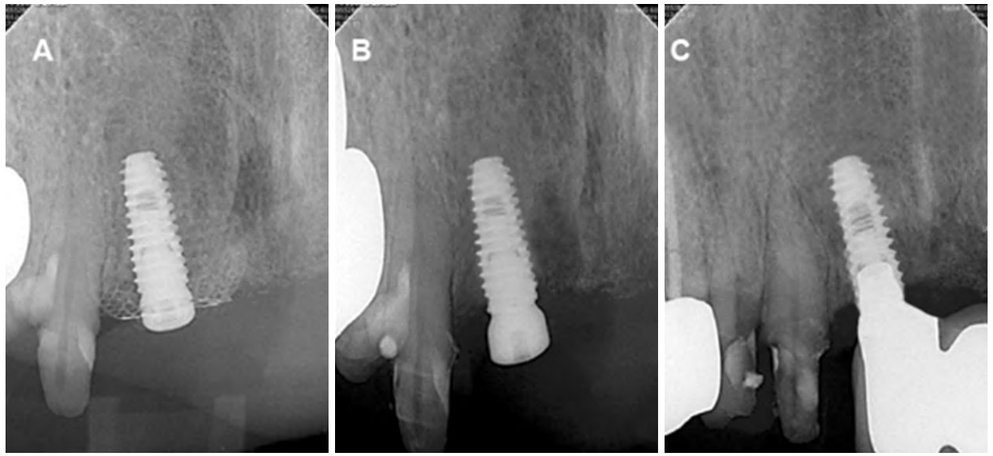


Fig. 7. Comparison of periapical radiographs taken at the application (A) and removal (B) of the preformed titanium mesh and at 1 year after delivery of the final prosthesis (C).

Results

Data of patients and surgery were presented in Table 1. Satisfactory bone regeneration with limited fibrous tissue was detected beneath the preformed titanium mesh.

Preliminary histologic findings revealed that newly formed bones were well-incorporated into the allografts and connective tissue. In the specimen obtained from patient #2, New growth was composed of approximately 80% vital bone, 5% fibrous marrow tissue, and 15% remaining allograft. All implants were functional without any significant complications.

Patient no.	Sex	Age (yr)	Surgical site	Implant fixture (mm)	Type of SMARTbuilder	Height (mm)	C/H	Complications[1]
1	M	39	#13	4.0×13	III	2	H	-
2	M	87	#46	4.5×10	II	1	C	+
3	M	59	#12	4.0×10	II	1	C	+
4	M	73	#15	4.0×11.5	III	2	H	-
5	F	64	#15	4.0×10	I	1	H	-
6	F	54	#45	4.5×8.5	II	2	C	+
7	F	17	#21	4.0×10	I	1	C	-
8	M	52	#16	4.5×8.5	III	2	H	-
9	F	58	#46, #47	4.5×8.5	II	1	H	-
10	F	67	#35, #36	4.5×10	I	1	C	-

Conclusions

The use of preformed titanium mesh may support bone regeneration by maintaining space for new bone growth through its macro-pores. This preliminary study presents the efficacy of a preformed titanium mesh as a ready-touse barrier membrane around peri-implant alveolar bone defect. This preformed mesh is also convenient to apply and to remove.

Alveolar bone augmentation using the SmartBuilder with new “Anchor”; Case Reports

Kyung-Tae Park, So-Mi Jeong, Yong-Jin Kim

Scientific Poster, Osstem Meeting 2015

Introduction

Titanium mesh can give a favorable result to the severe bone defects or vertical bone augmentation case due to its rigidity. Also, it works as a frame to keep the space and stabilize inside bone graft materials.

Recently, Osstem implant company has produced the SmartBuilder. The SmartBuilder is customized titanium mesh pre-formed in 3 dimension. Since SmartBuilder is ready-made according to the general types of alveolar bone loss, there is no need to spend time for trimming and bending to form the overall shape of titanium mesh.

Besides, it can be removed easily by replacing the screws used in fixing traditional titanium mesh with healing abutment or cover cap. So, I would like to present clinical cases of alveolar bone augmentation using the SmartBuilder with new “Anchor”.

Case Report 1

Age / Sex : 72Y / M
Chief complain : Partial Edentulism
Past medical history : HTN & Controlled DM
Treatment plan : 17, 18 Extraction & Implant placement with GBR

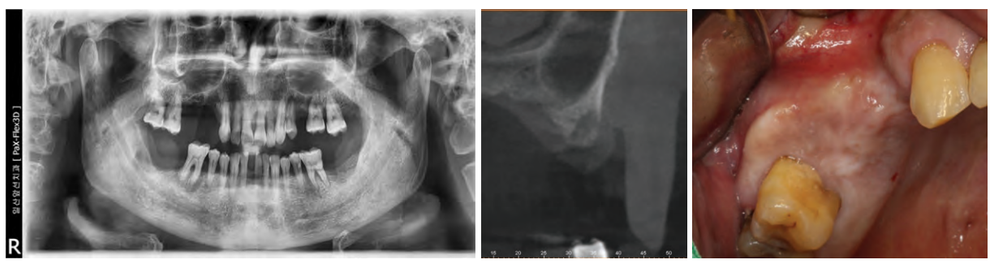
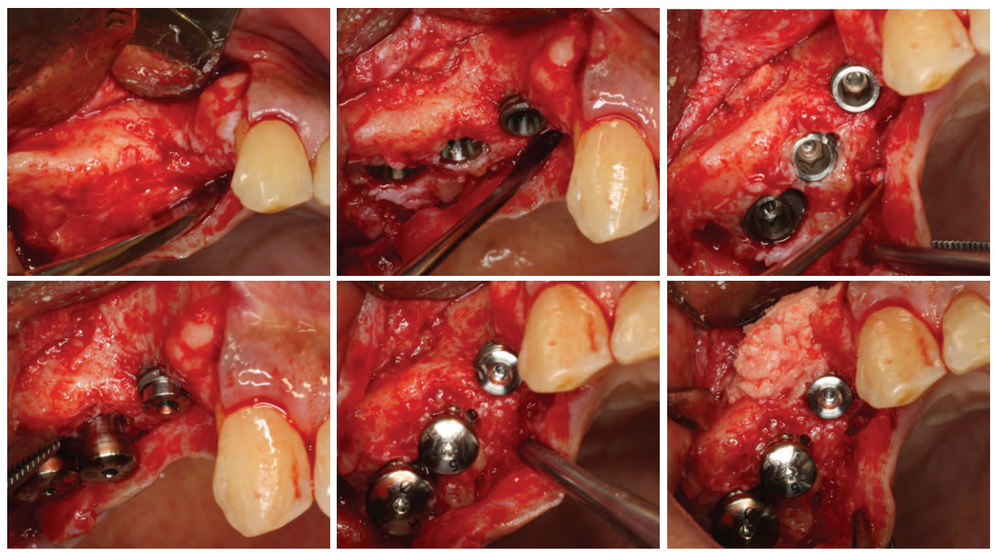


Fig. 1~3. Pre-operative radiograph & Intra-oral view



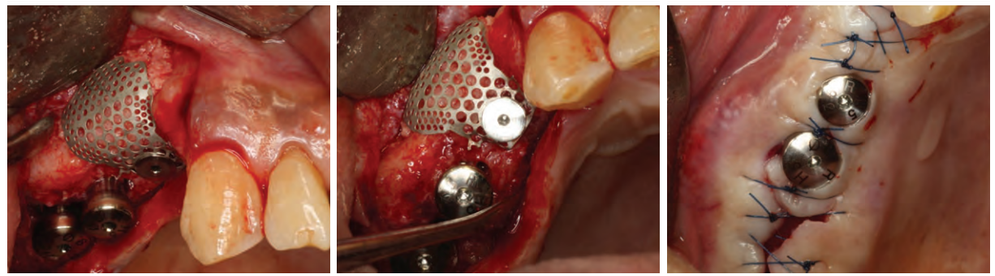


Fig. 4~12. Intra-operative view
Full thickness mucoperiosteal flap was elevated. Horizontal bone resorption of #14 area was observed. TSIII SA implant 4.0x11.5mm was installed at #14. Insertion torque was 30NCm. Autogenous bone was harvested from the maxillary tuberosity and particulated using the Bone crusher. The new “Anchor” for the SmartBuilder was connected and particulated autogenous bone was grafted. Two wall augmentation type SmartBuilder was used. The SmartBuilder was fixed with cover cap.

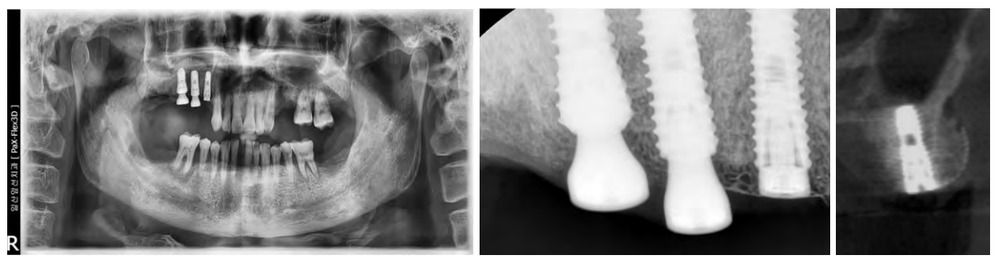


Fig. 13~15. Post-operative radiograph.
On the post-operative CT scan, it is observed that the SmartBuilder contours an ideal shape of buccal alveolar bone and the bone graft material is well maintained under the SmartBuilder.

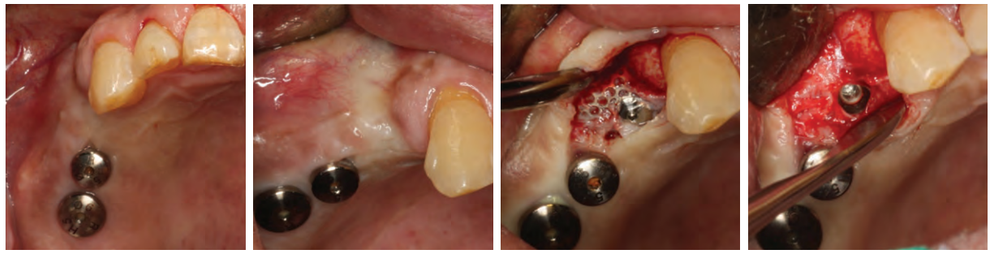


Fig. 16~19. 2nd stage surgery was done after 16 weeks.
During the healing period, the SmartBuilder was not exposed. Mucoperiosteal flap was elevated with crestal incision and the SmartBuilder was removed. Successful bone regeneration around #14 implant and horizontally increased alveolar bone volume was observed.

Case Report 2

Age / Sex : 46Y / F
Chief complain : Missing of #16
Past medical history : N/S
Past dental history : Extraction of #16 3 months ago
Treatment plan : Implant placement with GBR

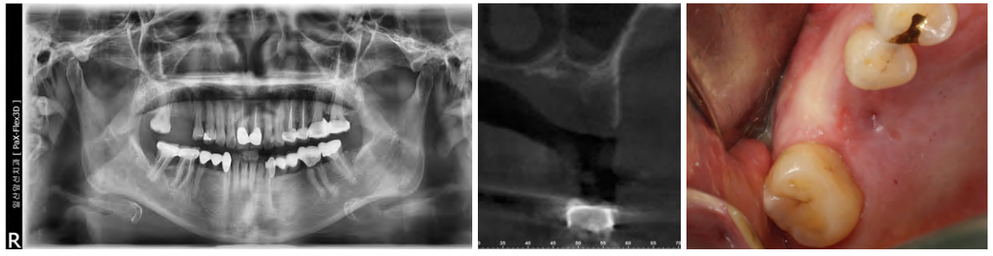
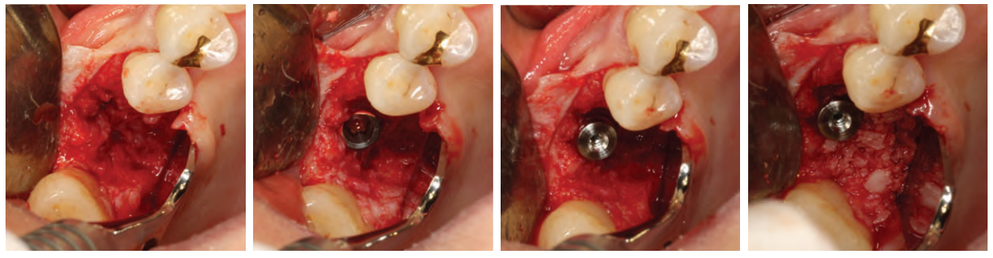


Fig. 1~3. Pre-operative radiograph & Intra-oral view
Pre-op CT scan shows severe palatal bone defect at right 1st molar area.



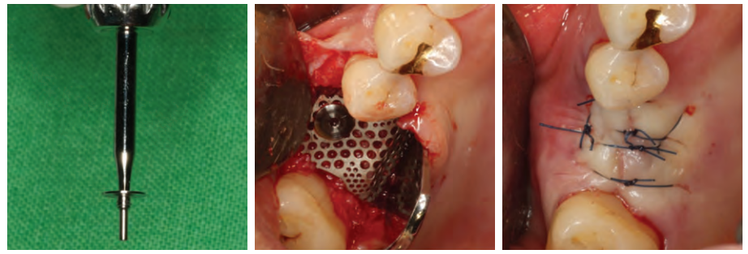


Fig. 4~10. Intra-operative view Full thickness mucoperiosteal flap was elevated. Palatal bone resorption of #16 area was observed. TSIII SA implant 5.0x11.5mm was installed at #16. An implant was placed 1 mm below buccal crest bone level and insertion torque was about 20NCm. The new "Anchor" for the SmartBuilder was connected and bone graft was done.

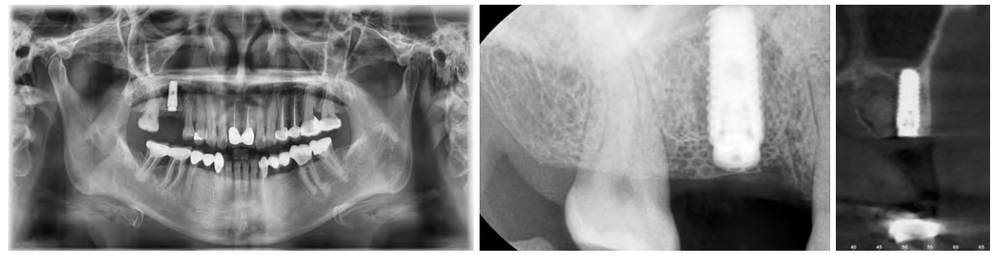


Fig. 11~13. Post-operative radiograph. In the post-op CT scan, the SmartBuilder is contouring an ideal shape of palatal alveolar bone and bone graft materials are placed stably under the SmartBuilder.

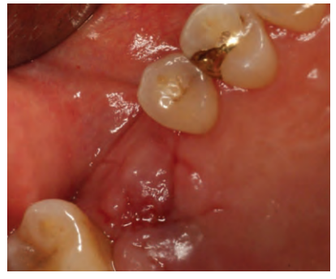


Fig. 14. Post-operative 2 weeks. Stitch out was done after 2 weeks. Soft tissue healed very well without any SmartBuilder exposure.

Conclusions

The new internal connection type "Anchor" of the SmartBuilder might decrease the possibility of the wound dehiscence and SmartBuilder exposure. For that reason, the new internal connection type "Anchor" could enhance the predictability of alveolar bone augmentation procedure using the SmartBuilder.

GBR with SmartBuilder

Jeong Jong Cheol

Scientific Poster, Osstem Meeting 2015

Introduction

There are many methods for GBR procedure for implant placement. But sometimes very difficulty in GBR procedure, especially for severe vertical or horizontal defect area. So We would like to introduce GBR procedure with SmartBuilder in horizontal or vertical defect area

Purpose

The aim of this study was to evaluate the capability of the successful guided bone regeneration in alveolar bone defect with SmartBulider

Materials & Methods

Ten patients participate in this study. These patients have a severe horizontal or vertical defect. GBR procedure was done with SmartBuilder with several kind of grafting materials before implant placement. About five months later, dental implants were placed in grafted area.

patient	Age	Sex	Recipient	Healing(m)	Defect	Complication
1	33	M	46	5	H.D	Screw exposure
2	28	F	35.36	6	H.D	
3	48	F	36.37	10M	V.D+H.D	Small fistula
4	28	M	35.36	7M	V.D+H.D	Partial mesh exposure
5	50	F	45.46	4 1/2M	V.D+H.D	
6	39	M	36.37	1yr	V.D	Full mesh exposure
7	29	F	34.36.46	5M	H.D	
8	61	F	46.47	4 1/2M	H.D	
9	31	F	46	1yr	H.D	
10	36	F	35.36.37	5M	V.D+H.D	

Results

In nine patients, dental implants was placed and made a final restorations successfully. In one patient, soft tissue rupture was observed about two months after surgery but healed successfully after removing the SmartBuilder. In one patient who had continuous smoking and uncontrollable behavior failed because of severe soft tissue rupture and infection

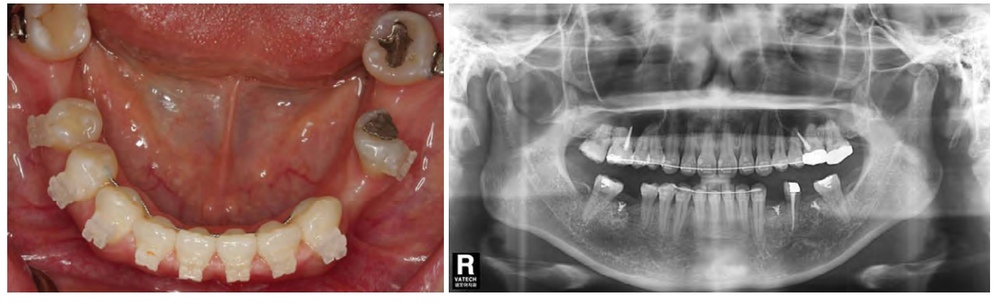


Fig. 1~2. Intra-oral and preoperative radiographic findings. Thin mandibular ridge is seen in extracted site

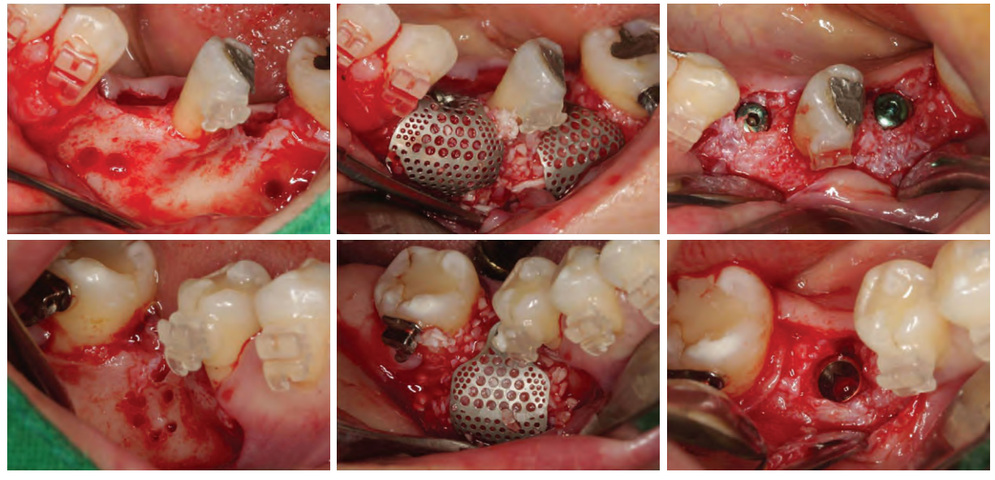


Fig. 3~8. Operative findings of lateral GBR with SmartBuilder and well healing state of 5 months after GBR.

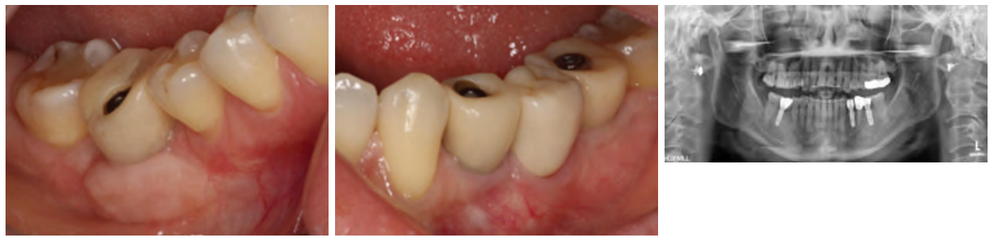


Fig. 9~11. Prosthetic state and panoramic view of 2 years after implant placement

Fig. 12~14. showing vertial augmentation with SmartBuilder.

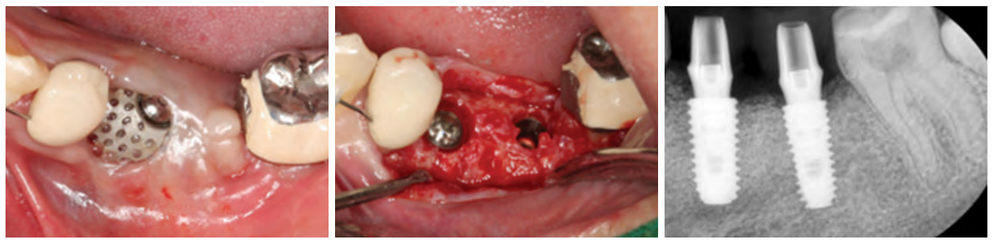


Fig. 15~17. Partial exposure of SmartBuilder about 2 months after GBR, but well healing state was seen during implant placement in 7 months after GBR. Periapical radiography showing maintained grafted bone at 1 year after implant placement

Conclusions

SmartBuilder can be used in reconstruction of severe horizontal or vertical alveolar bone defect in instead of nonresorbable membrane or block bone if we control soft tissue carefully for preventing or minimizing soft tissue rupture

GBR References

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03 Kyung-Tae Park, So-Mi Jeong, Yong-Jin Kim.. Alveolar bone augmentation using the SmartBuilder with new “Anchor”; Case Reports. Scientific Poster, Osstem Meeting 2015

04 Jeong Jong Cheol. GBR with SmartBuilder. Scientific Poster, Osstem Meeting 2015

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02 Jung, Si Young. A study on Vertical Bone Augmentation Utilizing SB Anchor and SmartBuilder. Scientific Poster, Osstem Meeting 2015.

06

TOOL

Selected literature of published Journals

230 Clinical Study

248 References

Assessment of dentists' subjective satisfaction with a newly developed device for maxillary sinus membrane elevation by the crestal approach

Young-Kyun Kim, Yong-Seok Cho, Pil-Young Yun

J periodontal Implant Sci 2013;43:308-314

Purpose

The purposes of this study were to assess the dentists' subjective satisfaction with the crestal approach sinus (CAS) kit, a device for maxillary sinus membrane elevation by the crestal approach using a special drilling system and hydraulic pressure, and to summarize the subjective satisfaction of dental implants placed after a sinus lift procedure with the CAS kit.

Methods

Thirty dental clinicians who had experience with dental implant placement after a sinus lift procedure with the CAS kit from June 2010 to May 2012 were included in this study. The questionnaire for the evaluation of the dentists' subjective satisfaction with the CAS kit was sent to the respondents and returned.

The questionnaire was composed of two main parts. The first part was related to the sinus membrane perforation rate. The second part was related to the dentists' subjective satisfaction with the CAS kit.

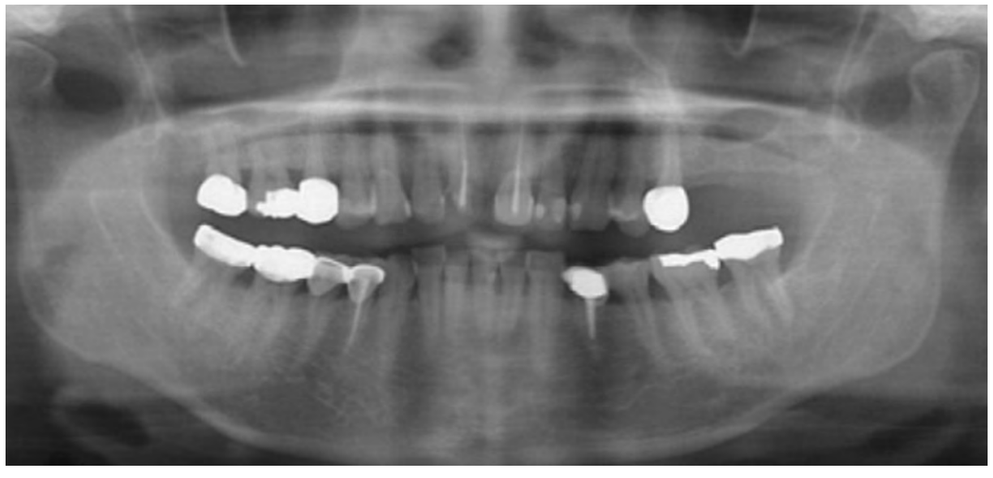


Fig. 1. Panoramic radiograph in the first dental examination. The residual bone at the first and second molar parts on the left side of the upper jaw is estimated to be about 4-5mm high.

Surgical procedures

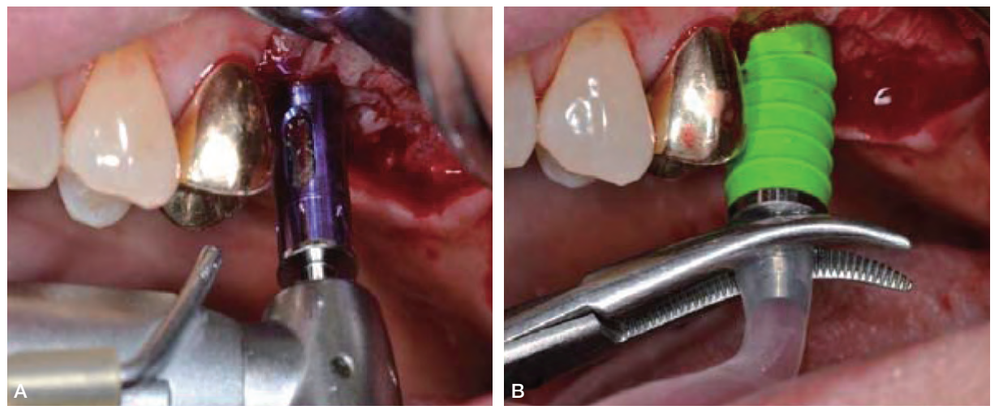


Fig. 2. A: initial drilling connected with the stopper. B: injecting 0.3-mL saline solution after inserting the hydraulic lifter to elevate the maxillary sinus membrane.

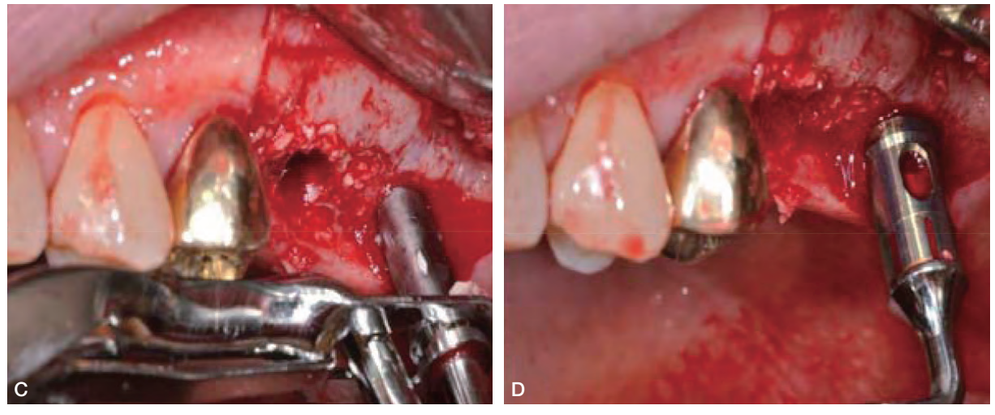
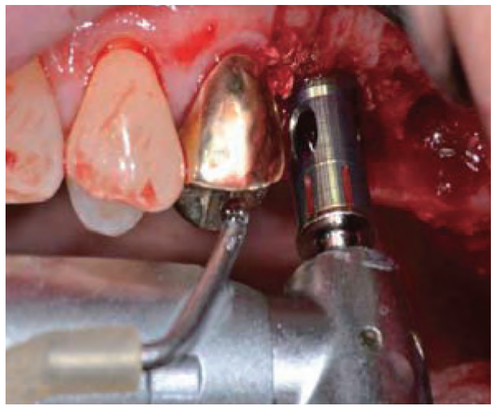


Fig. 3. C: filling the hole with bone graft material using the bone carrier. D: bone condenser with the stopper.



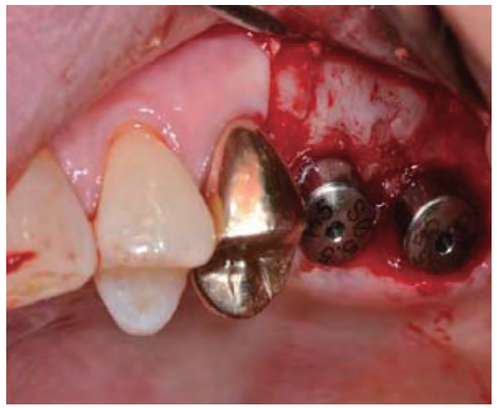


Fig. 4. E: bone spreader application, F: implant placement.

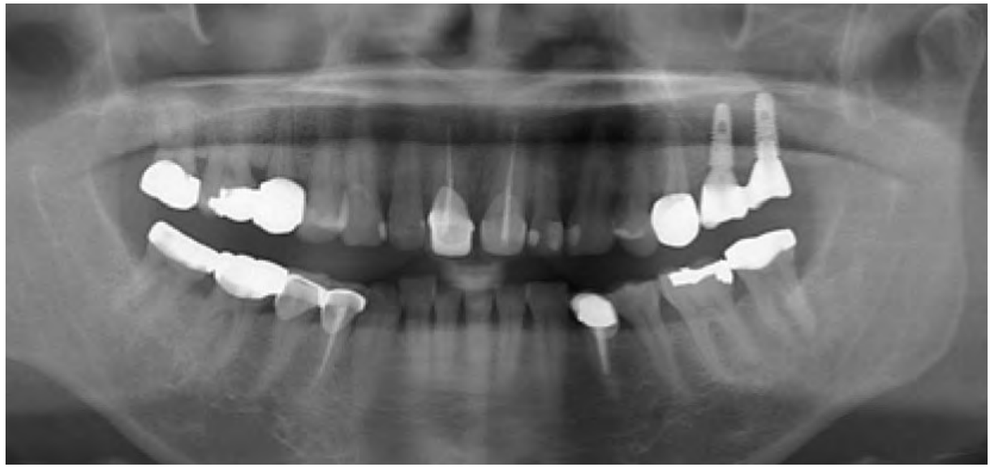


Fig. 5. Panoramic radiographic findings at 6 months after application of the final prosthesis.

Results

A total of 28 dentists answered the questionnaire. Among 924 implant cases, sinus membrane perforation occurred in 38 cases (4.1%). Among the 28 dentists, 26 dentists (92.9%) were satisfied or very satisfied with the CAS kit. In particular, 24 dentists (85.7%) reported that safety, cutting performance, and user-friendliness of the CAS drill were advantages of the CAS kit. However, 7 dentists (25%) did not routinely use the hydraulic lifter for sinus membrane elevation.

Table 1. Satisfaction with the CAS kit

Answer	General satisfaction	Cutting performance of the CAS drill	Bone carrier, bone condenser, and bone spreader	Hydraulic lifter for sinus membrane elevation
Very satisfied	11	8		3
Satisfied	15	15	15	12
Unsure	1	5	12	4
Dissatisfied	1		1	2
Total	28	28	28	21

Table 2. Advantages of the CAS kit

Answer	No. of dentists in agreement
The CAS drill (safety/cutting performance/user-friendliness)	24
Stopper (safety by drilling depth adjustment)	16
Hydraulic lifter (safe membrane elevation/user-friendliness)	11
The CAS drill (function of autogenous bone collection)	2

Conclusions

From the survey, it was shown that the respondents were generally satisfied with the CAS kit and that the cutting performance and safety of the drill component were considered strengths of the CAS kit.

Different Patterns of Bone Formation between Saline and Venous Blood Filling after Hydraulic Lifting of Sinus Membrane

Ki-Hyun Jeong

Scientific Poster, Osstem Meeting 2015

Purpose

The purpose of this randomized case-control clinical study was to evaluate implant survival and changes in residual alveolar bone height (RABH) after hydraulic sinus membrane elevation with saline as compared to venous blood. Instead of lateral approach, CAS kit (Osstem, Korea), which is well-known for its hydraulic sinus membrane elevation via crestal approach, is utilized in this study.

Materials & Methods

Patient selection

The study was approved by the Institutional Review Board of Hanyang University Hospital (HUH IRB 2012-06-014). A total of 40 Korean volunteers consecutively treated at 2 institutions (Division of Oral and Maxillofacial Surgery/Department of Dentistry, Hanyang University Hospital and Apsun Dental Hospital) were included in the study.

The patients were presented with edentulism in the posterior maxilla and a reduced RABH making the placement of implants with standard length longer than 8 mm impossible. None of these patients had systemic or local contraindications, including history of uncontrolled metabolic disorder, smoking habit, bruxism, or uncontrolled periodontal disease.

Surgical technique

In a patient with the posterior maxillary edentulism, the placement of dental implants (TS III CA, Osstem), sinus lift surgery via crestal approach by CAS kit. Immediately prior to implant placement, 3 ml of saline or the peripheral venous blood from a patient per an implant site was injected to support the elevated sinus membrane. No bone graft materials were added at any implant site. (Figs 1 & 2, Table 1).

Fig. 1. Crestal approach-sinus (CAS) kit (Osstem, Korea).

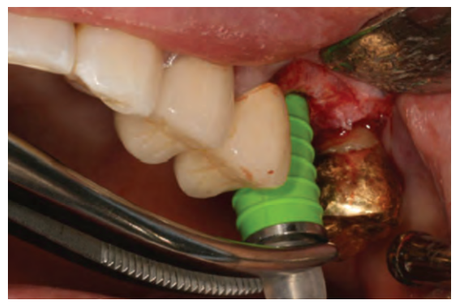
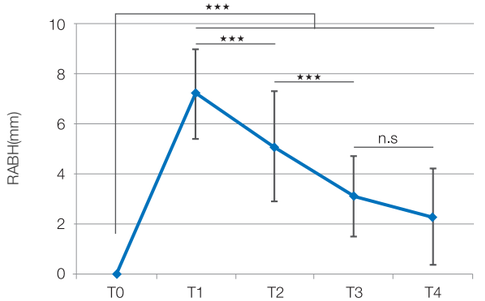


Fig. 2. Crestal approach for sinus lifting by hydraulic lifter, CAS kit.

Results

Table 1. Overview of dental implants used in this study

	Implant number	Location	Implant diameter(mm)	Implant length (mm)		
				8.5	10	11.5
Saline (20 patients)	22	Premolar	4.0	-	5	4
			4.5	1	-	-
		Molar	4.5	-	7	3
			5.0	-	2	-
Venous blood (20 patients)	23	Premolar	4.0	1	3	4
			4.5	-	1	-
		Molar	4.5	-	5	3
			5.0	-	6	-



	T0	T1	T2	T3	T4
RABH (mm)	6.8±1.2	14.1±2.5	11.9±2.9	10.0±1.8	9.1±2.1

Mean ±S.D.
*** $P < 0.001$ by Bonferroni test for multiple comparisons; n.s, not statistically significant RABH, residual alveolar bone height; T0, preoperative; T1, immediately postoperative; T2, postoperative 3 months; T3, postoperative 6 months; T4, postoperative 12 months

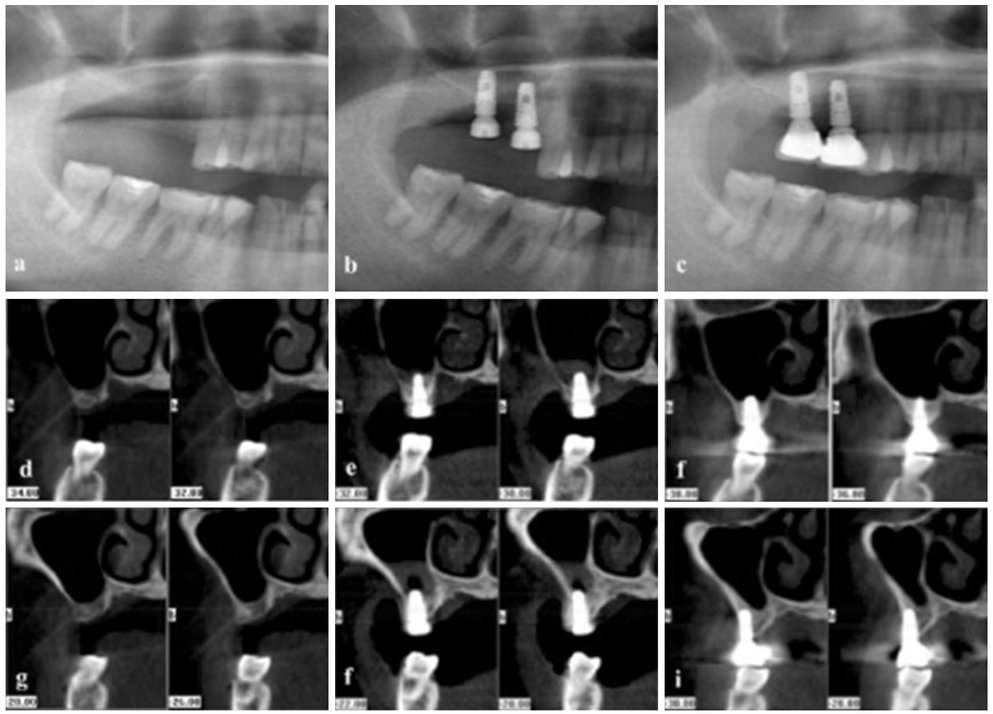


Fig. 3. Radiologic responses of the elevated sinus membrane after hydraulic lifting of sinus membrane without bone grafts.
Panoramic images at T0 (a), T1 (b), and T4 (c); Coronal CBCT images of the right maxillary second molar implant area at T0 (d), T1 (e), and T4 (f); Coronal CBCT images of the right maxillary first molar implant area at T0 (g), T1 (h), and T4 (i).

Table 2. Comparison of estimated gain of RABH

		T0	T1	T2	T3	T4
RABH (mm)	Saline group	6.4 ±1.1	14.3 ±2.7	12.1 ±2.8	9.8±1.8	8.1 ±2.1
	Blood group	7.2 ±1.1	13.8 ±2.4	11.3 ±2.9	10.2±1.9	9.8 ±2.2
	P	0.020**	0.285	0.207	0.264	0.013**

Conclusions

Within limitations of this study, it could be concluded that :

- In crestal approach for sinus lift surgery, hydraulic sinus membrane elevation with saline or patient's own venous blood filling could be an alternative technique to bone grafting in cases where primary stability of implants with standard length was obtained.
- In spite of 'tent-pole' effect of implants, drooping of sinus membrane continued up to T4 after sinus membrane elevation with no bone grafts, however, this phenomenon is found to be stabilized at T3.
- Compared to saline, patient's own venous blood could be better filler to support and maintain the compartment created between the elevated sinus membrane and sinus floor at T4.

Various Ridge Splitting Technique using the ESSET KIT

Kyung-Tae Park, Sang-Yeup Lee, Yong-Jin Kim

Scientic Poster, Osstem Meeting 2015

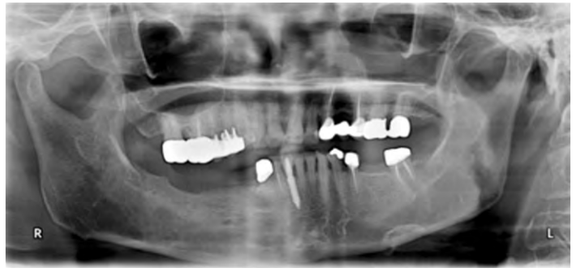
Introduction

The ridge splitting technique aims the creation of new implant bed by longitudinal osteotomy of the alveolar bone. The buccal cortex is repositioned laterally by greenstick fracture, and the space between the buccal and lingual cortical plates fills with new bone, thus enlarging the width of the alveolar ridge. The traditional ridge splitting method using chisel lacks precision and it is difficult to control. In addition, the chisel method lacks initial implant stability.

Case Report 1

Without Vertical Osteotomy

Age / Sex : 80Y / F
Chief complain : Ill fitting mandibular RPD
Past medical history : HTN
Past dental history : Mandibular RPD treatment 10 years ago
Treatment plan : Ridge splitting with the ESSET kit & simultaneous implant placement



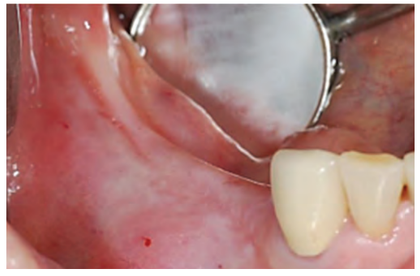


Fig. 1~2. Pre-operative radiograph & Intra-oral view.

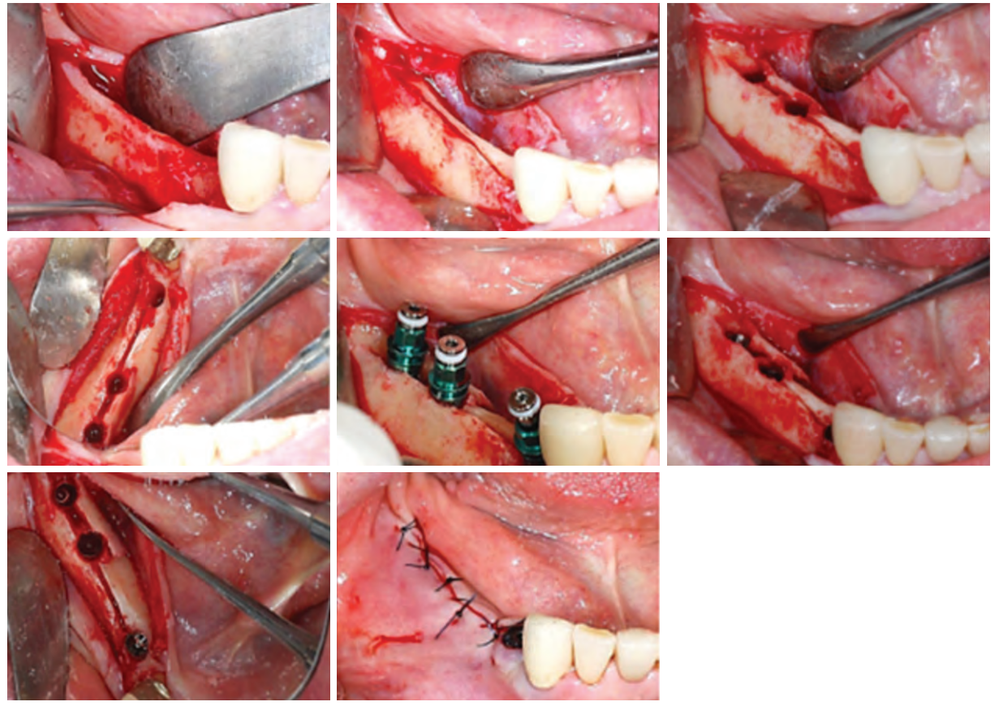


Fig 3~10. Intra-operative view. Full thickness mucoperiosteal flap was elevated with crestal incision and one vertical incision on the buccal side of the residual alveolar ridge distally.

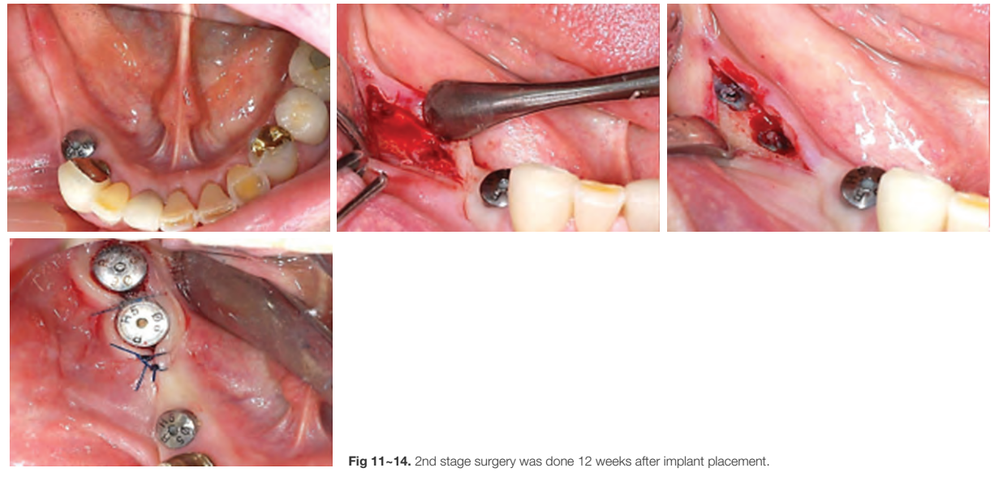


Fig 11~14. 2nd stage surgery was done 12 weeks after implant placement.

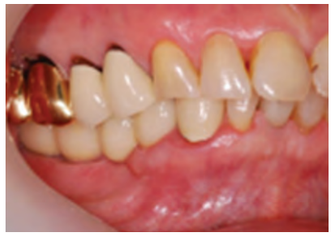
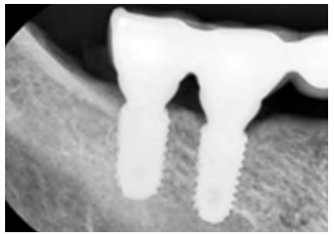



Fig 15–16. Final prosthesis was placed 14 weeks after implant placement. Gingival condition around implants looks healthy. Marginal bone level implants is well maintained until POD 1 year and expanded alveolar bone volume around implants is also well maintained.

Case Report 2

Single Vertical Osteotomy

Age / Sex : 36Y / F
Chief complain : Partial edentulism
Past medical history : N / S
Past dental history : Mandibular RPD treatment 5 years ago
Treatment plan : Ridge splitting with the ESSET kit & simultaneous implant placement

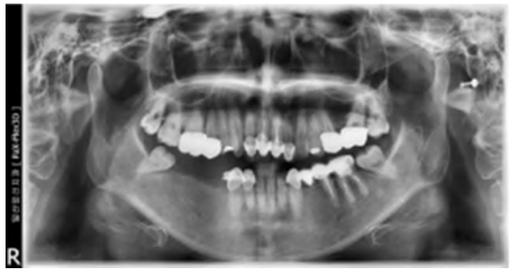
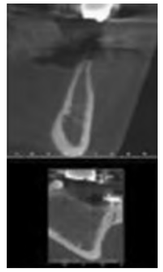
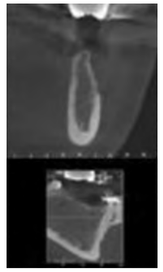
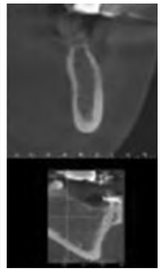





Fig 1~2. Pre-operative radiograph

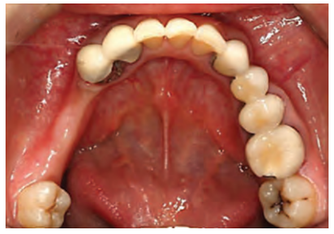
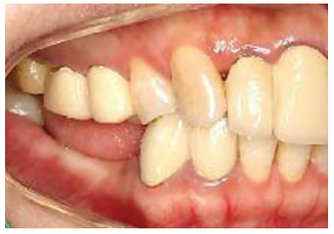
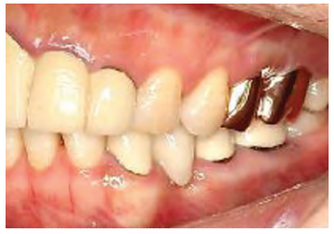
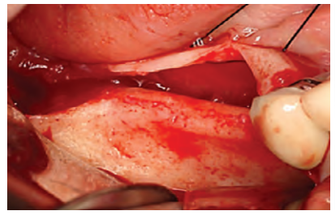
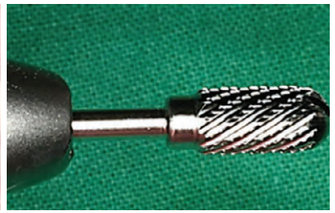
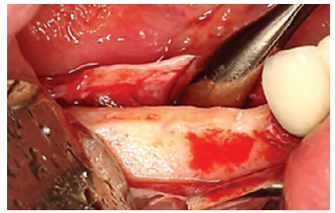
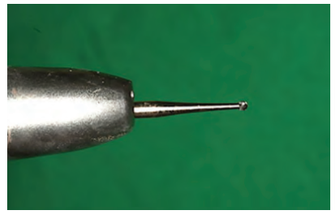
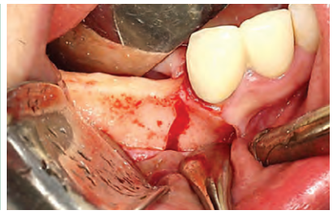
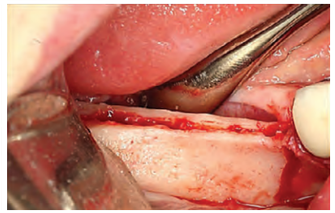
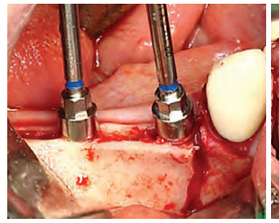




Fig 3~5. Intra-operative view

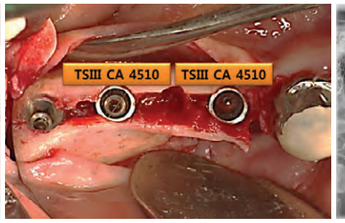
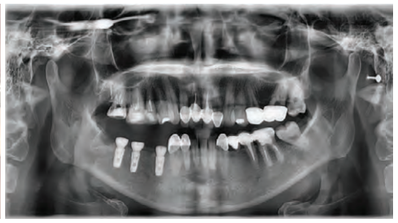



Fig 6~14. Intra-operative view.
Full thickness mucoperiosteal flap was elevated with one vertical incision on the mesial side. Vertical alveolar bone reduction was performed with a crestal remover until horizontal bone volume of at least 3mm~4mm was secured.

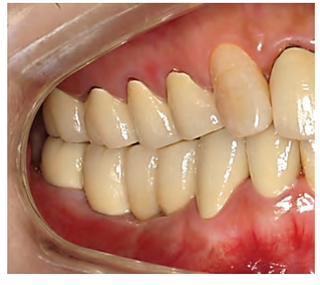
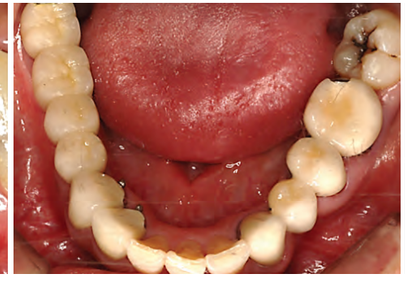
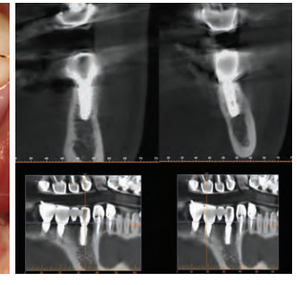




Fig 15~18. Final prosthesis was placed 14 weeks after implant placement. Horizontally increased alveolar bone volume and keratinized gingiva around prosthesis are well maintained. In the CT scan, the sufficient amount of expansion around both the first premolar and the first molar areas is seen.

Case Report 3

Double Vertical Osteotomy

Age / Sex : 66Y / F
Chief complain : Ill fitting mandibular RPD
Past medical history : HTN, DM
Past dental history : Mandibular RPD treatment 8 years ago
Treatment plan : Ridge splitting with ESSET kit & simultaneous implant placement

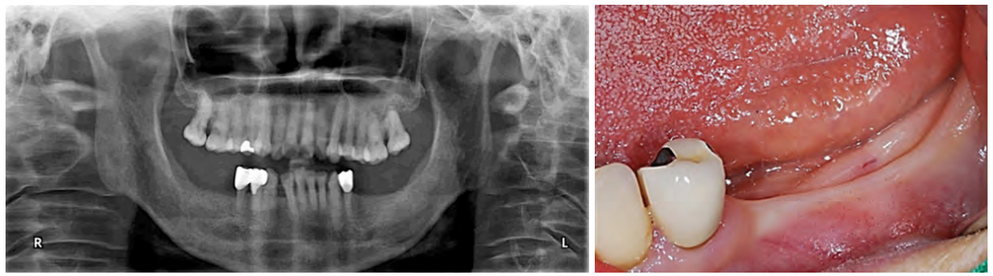
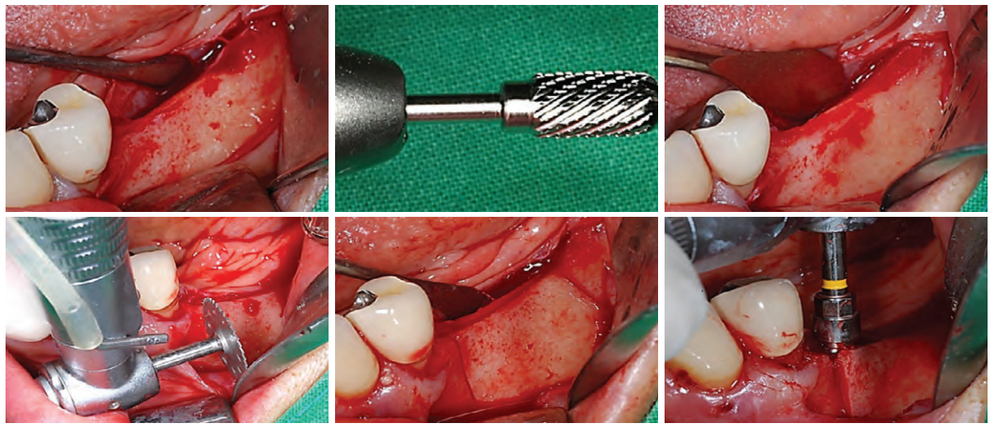


Fig 1~2. Pre-operative radiograph & Intra-oral view



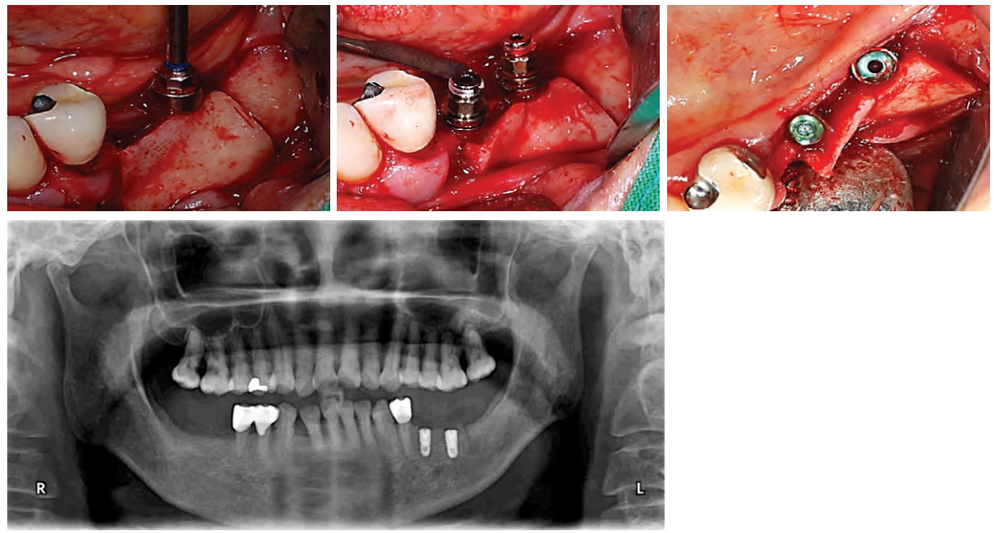


Fig 3~12. Intra-operative view

Conclusions

Our case reports demonstrated that the new alveolar ridge splitting technique using ESSET KIT is simple & effective in longitudinal expansion of the alveolar ridge in cases of alveolar atrophy and knife-shaped ridges. These results indicate that the new alveolar ridge splitting technique using ESSET KIT is a valid procedure for augmentation of atrophic and knife-shaped alveolar ridges and could shorten the overall treatment period in comparison to traditional ridge splitting method.
Also, In certain situations, conventional ESSET kit technique could be modified for more alveolar bone expansion. In cases where enough amount of expansion is needed, one or two vertical osteotomy can be made.

A case of osseointegrated implant removal by using EFR(Easy Fixture Removal) KIT

Yong Seok, Cho

Scientific Poster, Osstem Meeting 2015

Introduction

When an implant should inevitably be removed due to clinical failure, a trephine drill was primarily and commonly used in the past. Nevertheless, this treatment method had disadvantages such as high difficulty, risk of inferior alveolar nerve damage and bone loss around the implants.
In order to avoid these disadvantages, this clinical case seeks a method to remove implants easily by using the EFR KIT which is a tool created to remove failed implants noninvasively.

Materials & Methods

Case 1

A 41-year-old female patient had an implant inserted about 6 months back at a considerable distance from the mandibular canal. She complained, however, of a pain in the left angle and buccal region, and a paroxysmal pain when a healing abutment was touched. Although the cause was unknown, the implant had to be removed since there was no other method.

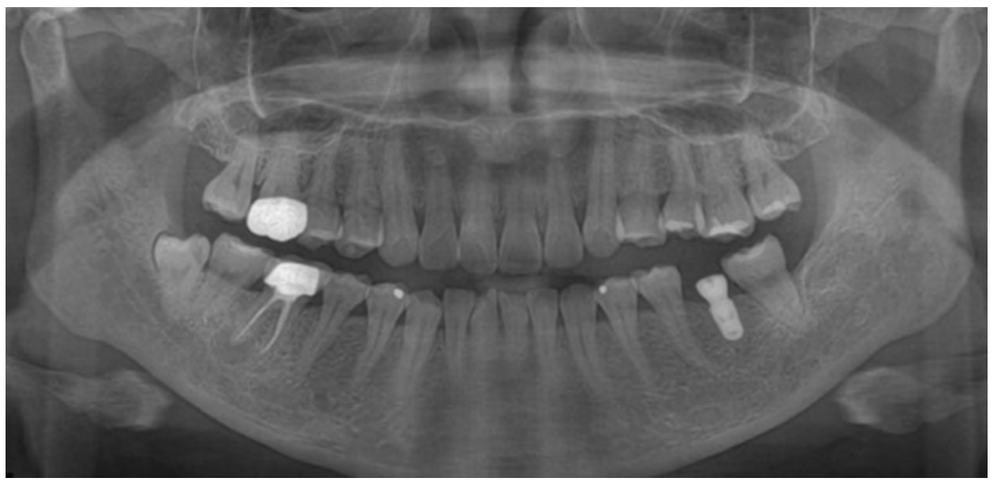


Fig 1. Osstem TSIII SA 4.5x7.0mm implant placed at #36.

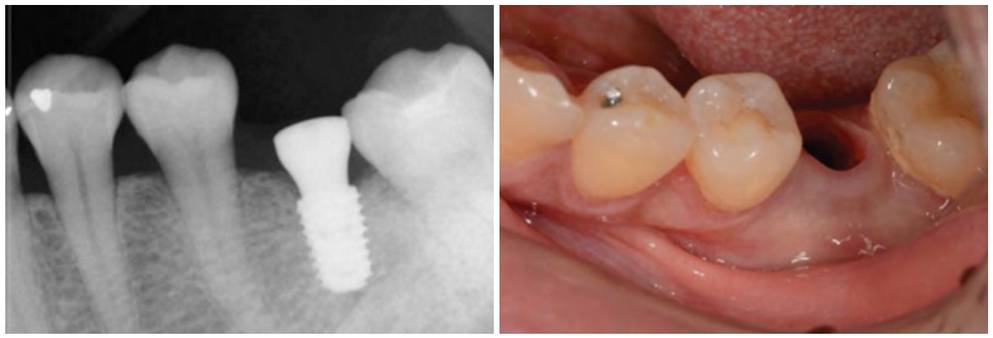


Fig 2. Successfully osseointegrated implant after 5months 2weeks(Left). After removing healing abutment(Right).

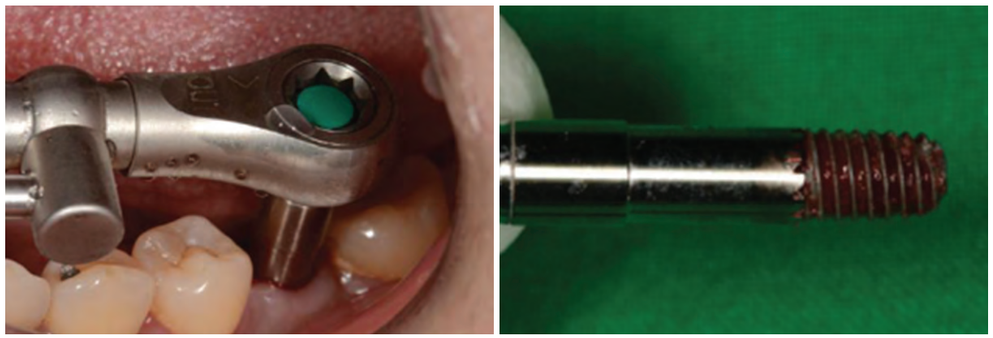


Fig 3. Tried to remove implant using remover body(Left). Removed implant at 200Ncm(Right).

Case 2

A 30-year-old female patient visited the dental clinic for aesthetic problems and mobility of her left maxillary central incisor which was inserted seven years ago. The shape and color of the implant crown were not harmonized.
Labial soft tissue and hard tissue defects were observed. On the radiograph, fracture of Zirconia abutment, which was connected to the well osseointegrated implant, was observed. In order to remove the existing implant, the EFT KIT was used to remove the implant noninvaisively.

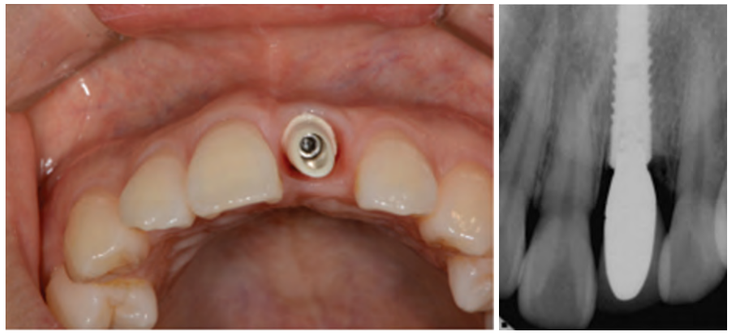


Fig 4. On the radiograth, fracture of zirconia abutment was observed.(Left), Zirconia abutment mobility was observed when removing crown(Right).

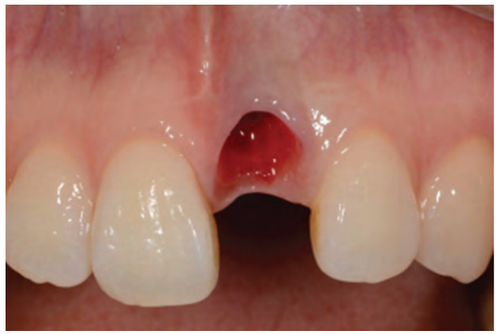


Fig 5. Observed deficit of soft tissue and hard tissue because of placing implant which is close to labial.

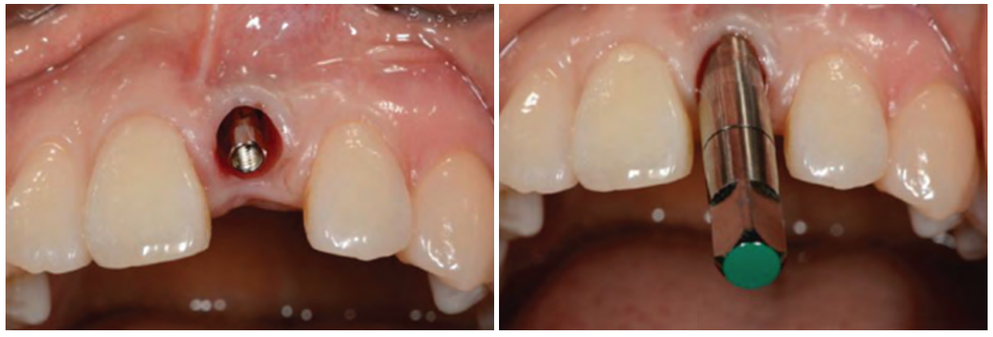


Fig 6. F4.0/4.5 Remover body tightened remover screw by counterclockwise(Upper). Removed implant(Lower).

Results

Case 1

The torque wrench, which can reach up to 400Ncm, was used to turn the remover body in the opposite direction (counterclockwise). After attempting the implant removal, the implant was turned at about 200Ncm.

Case 2

The torque wrench was used to remove the implant by turning the remover body counterclockwise. The implant was removed at close to 400Ncm.

Conclusions

The EFR KIT is proven to be a very useful tool to retrieve implant. It can easily remove even completely osseointegrated implant without damaging the surrounding tissues.

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